

# Modelo de classificação de Sentimentos em *Tweets* usando Programação Genética

Airton Bordin Junior

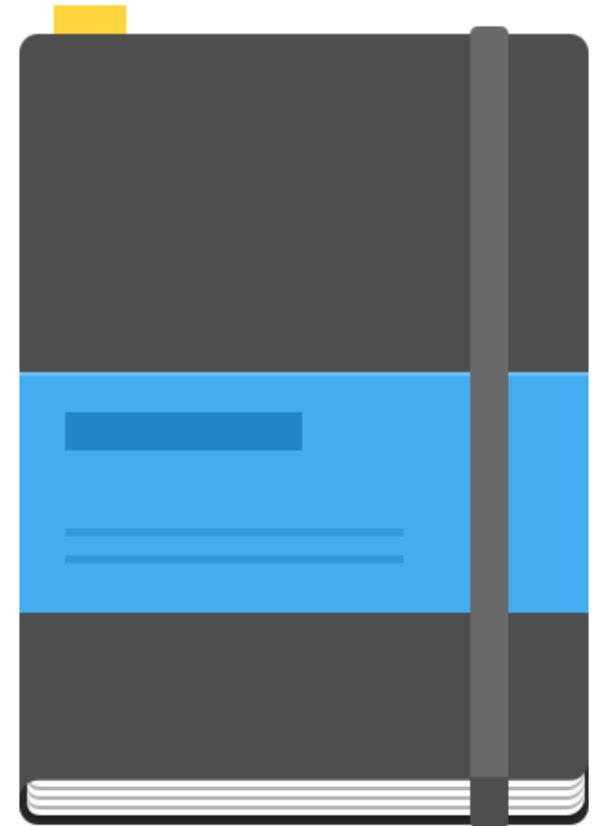
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Mestrado em Ciência da Computação

Universidade Federal de Goiás (UFG) - Instituto de Informática – Junho/2017

# Programação

- Introdução
- Heurísticas e Metaheurísticas
- Algoritmos evolucionários
- Análise de Sentimentos
- Programação Genética
- Referências





# Introdução

- Problemas computacionais

Tratáveis

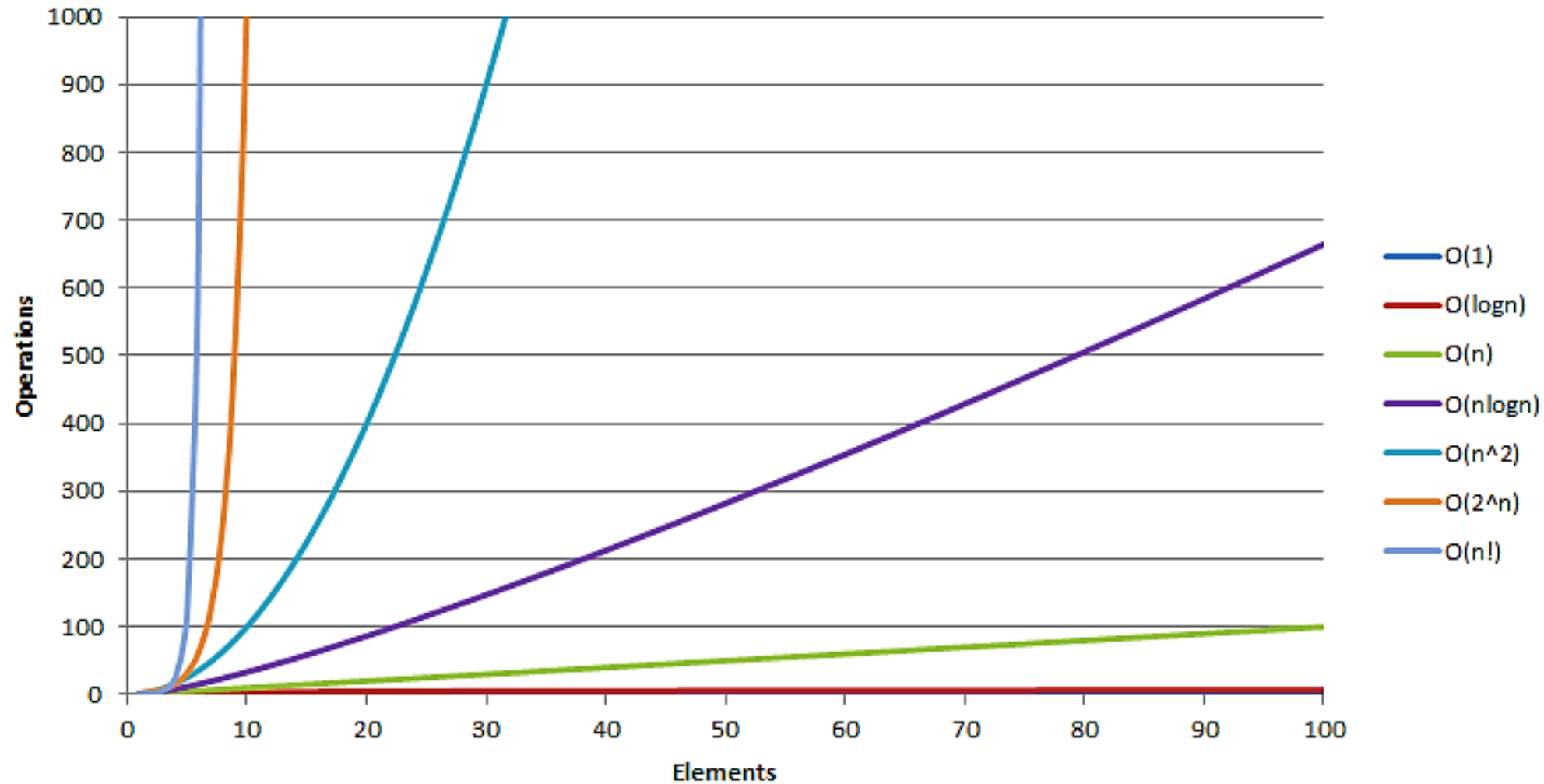
- Polinomiais
- Algoritmos determinísticos

Intratáveis

- Não polinomiais
- Algoritmos não determinísticos
- Solução determinística inviável
- Sem solução em tempo hábil



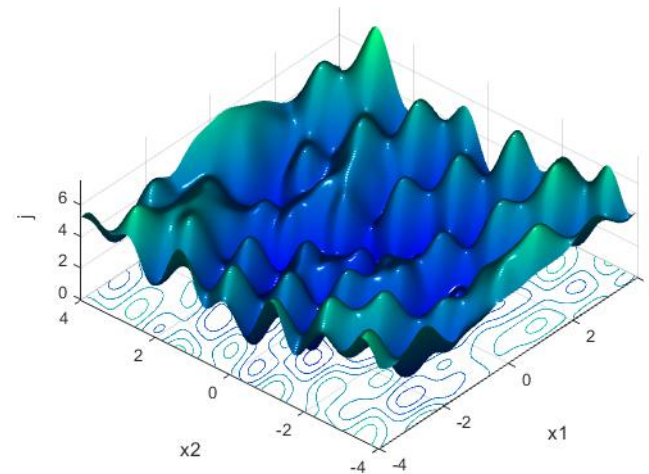
# Introdução





# Heurística

- Impraticabilidade de encontrar/calcular a melhor resposta para problemas não polinomiais;
- Desafio: produzir, em tempo reduzido, soluções tão próximas quanto possíveis da solução ótima.

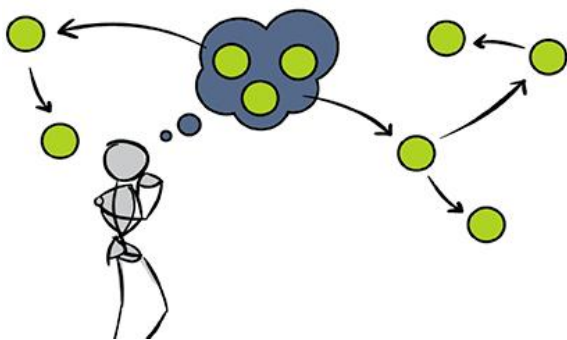




# Metaheurística

## Propriedades e características das metaheurísticas

[SALIBA, 2010]



Estratégias que guiam o processo de busca;

Exploração eficiente do espaço de busca - soluções ótimas ou quase ótimas;

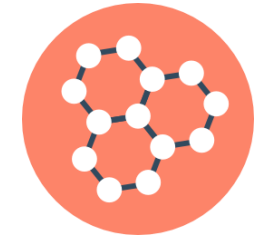
De simples procedimentos de busca local a complexos processos de aprendizado;

Aproximados e usualmente não determinísticos;

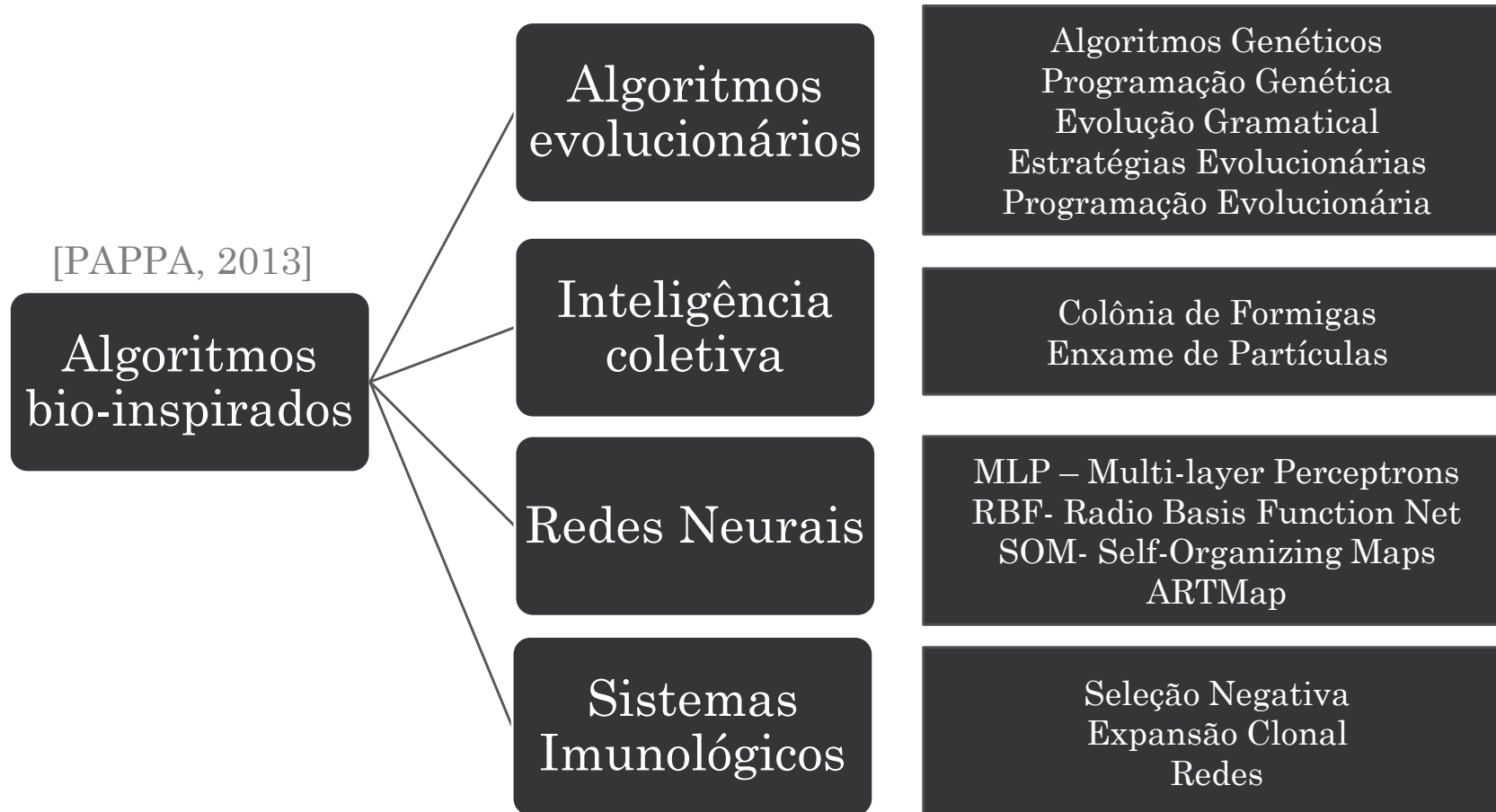
Podem incorporar mecanismos para evitar ficar presos em áreas confinadas do espaço de busca;

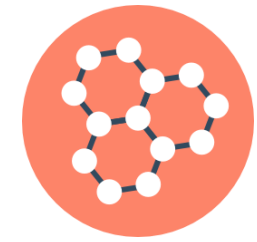
Não são específicas para um determinado problema;

Podem usar um conhecimento específico do problema na forma de heurísticas que são controladas por uma estratégia de nível superior.

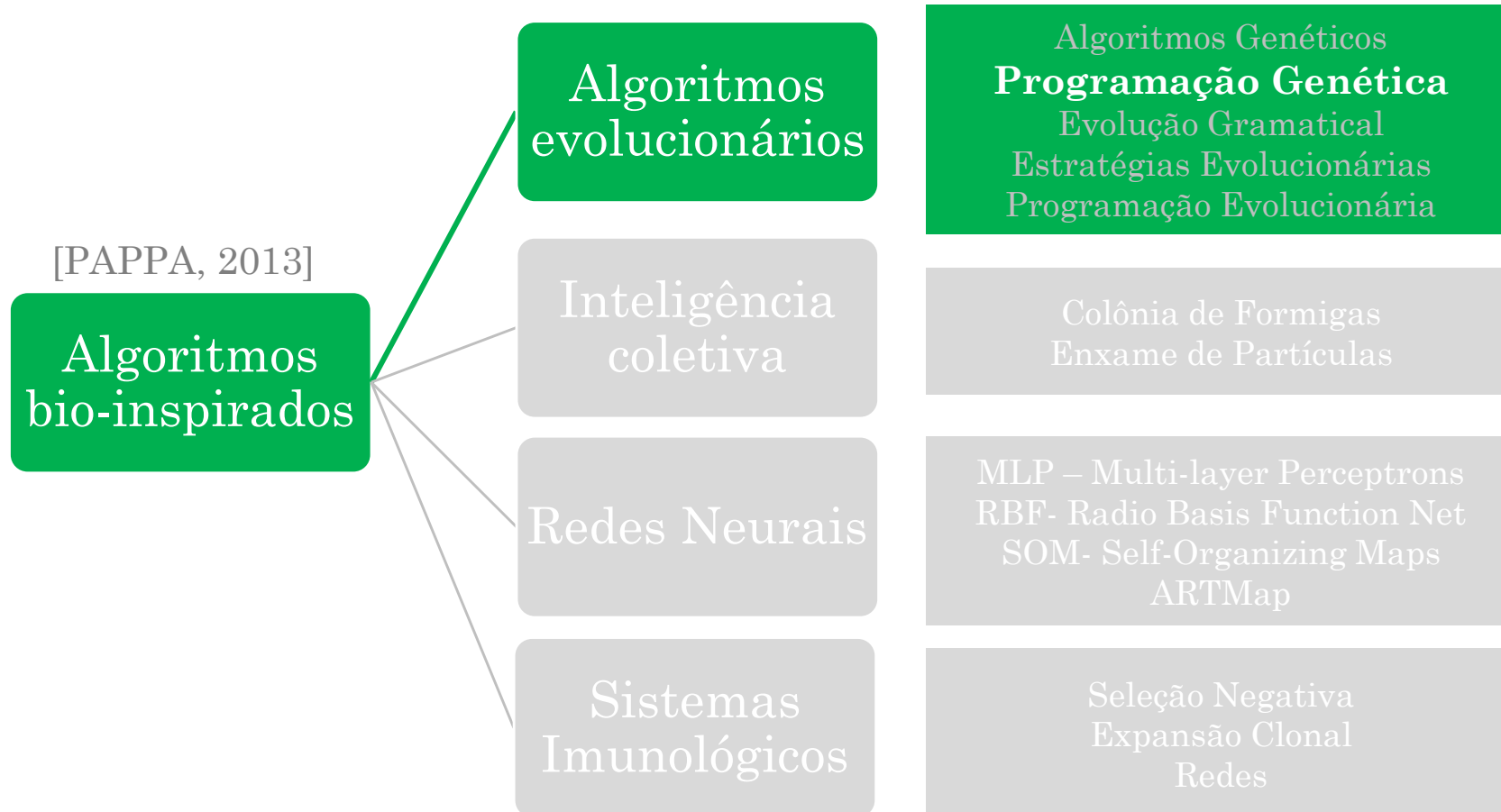


# Algoritmos bio-inspirados

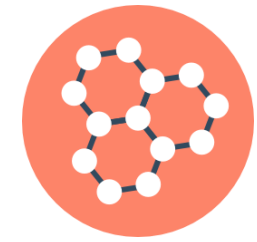




# Algoritmos bio-inspirados

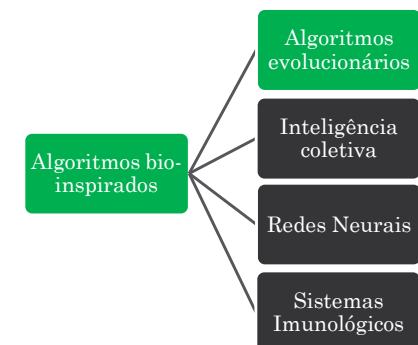
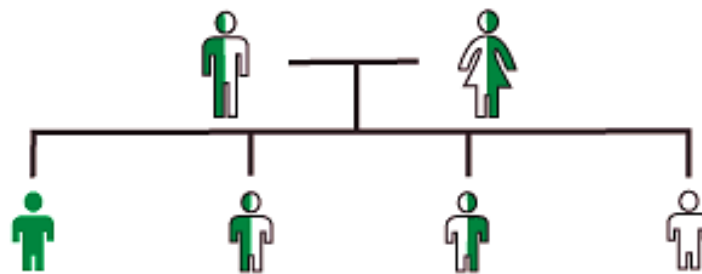


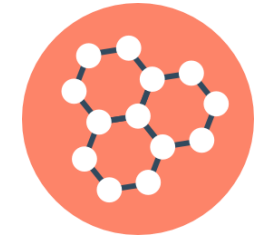




# Algoritmos evolucionários

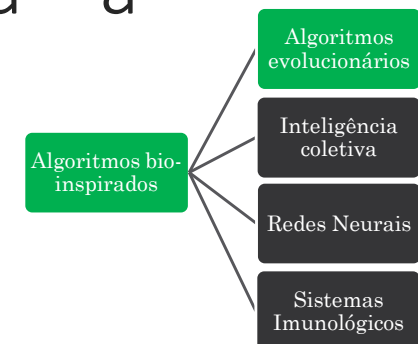
- Inspirados na teoria de evolução de Darwin;
- Evolução: mudança das características (genéticas) de uma população de uma geração para a próxima
  - Mutação dos genes;
  - Recombinação dos genes dos pais.





# Algoritmos evolucionários

- Evolução é caracterizada basicamente por um processo constituído de 3 passos [VON ZUBEN, 2005]
  1. Reprodução com herança genética;
  2. Introdução de variação aleatória em uma população de indivíduos;
  3. Aplicação da “seleção natural” para a produção da próxima geração.



# Análise de Sentimentos



# Análise de sentimentos

- Também chamado de Mineração de Opiniões;
- Estudo de opiniões que expressam/implicam um sentimento positivo/negativo;
- Opiniões e sentimentos subjetivos (não factuais)
- Nomenclaturas utilizadas
  - Orientação Semântica;
  - Polaridade.



# Análise de sentimentos

- Motivação:
  - Aumento na quantidade de pessoas com acesso à Internet;
  - Consequente aumento de conteúdo gerado pelas pessoas;
  - Analisar/minerar os sentimentos/opiniões, identificar o sentimento das pessoas sobre determinado assunto/produto/contexto
    - Pode ser muito valioso para empresas, governos, etc.



# Análise de sentimentos

YouTube

LinkedIn

skype™

amazon

facebook

ebay

Baidu 百度

Google

bing

# Análise de sentimentos



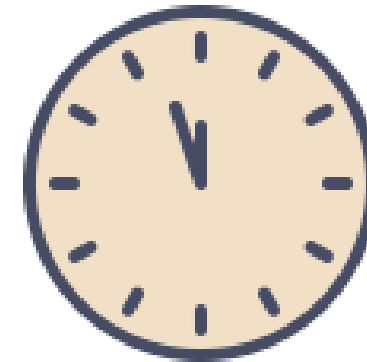
460 mil *tweets*



400 horas de vídeo



510 mil comentários



Por minuto



# Análise de sentimentos

- Definição importante [LIU, 2012]

Opinião (quíntupla)

$(e_i, a_{ij}, s_{ijkl}, h_k, t_l)$

(Entity, Aspect, Sentiment, Holder, Time)





# Análise de sentimentos

- **Léxico de sentimentos**
  - Conjunto de palavras e frases com suas orientações semânticas.
- **Principais abordagens para criação/expansão do Léxico**
  - Manual;
  - Baseada em dicionário;
  - Baseada em Corpus.



# Análise de sentimentos

- Abordagem manual
  - Por sua característica inerente, é limitada ao esforço de especialistas humanos;
  - Mais lenta que outras abordagens;
  - Raramente é utilizada como única forma de criação/expansão do Léxico.





# Análise de sentimentos

- Baseada em dicionário
  - Usa um dicionário como base
    - *WordNet*, por exemplo.
  - Por meio de palavras-semente com polaridade conhecida, faz um processamento de forma a construir um dicionário léxico descobrindo a orientação semântica das palavras;
  - Diversas abordagens foram desenvolvidas
    - Sinônimos, antônimos, sufixos, prefixos;
    - Pointwise Mutual Information (PMI);
    - Distância em grafos;
    - *Label Propagation*, etc.



# Análise de sentimentos

- Baseada em *Corpus*
  - Descobrir a orientação semântica das palavras no domínio do *Corpus*;
  - Adaptação de um Léxico de propósito geral para um domínio específico;
  - Palavras podem ter polaridade diferente em contextos distintos
    - Exemplo: câncer
      - Em um domínio técnico, a palavra pode não ter uma orientação semântica negativa e, sim, neutra.

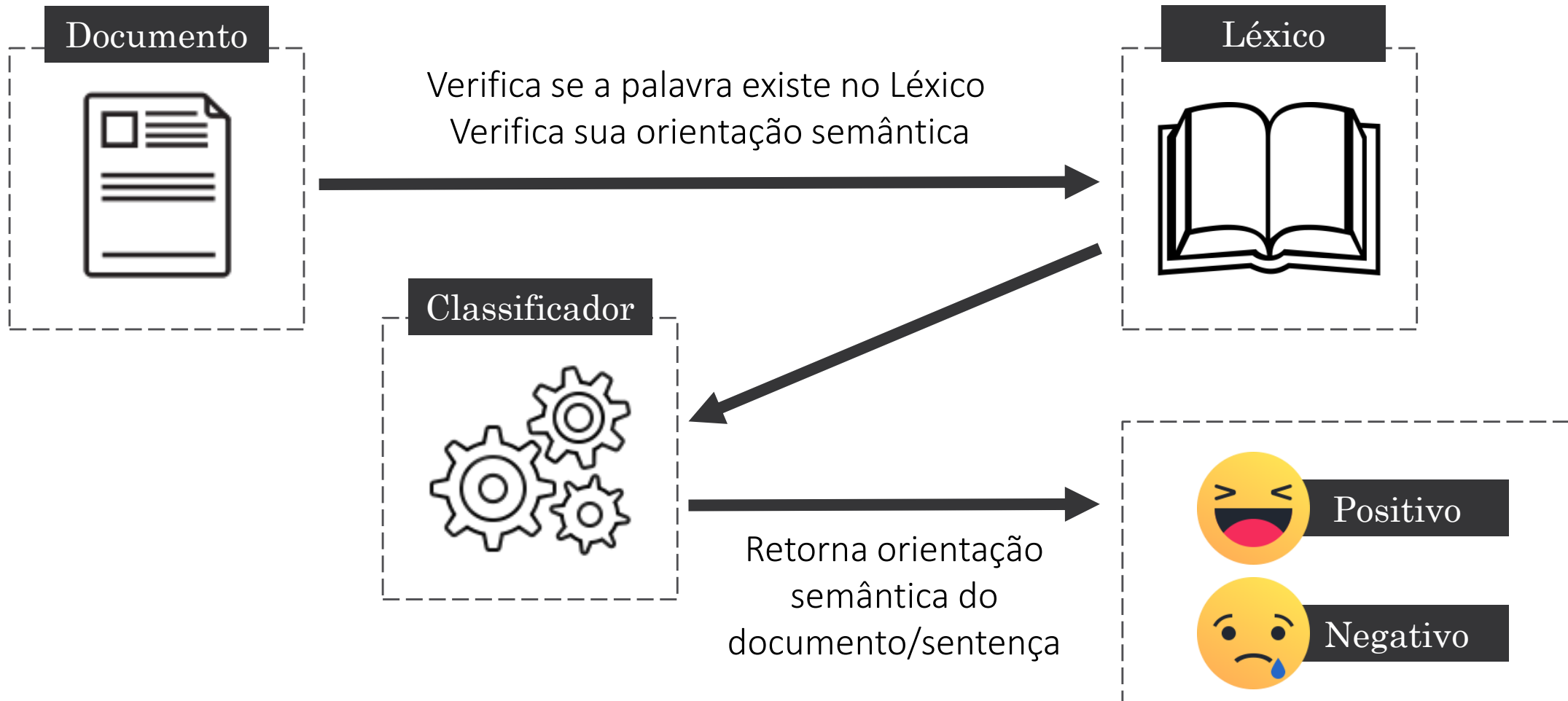


# Análise de sentimentos

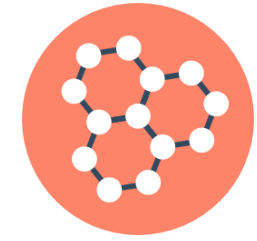
- Léxicos
  - Como podemos observar, Léxicos são extremamente importantes para o correto funcionamento da Análise de Sentimentos;
  - O classificador consulta o Léxico para processar o documento/sentença e retornar a orientação semântica do mesmo;
  - Léxicos incorretos levam a resultados inconsistentes.



# Análise de sentimentos



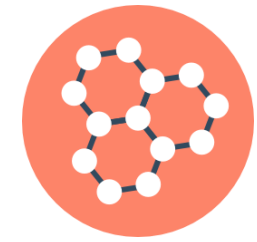
# Programação Genética



# Programação genética

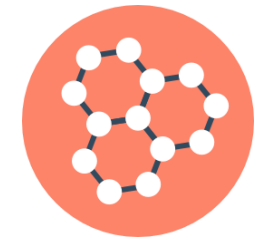
*Como computadores podem resolver problemas sem serem explicitamente programados para tal?*





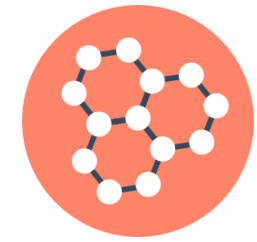
# Programação genética

- *Como computadores podem resolver problemas sem serem explicitamente programados para tal?*
  - Evolução de programas computacionais
    - Analogias com mecanismos utilizados da evolução biológica natural;
  - Criação (automatizada) de um programa que resolve um determinado problema.



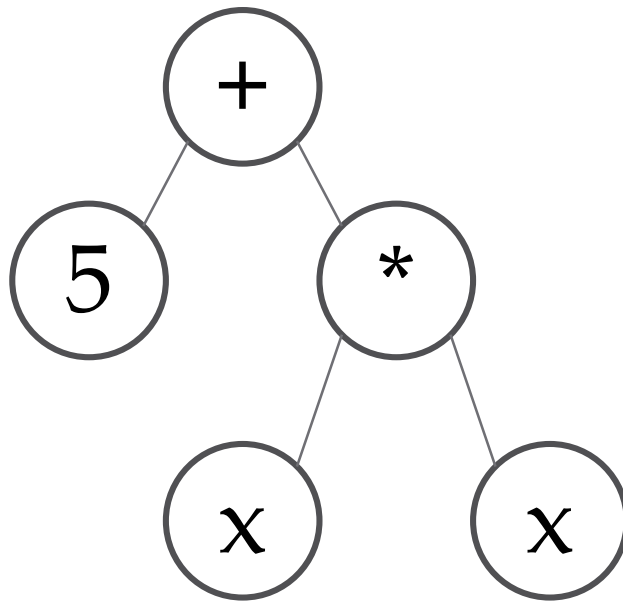
# Programação genética

- *Como computadores podem resolver problemas sem serem explicitamente programados para tal?*
  - Pode ser vista como uma extensão dos AG's
    - Indivíduos são programas;
    - Espaço de busca são todos os possíveis programas.

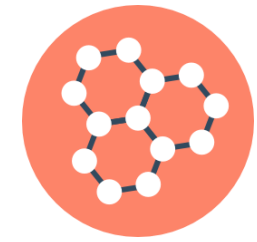


# Programação genética

- Programas?
  - Funções matemáticas, por exemplo;
  - Representação feita por meio de árvores.

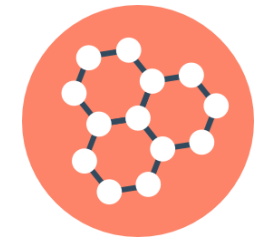


Exemplo programa:  
 $x^2+5$



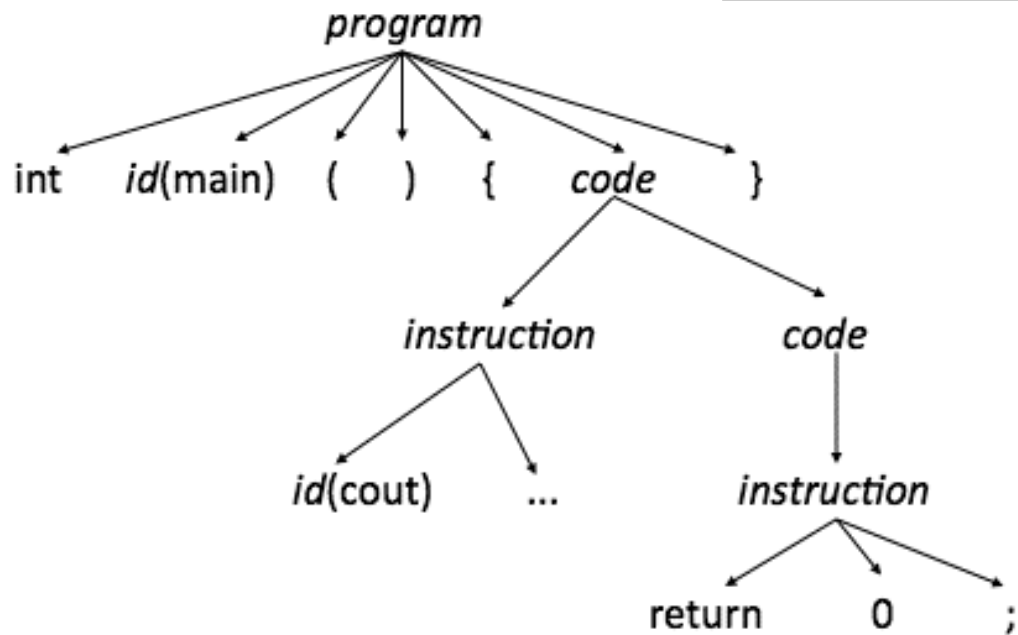
# Programação genética

- Intimamente ligada à ideia de programação funcional (sequência de aplicação de funções a argumentos)
  - Independentemente da linguagem, todos os programas podem ser vistos como uma sequência de aplicações de funções a argumentos;
  - Compiladores usam esse fato para traduzir um programa em uma árvore sintática.

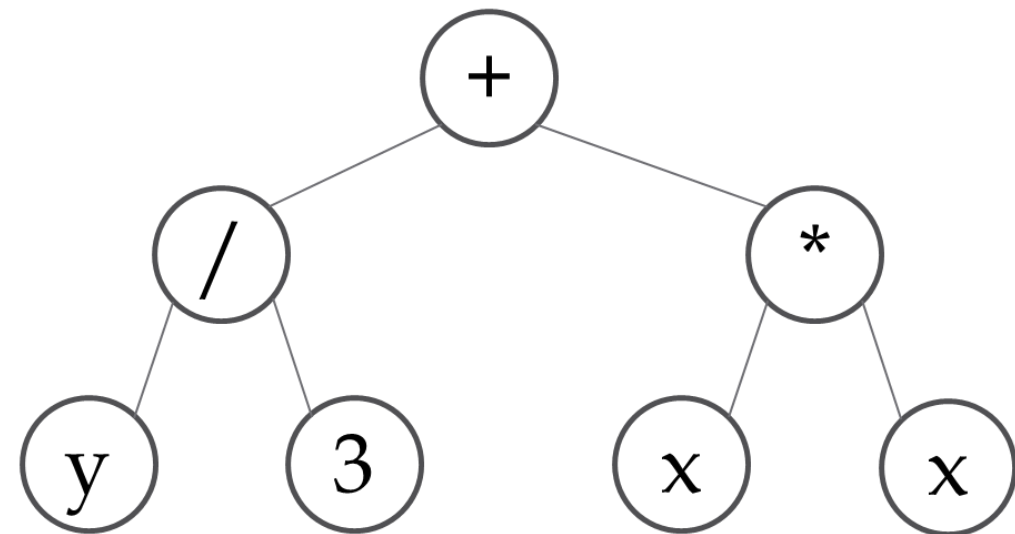


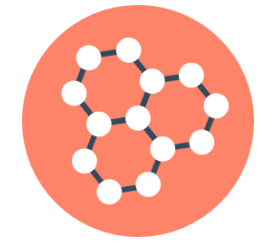
# Programação genética

Árvore sintática



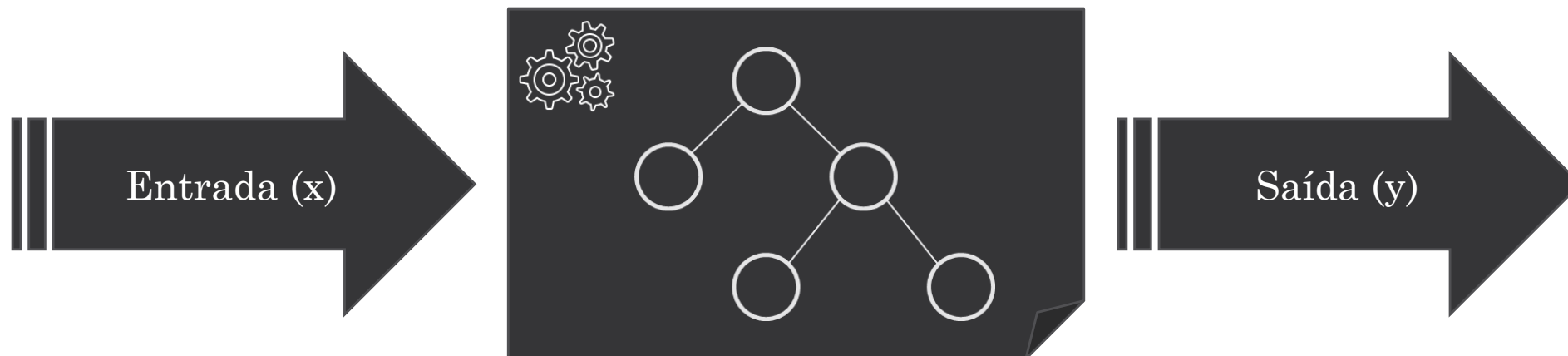
Expressão matemática

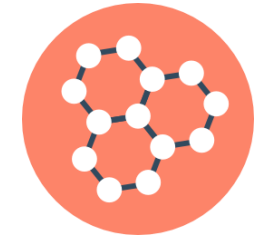




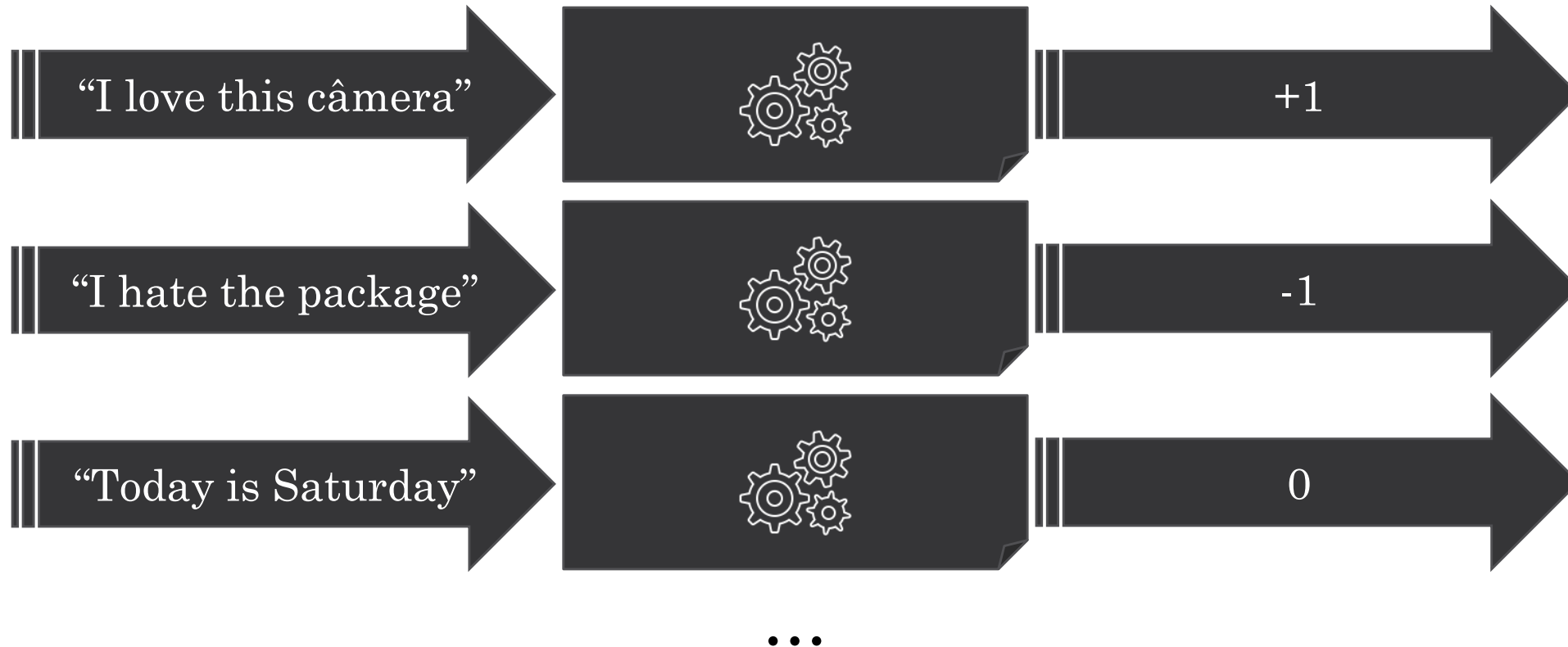
# Programação genética

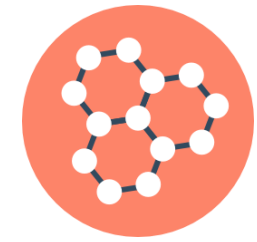
- Modelo M
  - Relaciona um vetor de entrada com um vetor de saída;
  - Assume-se que o modelo é desconhecido.





# Programação genética

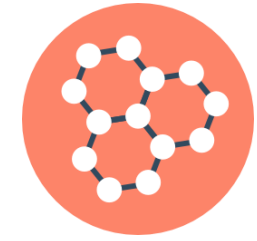




# Programação genética

- Passos para o correto funcionamento [KOZA, 1992]
  1. Determinar conjunto de terminais;
  2. Determinar conjunto de funções;
  3. Determinar função *fitness*;
  4. Determinar parâmetros e variáveis para controle da execução;
  5. Determinar critério de parada.





# Programação genética

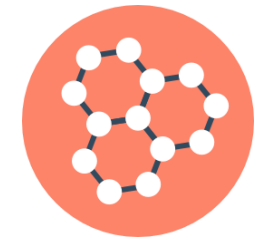
- Library DEAP - Distributed Evolutionary Algorithms in Python;
- Computer Vision and Systems Laboratory (CVSL) at Université Laval, in Quebec city, Canada;



Félix-Antoine Fortin, François-Michel De Rainville, Marc-André Gardner, Marc Parizeau and Christian Gagné, “DEAP: Evolutionary Algorithms Made Easy”, Journal of Machine Learning Research, pp. 2171-2175, no 13, jul 2012.

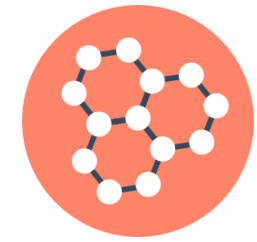


François-Michel De Rainville, Félix-Antoine Fortin, Marc-André Gardner, Marc Parizeau and Christian Gagné, “DEAP: A Python Framework for Evolutionary Algorithms”, Companion proc. of the Genetic and Evolutionary Computation Conference (GECCO 2012), July 2012.



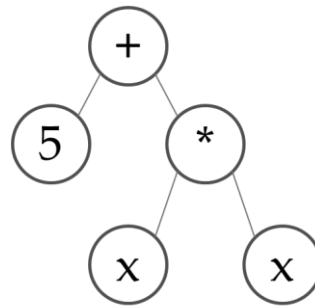
# Programação genética

- Criação da população
  - Cria uma população de forma randômica;
  - Profundidade máxima definida por parâmetro;
- Principais métodos
  - Full;
  - Grow;
  - Ramped half-and-half.

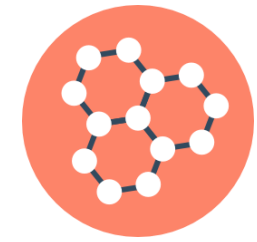


# Programação genética

- Criação da população
  - Método Grow
    - Respeita o critério de profundidade máxima da árvore;
    - Escolhe aleatoriamente entre funções e terminais em qualquer nível da árvore, podendo criar estruturas irregulares.

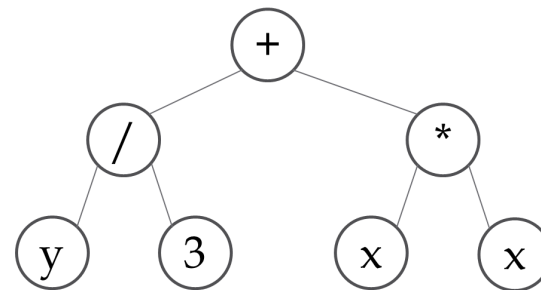


```
toolbox.register("expr", gp.genGrow, pset=pset, min_=1, max_=7)
```

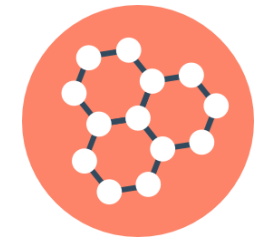


# Programação genética

- Criação da população
  - Método Full
    - Árvores com a profundidade máxima;
    - Escolhe aleatoriamente somente funções, até que um nó de profundidade máxima seja atingido, aí então escolhendo somente terminais.

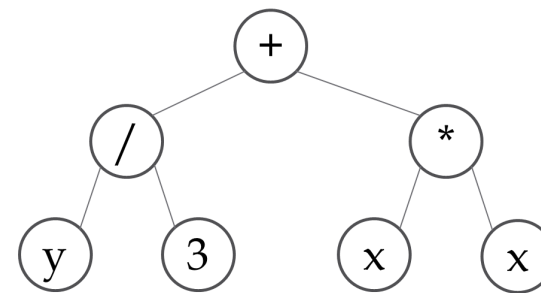
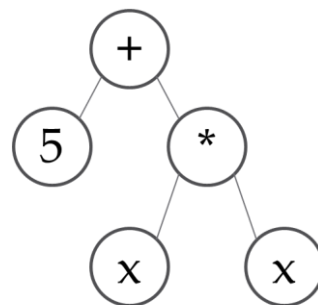


```
toolbox.register("expr", gp.genFull, pset=pset, min_=1, max_=7)
```

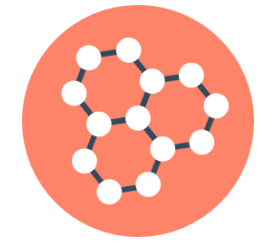


# Programação genética

- Criação da população
  - Método Ramped half-and-half
    - Utiliza o método Grow e Full;
    - Gera um número igual de árvores para cada profundidade;
    - 50% utilizará o método full e 50% o método Grow.

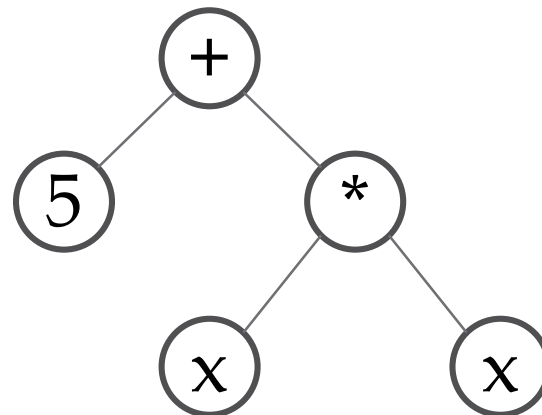


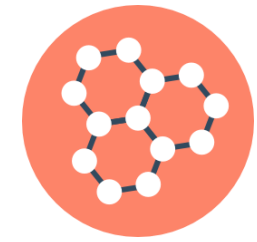
```
toolbox.register("expr", gp.genHalfAndHalf, pset=pset, min_=1, max_=7)
```



# Programação genética

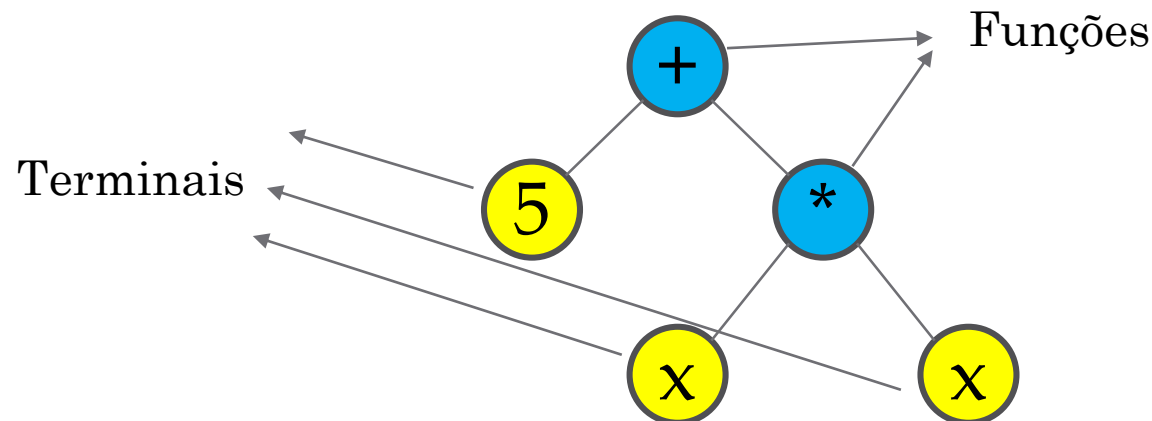
- Funções e terminais
  - **Funções:** funções aritméticas (+, -, /, \*), funções booleanas, funções matemáticas, etc;
  - **Terminais:** constantes numéricas, dados externos, variáveis.

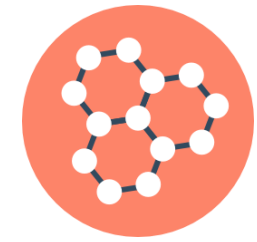




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# Programação genética

- Funções e terminais

```
pset.addPrimitive(operator.add, [float, float], float)
pset.addPrimitive(operator.sub, [float, float], float)
pset.addPrimitive(operator.mul, [float, float], float)
pset.addPrimitive(protectedDiv, [float, float], float)
pset.addPrimitive(math.cos, [float], float)
pset.addPrimitive(math.sin, [float], float)
```

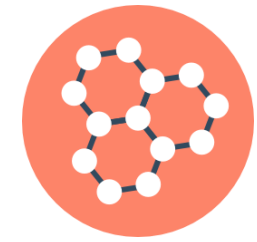
```
pset.addPrimitive(protectedLog, [float], float)
pset.addPrimitive(invertSignal, [float], float)
```

```
pset.addPrimitive(positiveHashtags, [str], float)
pset.addPrimitive(negativeHashtags, [str], float)
pset.addPrimitive(polaritySum, [str], float)
```

```
pset.addEphemeralConstant("r", lambda: float(random.randint(-1, 1)), float)
```

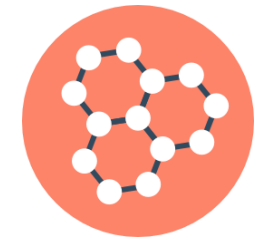






# Programação genética

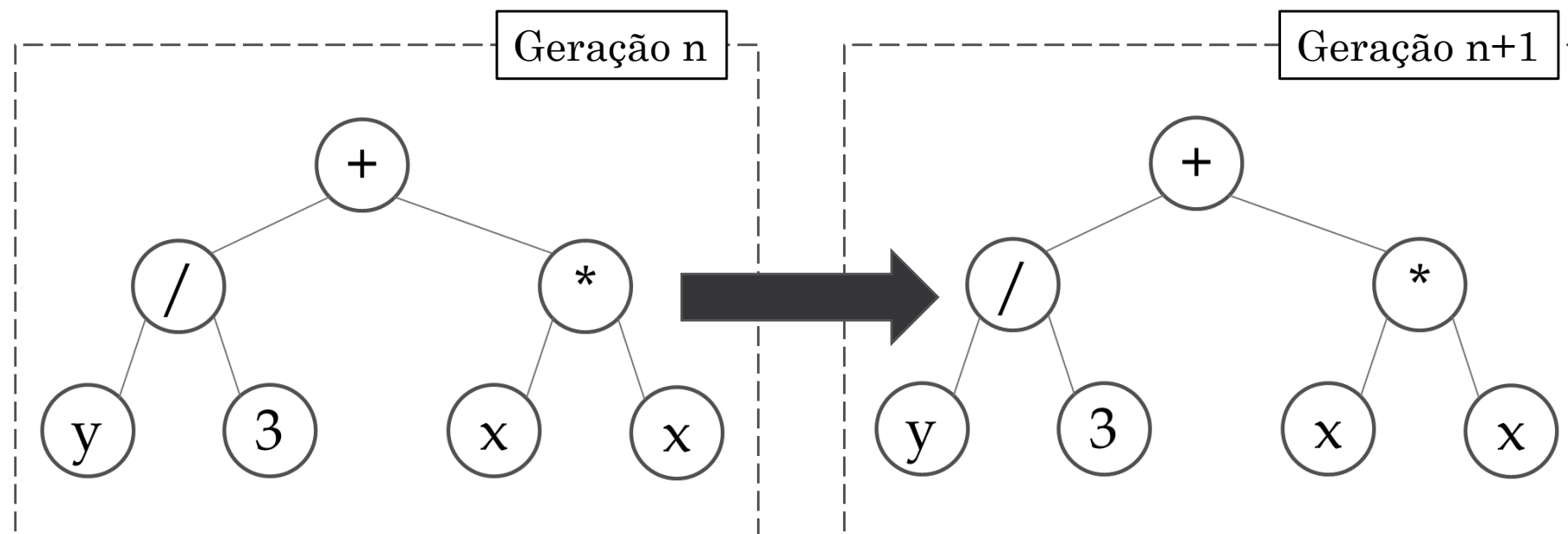
- Operadores genéticos
  - Reprodução;
  - Crossover;
  - Mutação;
  - Permutação;
  - Edição;
  - Encapsulamento;
  - Destruição.

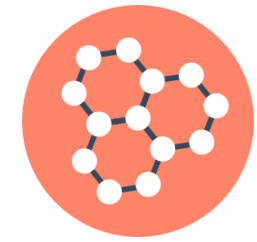


# Operadores genéticos

- Reprodução

- Um indivíduo com uma bom valor após função de avaliação (*fitness*) é escolhido;
- É feita uma cópida idêntica do indivíduo para a próxima geração.

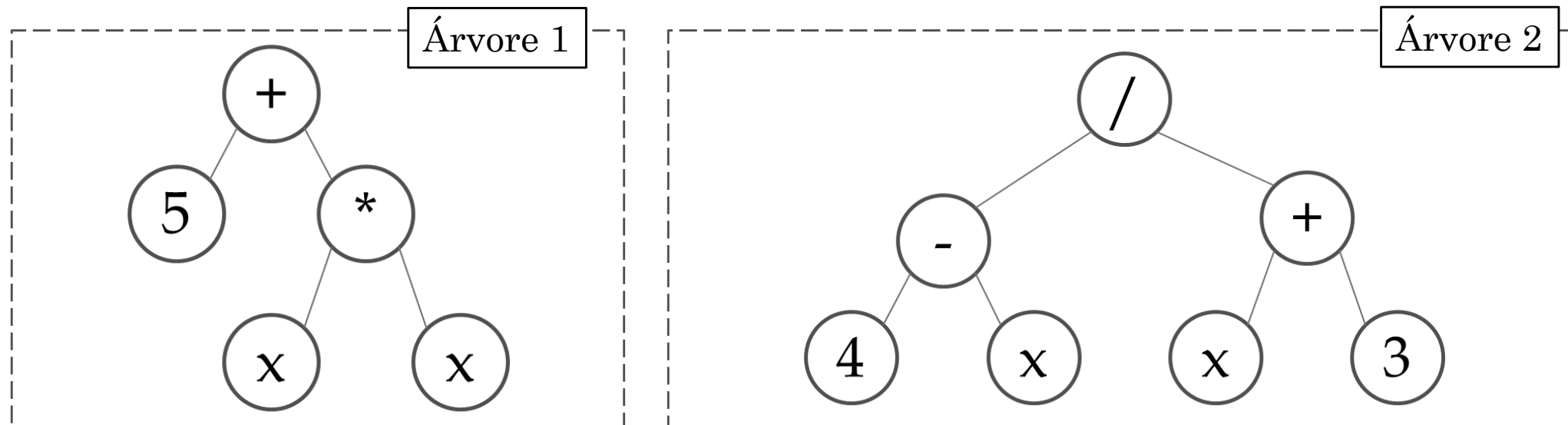




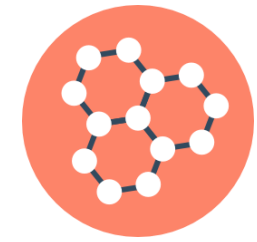
# Operadores genéticos

- Crossover

- Troca entre partes dos indivíduos selecionados;
- Partes escolhidas de forma aleatória nas duas árvores.



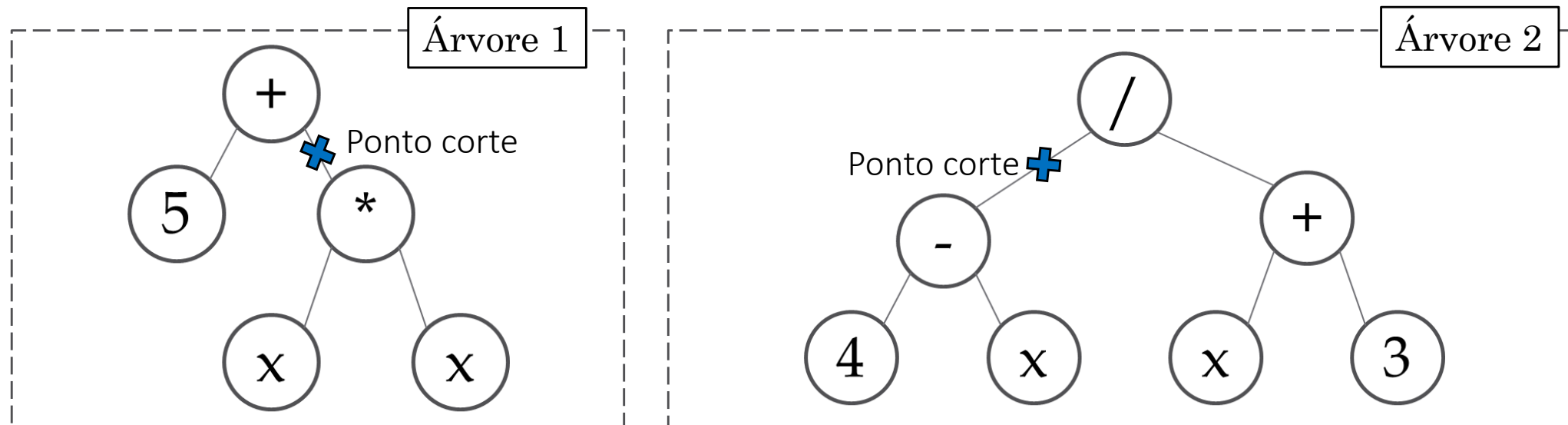
```
toolbox.register("mate", gp.cxOnePoint)
```



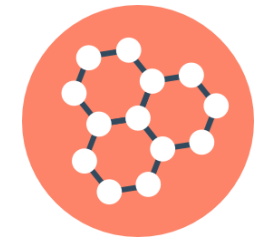
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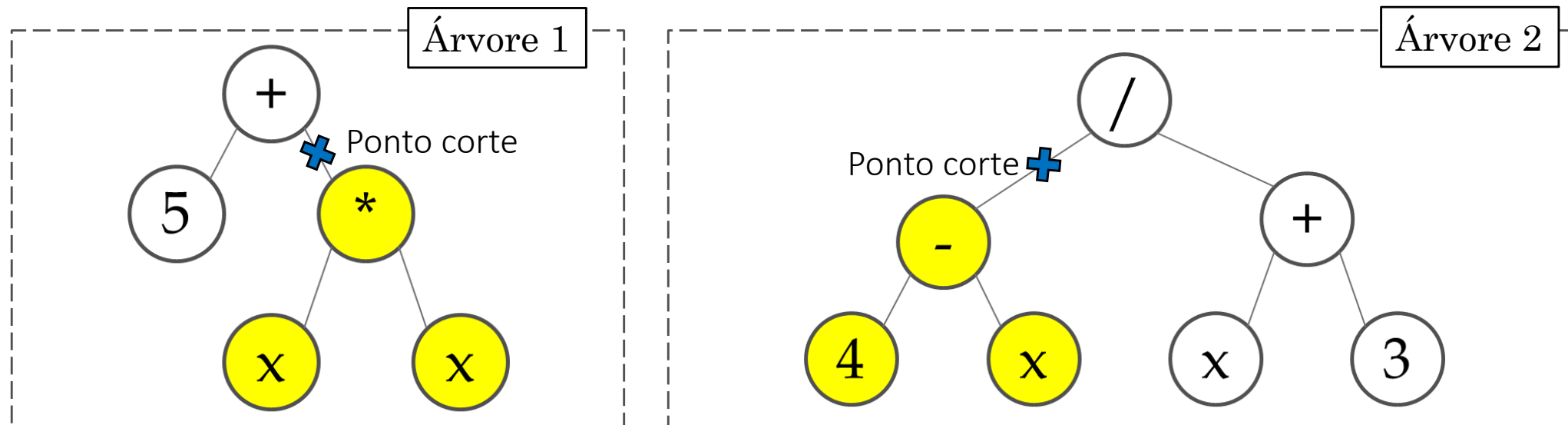
```
toolbox.register("mate", gp.cxOnePoint)
```



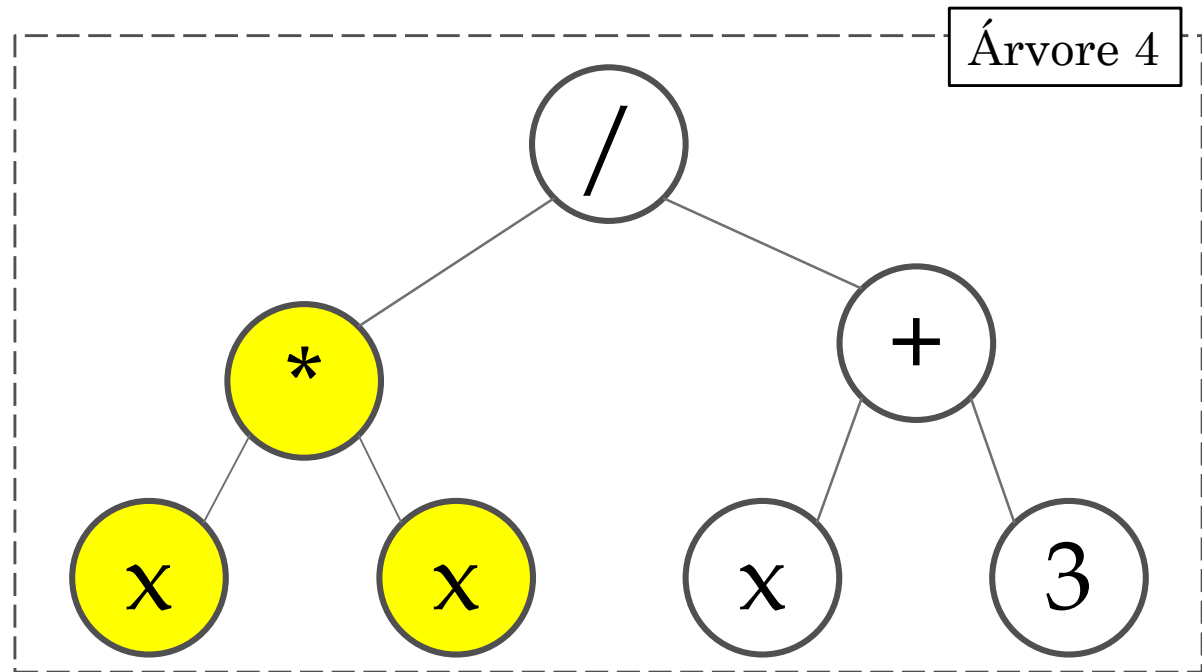
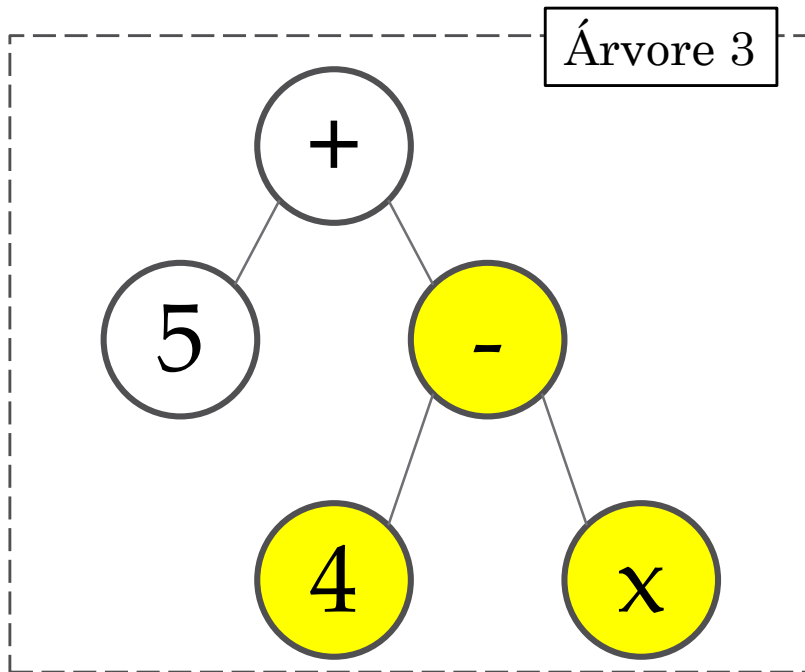
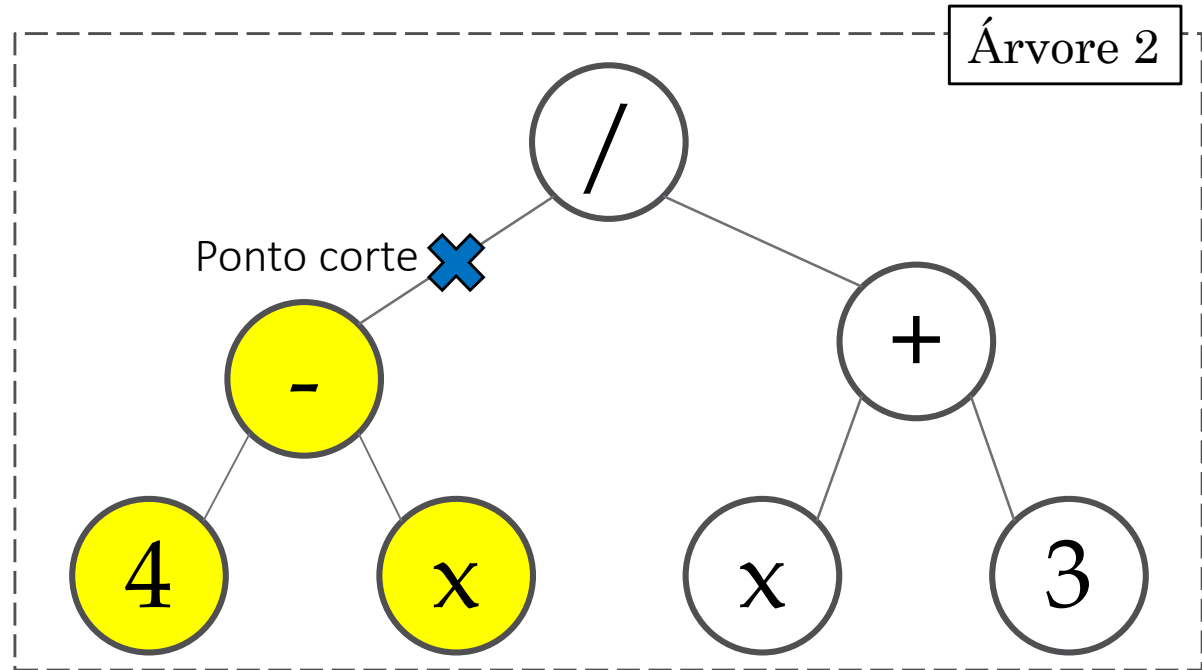
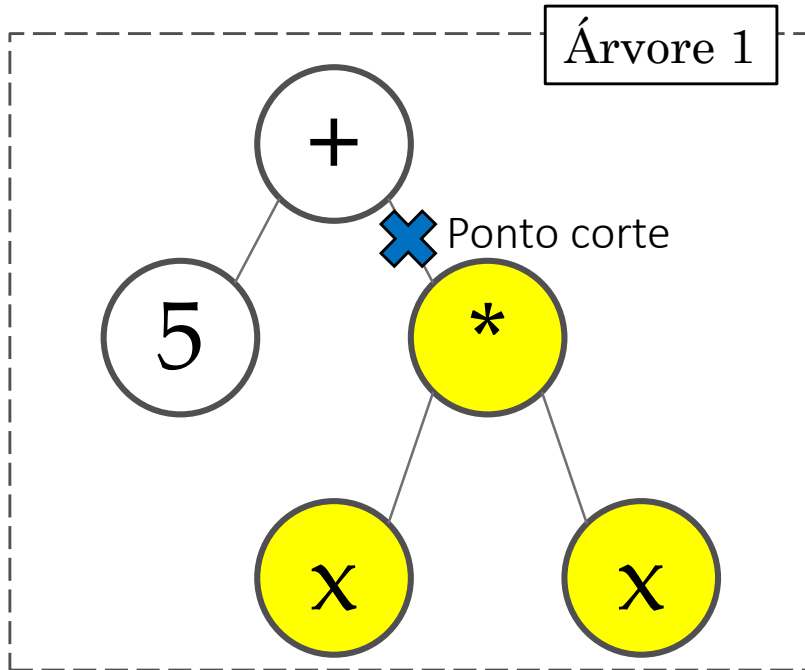
# Operadores genéticos

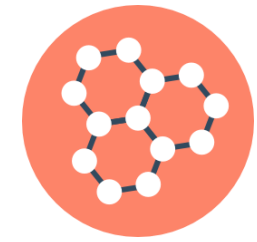
- Crossover

- Troca entre partes dos indivíduos selecionados;
- Partes escolhidas de forma aleatória nas duas árvores.



```
toolbox.register("mate", gp.cxOnePoint)
```

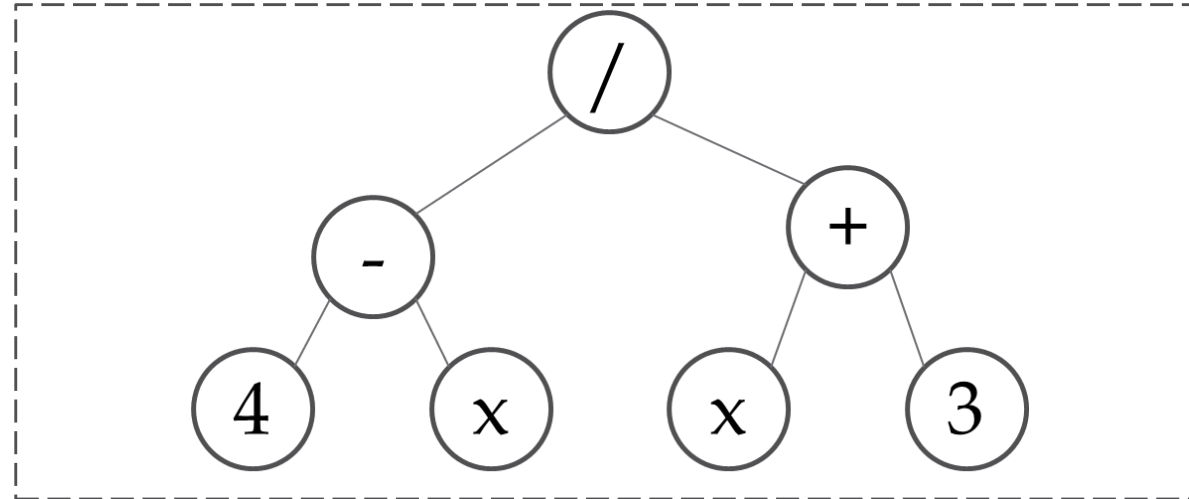




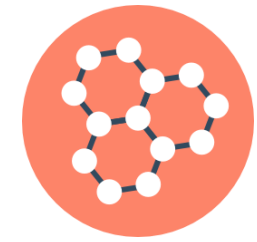
# Operadores genéticos

- Mutaç o

- Mudana aleat ria em um dos n s da  rvore;
- Adiciona diversidade na populao.



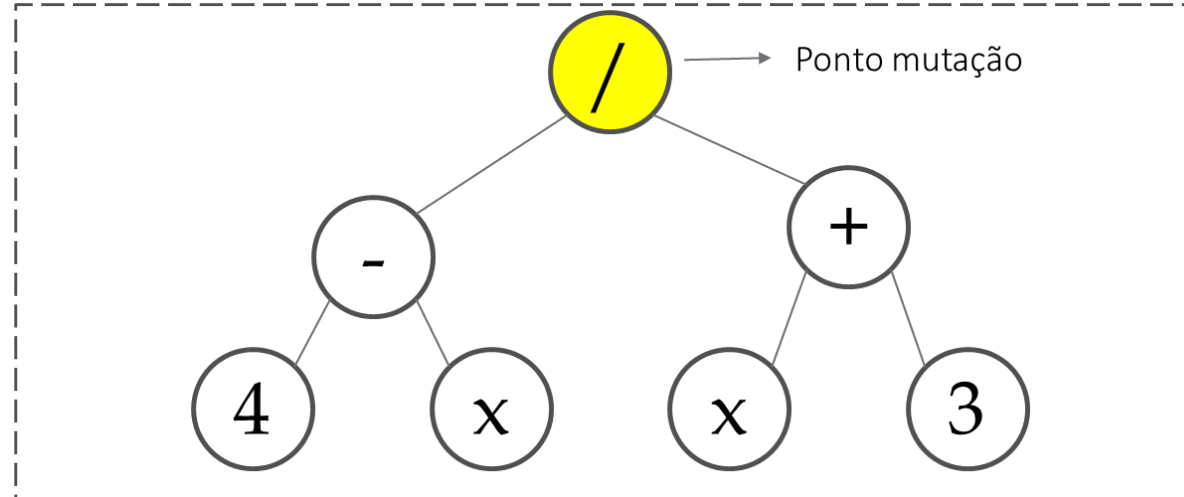
```
toolbox.register("mutate", gp.mutUniform, expr=toolbox.expr_mut, pset=p)
```



# Operadores genéticos

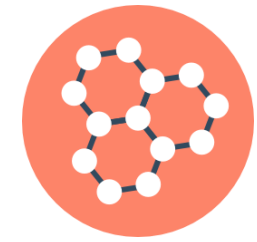
- Mutaç o

- Mudana aleat ria em um dos n s da  rvore;
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```
toolbox.register("mutate", gp.mutUniform, expr=toolbox.expr_mut, pset=p)
```

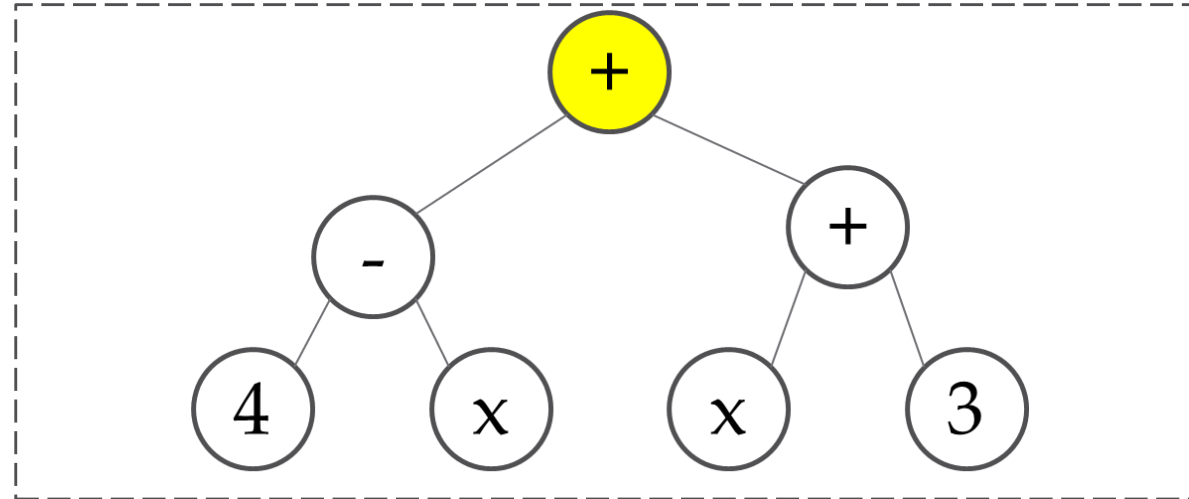




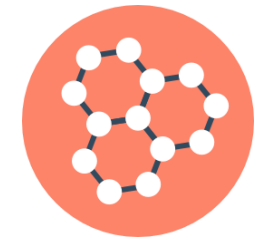
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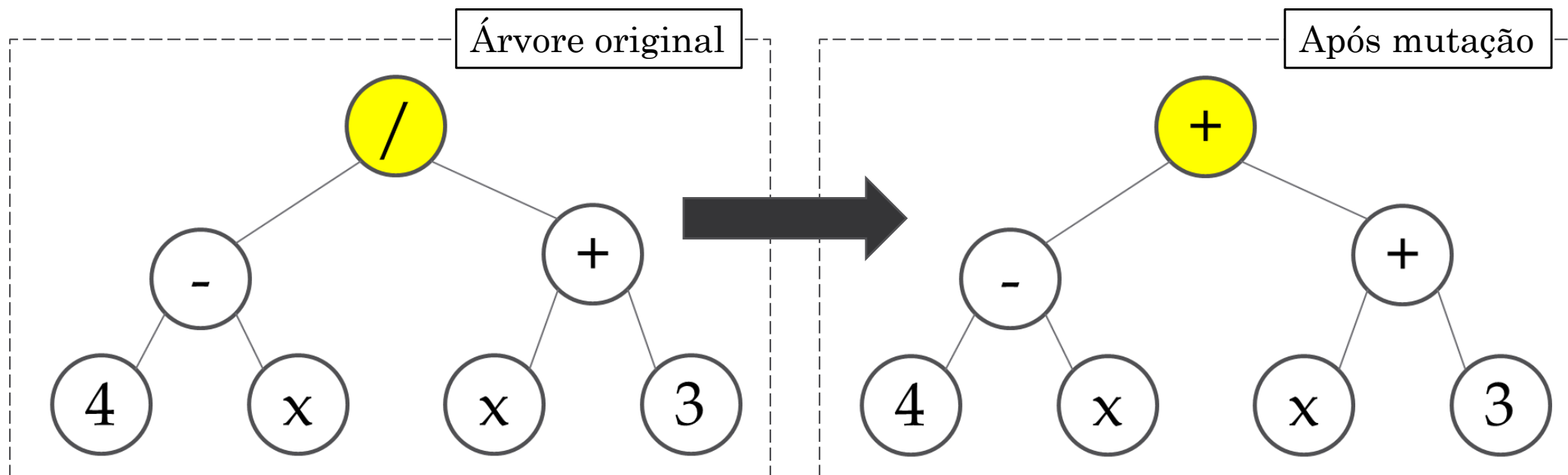
```
toolbox.register("mutate", gp.mutUniform, expr=toolbox.expr_mut, pset=p)
```

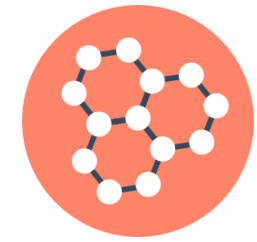


# Operadores genéticos

- Mutaç o

- Mudana aleat ria em um dos n s da  rvore;
- Adiciona diversidade na populao.





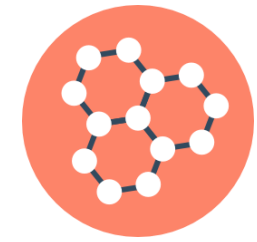
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- Mudana aleat ria em um dos n s da  rvore;
- Adiciona diversidade na populao.



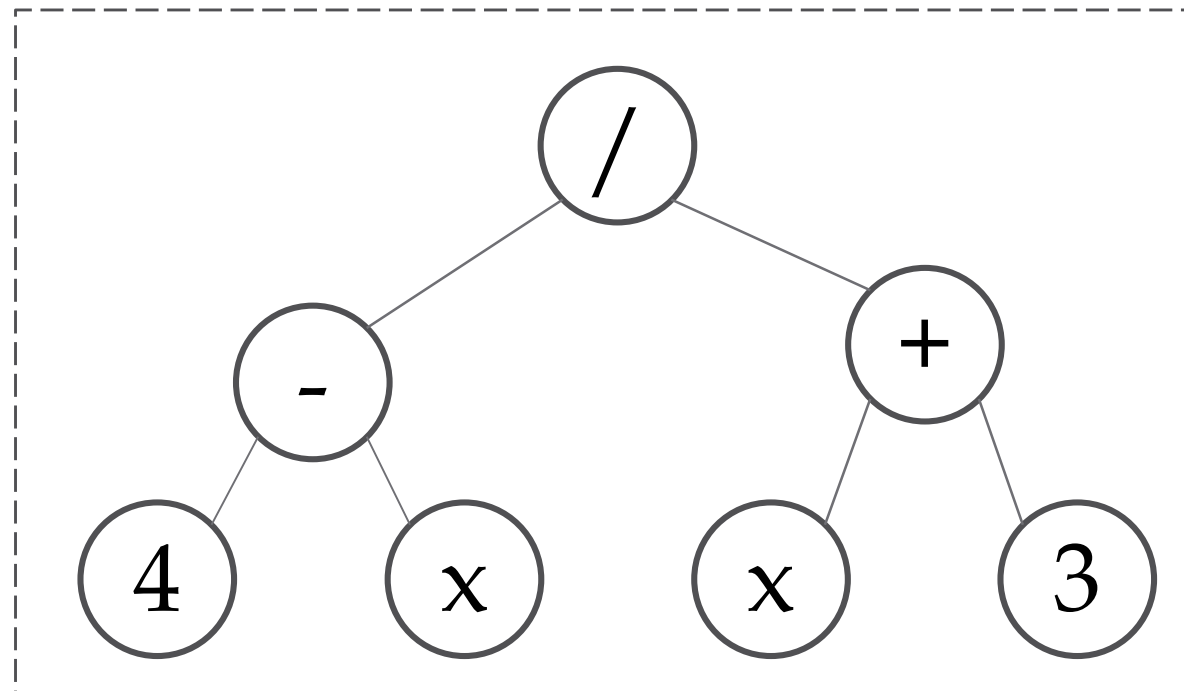
```
toolbox.register("mutate", gp.mutUniform,  
                expr=toolbox.expr_mut, pset=pset)  
toolbox.decorate("mutate",  
                gp.staticLimit(key=operator.attrgetter("height"),  
                               max_value=17))
```

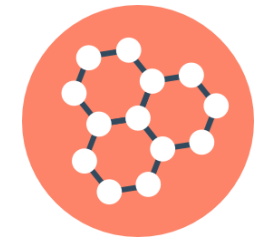


# Operadores genéticos

- Permutação

- Escolhe um ponto aleatório e inverte os terminais e/ou funções.

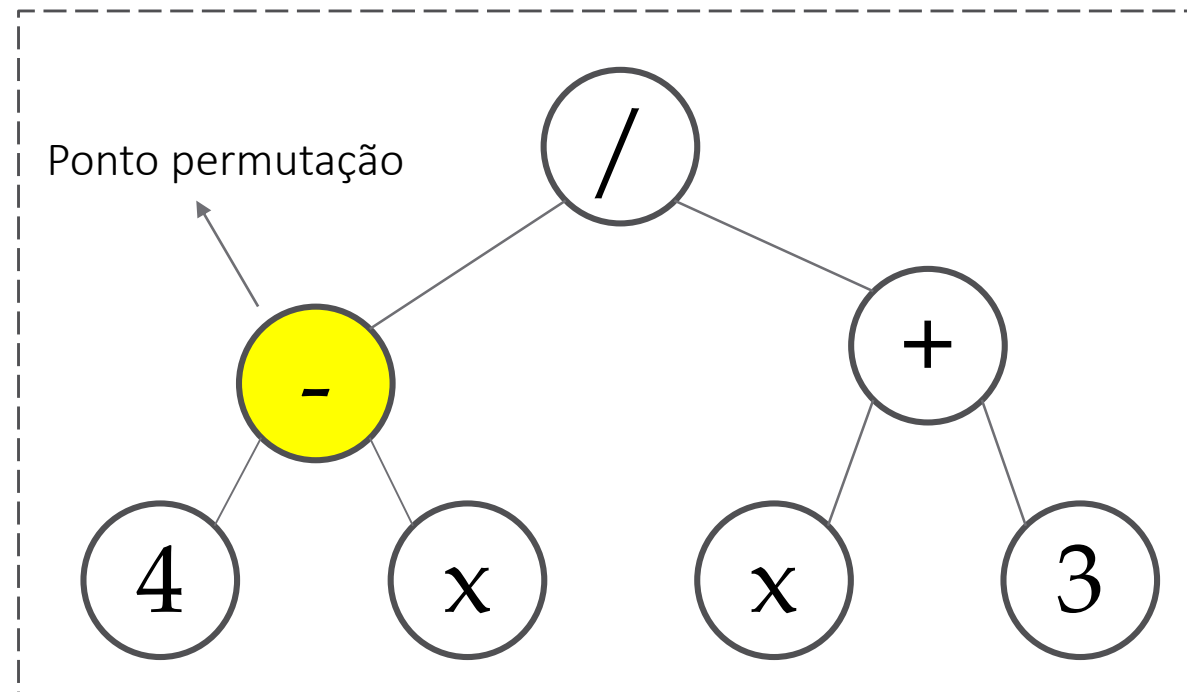


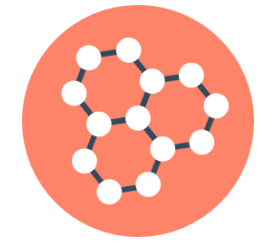


# Operadores genéticos

- Permutação

- Escolhe um ponto aleatório e inverte os terminais e/ou funções.

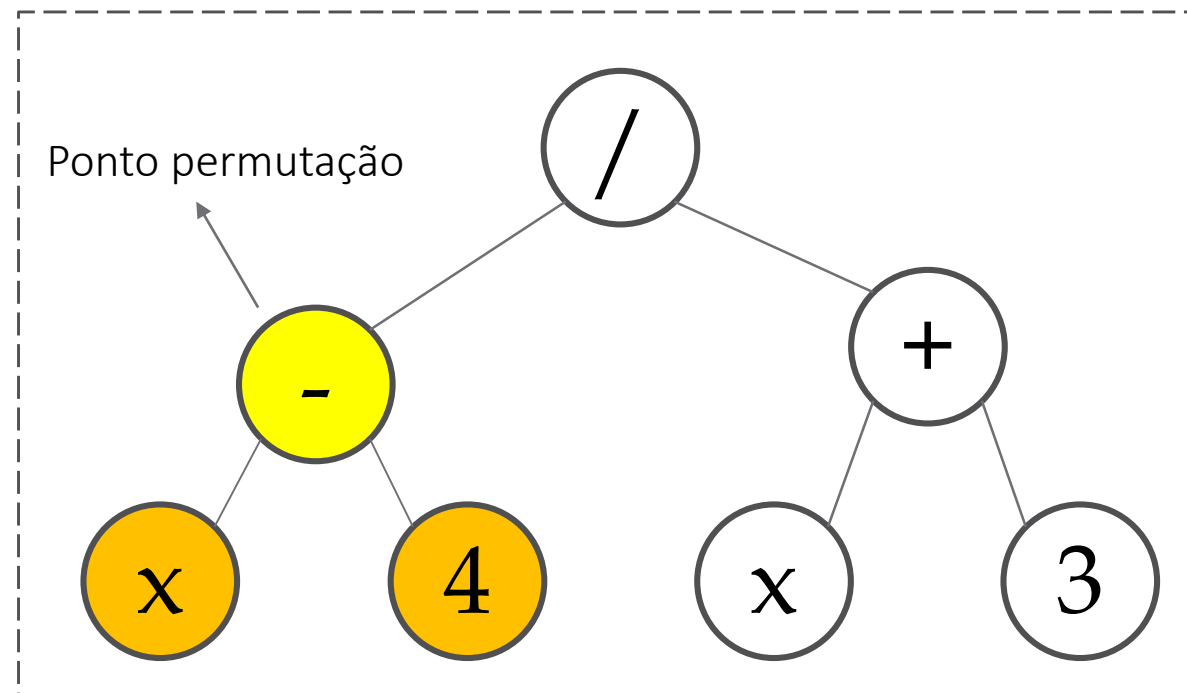


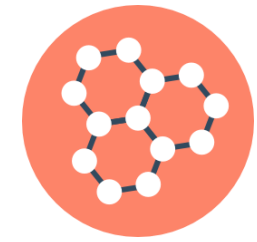


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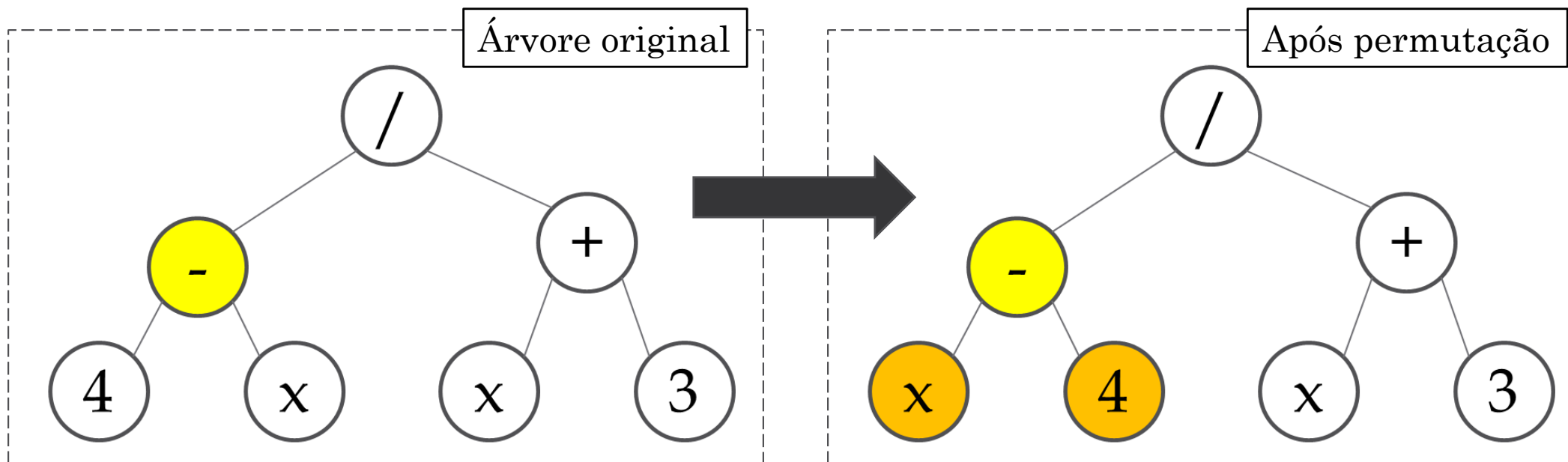


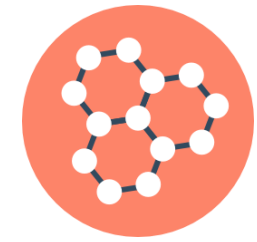


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- Permutação

- Escolhe um ponto aleatório e inverte os terminais e/ou funções.

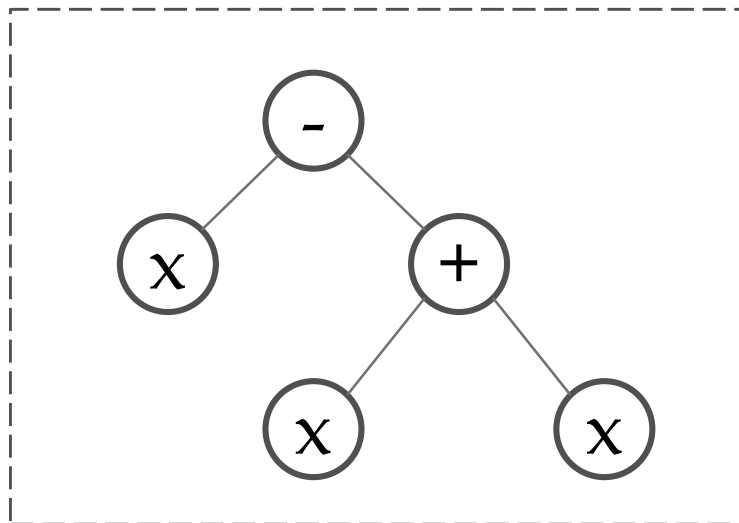




# Operadores genéticos

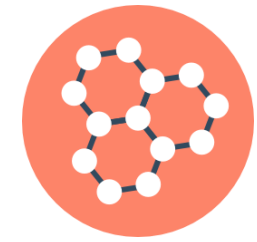
- Edição

- Forma de simplificação e edição de expressões;
- Muito custosa – Consumo considerável de tempo;
- Torna a expressão menos vulnerável ao crossover.



Expressão:  
 $X+X-X$

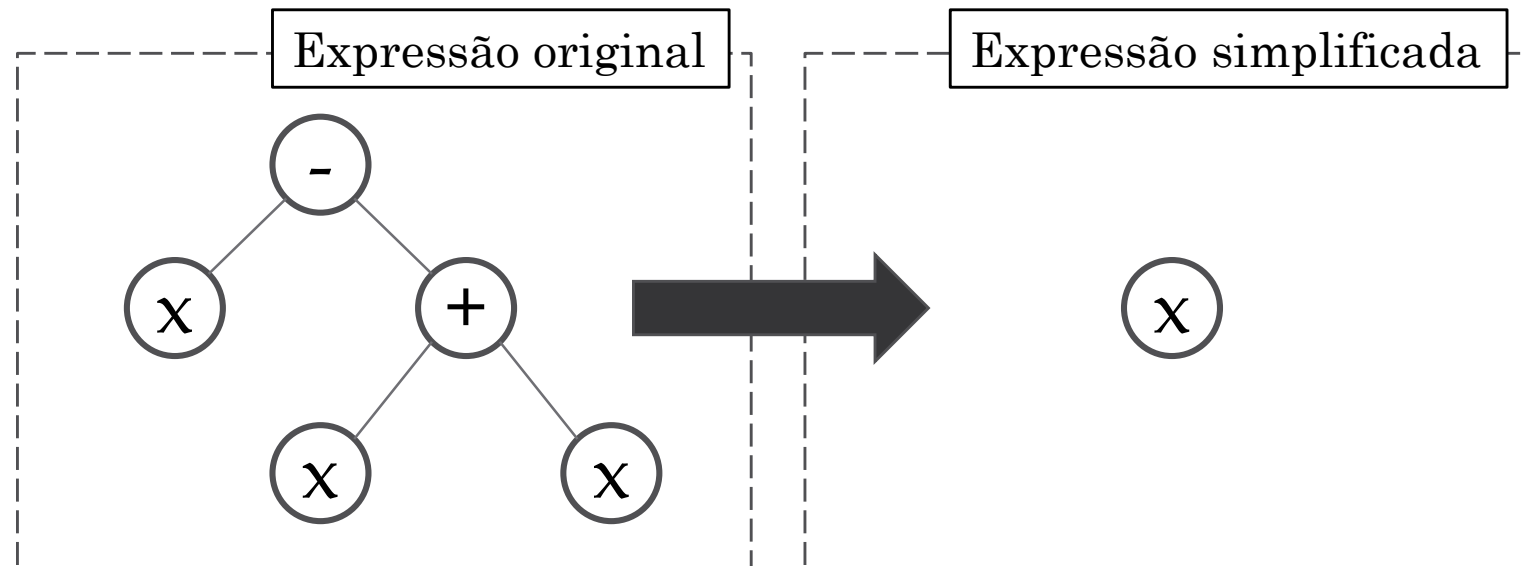


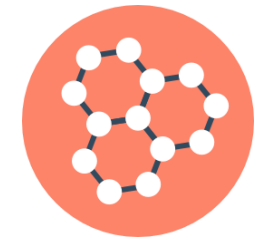


# Operadores genéticos

- Edição

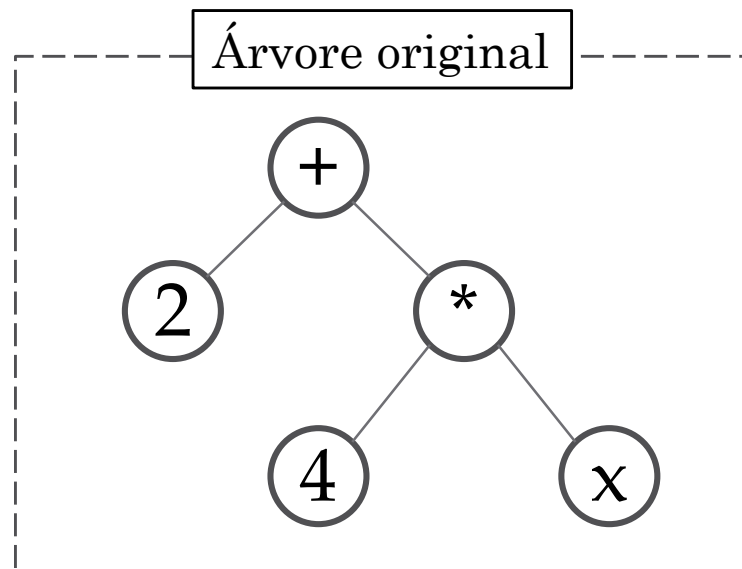
- Forma de simplificação e edição de expressões;
- Muito custosa – Consumo considerável de tempo;
- Torna a expressão menos vulnerável ao crossover.

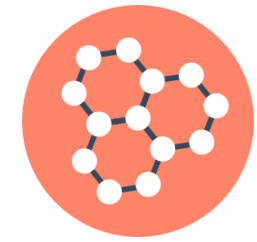




# Operadores genéticos

- Encapsulamento
  - Identifica subárvores potencialmente útil;
  - Dá um nome para que possa ser referenciada futuramente.

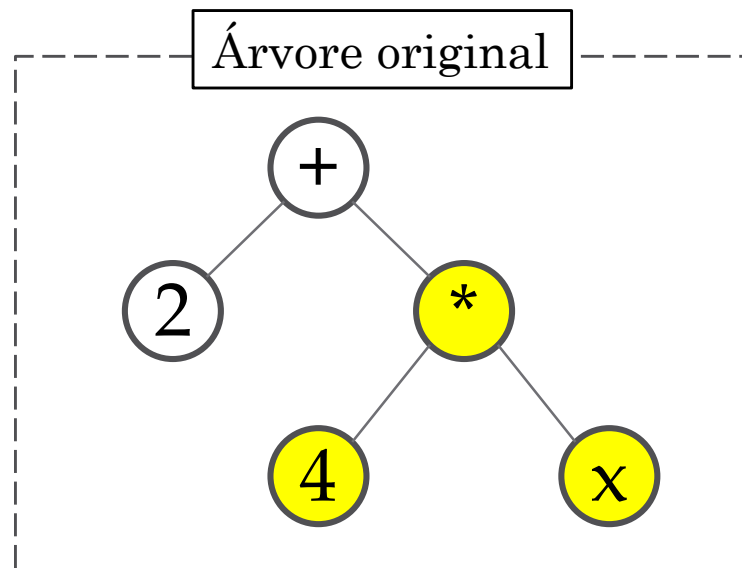


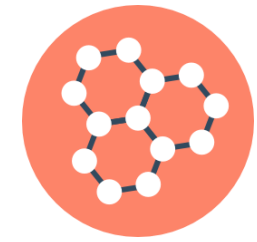


# Operadores genéticos

- Encapsulamento

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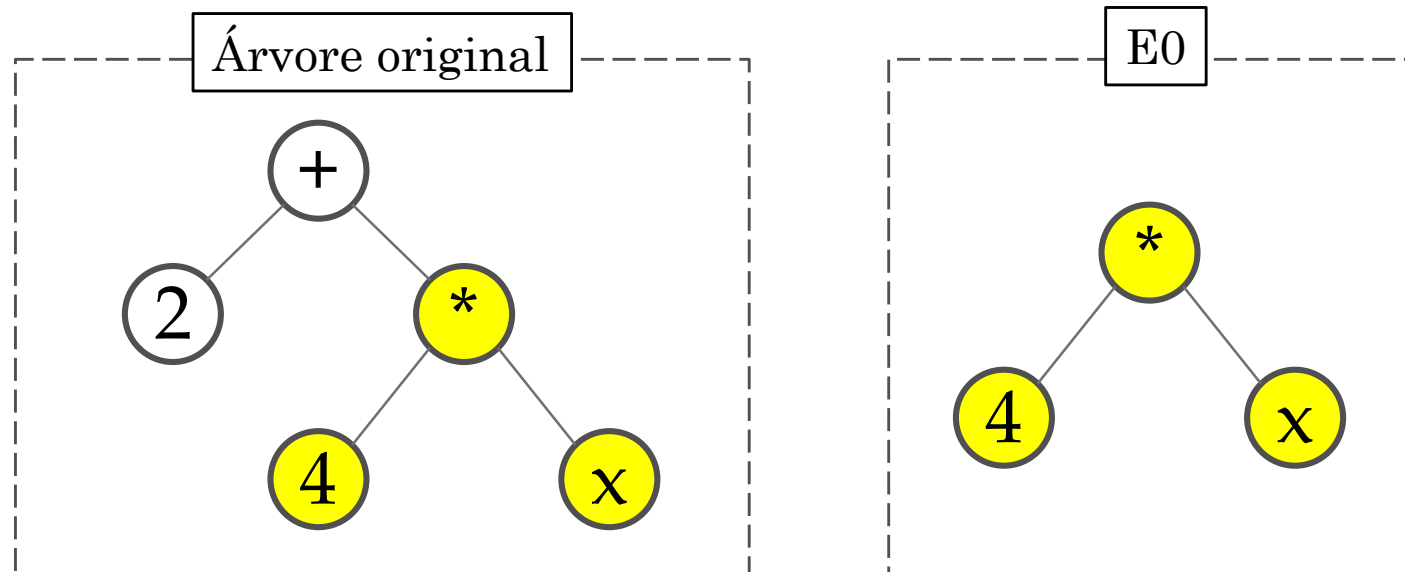


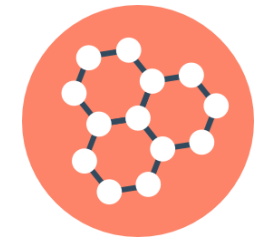


# Operadores genéticos

- Encapsulamento

- Identifica subárvores potencialmente útil;
- Dá um nome para que possa ser referenciada futuramente.

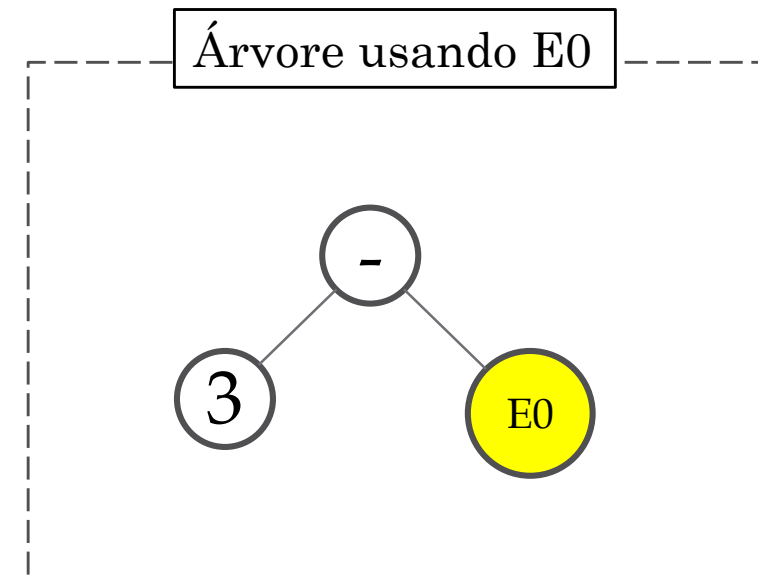
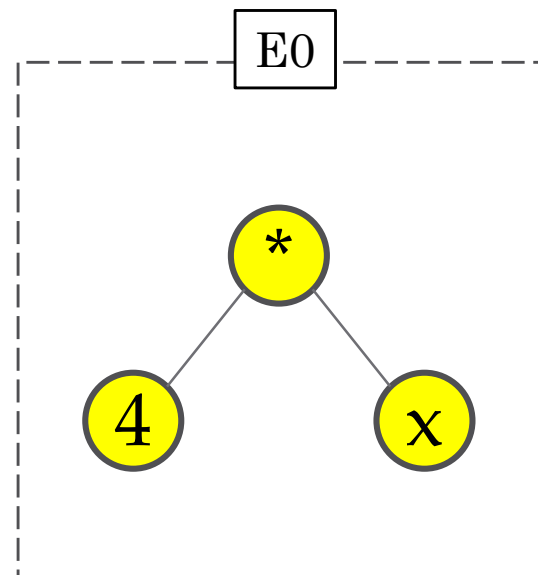
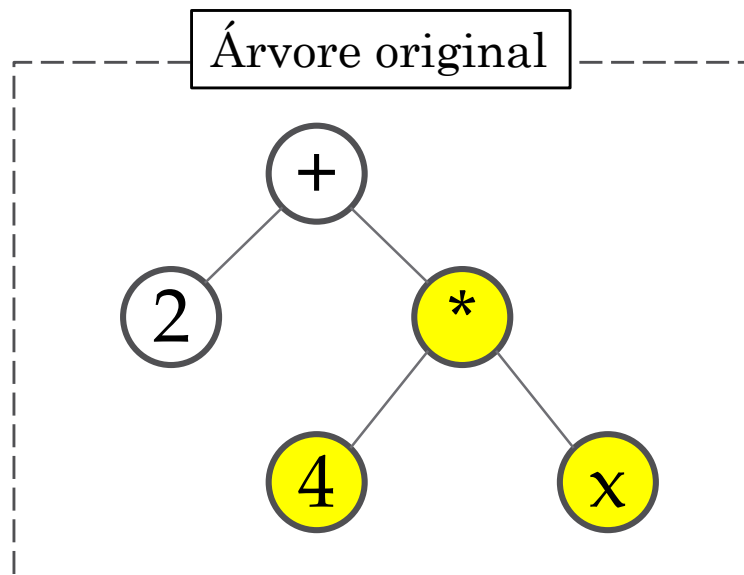


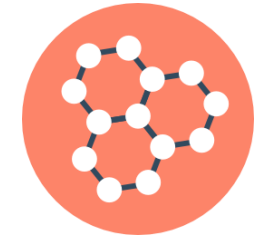


# Operadores genéticos

- Encapsulamento

- Identifica subárvores potencialmente útil;
- Dá um nome para que possa ser referenciada futuramente.





# Operadores genéticos

- Destruição

- Casos complexos, grande parte da população pode ter um *fitness* muito ruim, causando uma perda de diversidade rápida e um custo computacional muito grande;
- Forma de destruir indivíduos medíocres nas gerações iniciais;
- Parâmetros
  - Quantidade de indivíduos mantidos;
  - Condição em que o operador será invocado;
- Indivíduos sobreviventes são escolhidos com base no *fitness*.

# Estratégia de solução



# Estratégia de solução

- Ideia original

- Atribuição da orientação semântica das palavras de um Léxico utilizando Algoritmos Genéticos;
- Abordar a criação/expansão do dicionário Léxico como um problema de otimização.

I	love	this	camera
0	+1	0	-2
+3	+2	-4	-1
-2	-1	+1	-2
...			






# Estratégia de solução


## • Ideia original




Keshavarz, Hamidreza, and Mohammad Saniee Abadeh. "ALGA: Adaptive lexicon learning using genetic algorithm for sentiment analysis of microblogs." Knowledge-Based Systems 122 (2017): 1-16.



Knowledge-Based Systems  
Volume 122, 15 April 2017, Pages 1–16




ALGA: Adaptive lexicon learning using genetic algorithm for sentiment analysis of microblogs



ALGA

Authors: [Hamidreza Keshavarz](#) [Faculty of Electrical and Computer Engineering, Tarbiat Modares University, Tehran, Iran](#)  
[Mohammad Saniee Abadeh](#) [Faculty of Electrical and Computer Engineering, Tarbiat Modares University, Tehran, Iran](#)

Published in:  
 · Journal  
 Knowledge-Based Systems [archive](#)



2017 Article

	<b>good</b>	<b>was</b>	<b>loveable</b>	<b>water</b>	...
Chromosome 1	+8	-6	+7	-2	...
Chromosome 2	+1	0	+10	-1	...
Chromosome 3	-9	-1	+1	+8	...

$$P(T_i, k) = \sum_{w_j \in T_i} v_k(w_j)$$

<http://www.sciencedirect.com/science/article/pii/S0950705117300382>



# Estratégia de solução

- Ideia original
  - Apesar de utilizar Algoritmos Genéticos para a atribuição de orientação semântica para as palavras do dicionário, o trabalho faz a classificação com a soma das polaridades

$$P(T_i, k) = \sum_{w_j \in T_i} v_k(w_j)$$

<http://www.sciencedirect.com/science/article/pii/S0950705117300382>



# Estratégia de solução

- Ideia atual
  - Usar Algoritmos Evolutivos para encontrar um modelo eficiente para a classificação de sentimentos
  - Tentar encontrar uma solução

$$P(T_i, k) = \textcircled{?}$$



# Estratégia de solução

- Ferramentas e materiais
  - DEAP *library* (<https://github.com/deap/deap>);
  - Textos anotados
    - Amazon ~~reviews~~ (LIU);
    - Tweets.
  - Dicionários Léxicos
    - Positive/Negative *words* (LIU);
    - Positive/Negative *emoticons* (SentiHealth);
    - SentiWordNet (em implementação).



# Estratégia de solução

- Avaliar manualmente; [LIU, 2004]
- Conjuntos de polaridades [-n, +n].



[t]ext... serious amateur  
cam... light  
sit... sort of action  
left... camera in...s.



# Estratégia de solução

- Avaliar manualmente; [LIU, 2004]
- Conjuntos de polaridades [-n, +n].



[t]ext... serious amateur  
cam... light  
sit... sort of action  
left... camera in... s.

Feature

Polaridade

Início frase

Fonte: <https://www.cs.uic.edu/~liub/FBS/sentiment-analysis.html>



# Estratégia de solução



- Conjunto de *tweets* e suas orientações semânticas;
- 0: negativo; 1: positivo
- Base de testes Semeval 2014 – Task 9 B

```
2,64184E+17    15140428    positive    Gas by  
my house hit $3.39!!!! Im going to Chapel  
Hill on Sat. :)
```

tweets.txt



# Estratégia de solução



- Conjunto de *tweets* e suas orientações semânticas;
- 0: negativo; 1: positivo
- Base de testes Semeval 2014 – Task 9 B

```
2,64184E+17    15140428    positive    Gas by  
my house hit $3.39!!!! Im going to Chapel  
Hill on Sat. :)
```

sentimento

Início frase





# Estratégia de solução



Fonte: <https://www.cs.uic.edu/~liub/FBS/sentiment-analysis.html>



# Estratégia de solução

[+2]##I love this câmera so much!

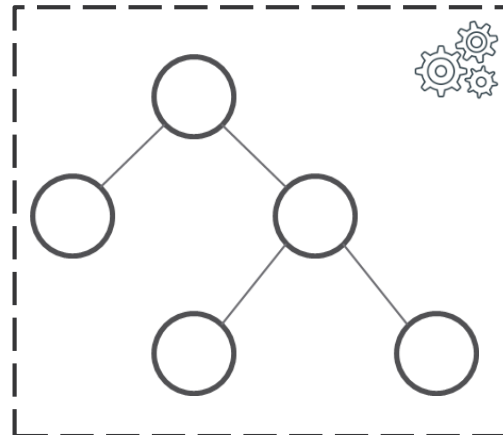
[-2]##I hate this câmera so much!

[+1]## Great!

[-1]##I hate the package

[+1]##Another phrase!

...



positive

negative

positive

negative

positive

...

# Estratégia de solução



[+2]##I love this câmera so much!

[-2]##I hate this câmera so much!

[+1]## Great!

[-1]##I hate the package

[+1]##Another phrase!

...



positive

negative

positive

negative

positive

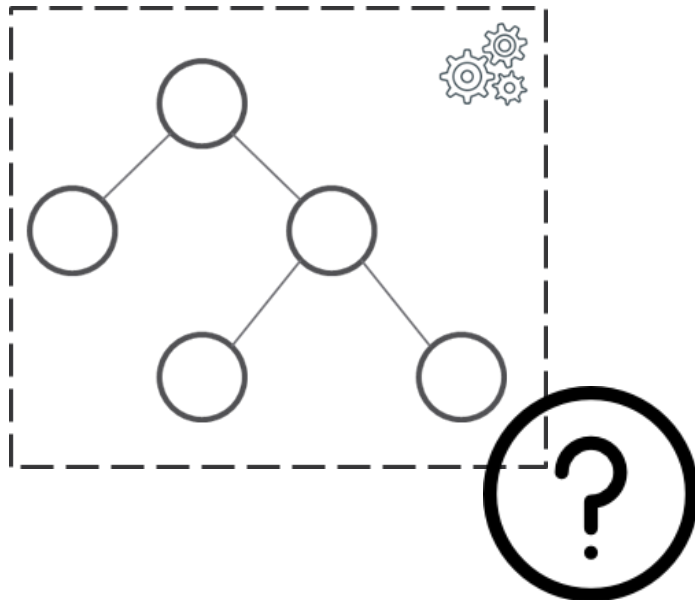
...



# Estratégia de solução

- Ideia principal

- Encontrar um modelo para a classificação das opiniões que avalie corretamente a polaridade dos documentos/sentenças.



- **Programação Genética** para a criação dos modelos;
- Representação da solução como uma árvore;
- Funções matemáticas e de manipulação do texto para tentar chegar em um modelo ótimo;

# Estratégia de solução



tweets.txt



reviews.txt



positive-words.txt



negative-words.txt



positive-emoticons.txt



negative-emoticons.txt



# Estratégia de solução

```
addPrimitive(operator.add, [float,float], float)
addPrimitive(operator.sub, [float,float], float)
addPrimitive(operator.mul, [float,float], float)
addPrimitive(protectedDiv, [float,float], float)
addPrimitive(math.exp, [float], float)
addPrimitive(math.cos, [float], float)
addPrimitive(math.sin, [float], float)
addPrimitive(protectedSqrt, [float], float)
addPrimitive(protectedLog, [float], float)
addPrimitive(invertSignal, [float], float)

addPrimitive(positiveHashtags, [str], float)
addPrimitive(negativeHashtags, [str], float)
addPrimitive(polaritySum, [str], float)
addPrimitive(positiveWordsQuantity, [str], float)
addPrimitive(negativeWordsQuantity, [str], float)
pset.addPrimitive(positiveHashtags, [str], float)
pset.addPrimitive(negativeHashtags, [str], float)
pset.addPrimitive(positiveEmoticons, [str], float)
pset.addPrimitive(negativeEmoticons, [str], float)
```





# Estratégia de solução

- *Fitness*

- Quantidade de frases com polaridades calculadas corretamente;
- Melhor caso: 100% das palavras avaliadas preditas corretamente.

```
def evalSymbReg(individual):  
    for item in enumerate(reviews):  
  
        if correctValue(individual, item):  
            fitnessReturn += 1  
  
    return fitnessReturn,
```



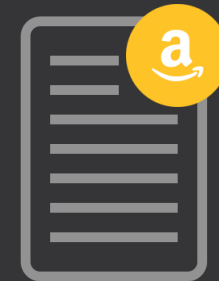
# Resultados





# Resultados Parciais

Population: 20  
Generations: 50  
Mating probability:  
Mutation probability:  
Variation: varAnd (cross  
Selection type: tournament  
Creation: Half and Half - si



reviews.txt

```
[42 phrases] [39 matches  
  sub (polaritySum  
      in (add(0, 1)))  
[239 phrases] [184  
  exp (sin (ad  
    protectedDiv  
    positiveWordsQ  
[239 phrases] [188 matches (fitness)] [751 seconds]  
  add (add (polaritySum (x), log (log (-2.0))), 1.0)  
[239 phrases] [202 matches (fitness)] [406 seconds]  
  protectedDiv (1.5159468201145594, polaritySum (x))
```



# Resultados Parciais

```
Population: 20
Generations: 50
Mating probability: 1.5
Mutation probability: 0.5
Variation: varAnd (cross
Selection type: tournament
Creation: Half and

[207 phrases] [138 m... ] [458
add(add(add(-1.0, 0.927384, -1.0, 0.18143),
negativeHashtags, mul(negativeWords, y(x), -1.3287832809148568))
```



tweets.txt



# Resultados parciais - Treino

```
## Results ##
[total tweets]: 5098 [3640 positives and 1458 negatives]
[best fitness]: 0.7754021184778345 [3404 positives and 549 negatives]
[function]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024, -0.37724008898609984))))), 1.8336740571089738))
[best precision positive]: 1.0
[best precision negative]: 0.8417721518987342
[best precision avg]: 0.7867767642084764
[best precision avg function]: cos(mul(protectedLog(positiveWordsQuantity(repeatInputString(repeatInputString(x))))), polaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))))))
[best recall positive]: 1.0
[best recall negative]: 1.0
[best recall avg]: 0.6587993111141259
[best recall avg function]: sub(polaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))))), protectedLog(mul(protectedLog(positiveWordsQuantity(repeatInputString(repeatInputString(x))), hashtagPolaritySum(x))), 1.8336740571089738))
[best fitness]: 0.8560
[best fitness avg]: 0.49
[best fitness avg function]: sub(polaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))))), protectedLog(mul(protectedLog(positiveWordsQuantity(repeatInputString(repeatInputString(x))), hashtagPolaritySum(x))), 1.8336740571089738))
Script ends
```





# Resultados parciais - Treino

```
## Results ##
[total tweets]: 5098 [3640 positives and 1458 negatives]
[best fitness]: 0.7754021184778345 [3404 positives and 549 negatives]
[function]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024, -0.37724008898609984))))), 1.8336740571089738))
[best precision positive]: 1.0
[best precision negative]: 0.8417721518987342
[best precision avg]: 0.7867767642084764
[best precision avg function]: cos(mul(protectedLog(positiveWordsQuantity(repeatInputString(repeatInputString(x))))), polaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))))))
[best recall positive]: 1.0
[best recall negative]: 1.0
[best recall avg]: 0.6587993111141259
[best recall avg function]: sub(polaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))))), protectedLog(mul(protectedLog(positiveWordsQuantity(repeatInputString(repeatInputString(x))), hashtagPolaritySum(x))), 1.8336740571089738))
[best f1]: 0.8566
[best f1 function]: sub(polaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))))), protectedLog(mul(protectedLog(positiveWordsQuantity(repeatInputString(repeatInputString(x))), hashtagPolaritySum(x))), 1.8336740571089738))
Script ends
```

Modelo (melhor acurácia) [77%]

Modelo (melhor precisão média) [78%]

Modelo (melhor recall médio) [65%]

Modelo (melhor F1 médio) [67%]





# Resultados parciais - Teste

```
[Tweets2013 messages]
[messages evaluated]: 2173
[correct evaluations]: 1685 (1467 positives and 218 negatives)
[model]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024,
-0.37724008898609984))))), 1.8336740571089738))
[accuracy]: 0.78
[precision_avg]: 0.73
[recall_avg]: 0.65
[f1_avg]: 0.66
[true_positive]: 1467
[false_positive]: 383
[true_negative]: 218
[false_negative]: 105
Accuracy: 0.78
Precision avg: 0.73
Recall avg: 0.65
F1 avg: 0.66

[Tweets2014 messages]
[messages evaluated]: 1184
[correct evaluations]: 989 (925 positives and 64 negatives)
[model]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024,
-0.37724008898609984))))), 1.8336740571089738))
[accuracy]: 0.84
[precision_avg]: 0.7
[recall_avg]: 0.63
[f1_avg]: 0.65
[true_positive]: 925
[false_positive]: 138
[true_negative]: 64
[false_negative]: 57
Accuracy: 0.84
Precision avg: 0.7
Recall avg: 0.63
F1 avg: 0.65

[SMS2013 messages]
[messages evaluated]: 886
[correct evaluations]: 564 (448 positives and 116 negatives)
[model]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024,
-0.37724008898609984))))), 1.8336740571089738))
[accuracy]: 0.64
[precision_avg]: 0.67
[recall_avg]: 0.6
[f1_avg]: 0.58
[true_positive]: 448
[false_positive]: 278
[true_negative]: 116
[false_negative]: 44
Accuracy: 0.64
Precision avg: 0.67
Recall avg: 0.6
F1 avg: 0.58
```





# Resultados parciais - Teste

```
[LiveJournal2014 messages]
[messages evaluated]: 731
[correct evaluations]: 533 (403 positives and 130 negatives)
[model]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024,
-0.37724008898609984))))), 1.8336740571089738))
[accuracy]: 0.73
[precision_avg]: 0.77 Accuracy: 0.73
[recall_avg]: 0.69 Precision avg: 0.77
[f1_avg]: 0.69 Recall avg: 0.69
[true_positive]: 403 F1 avg: 0.69
[false_positive]: 174
[true_negative]: 130

[Tweets2014Sarcasm messages]
[messages evaluated]: 73
[correct evaluations]: 33 (31 positives and 2 negatives)
[model]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024,
-0.37724008898609984))))), 1.8336740571089738))
[accuracy]: 0.45
[precision_avg]: 0.47 Accuracy: 0.45
[recall_avg]: 0.49 Precision avg: 0.47
[f1_avg]: 0.35 Recall avg: 0.49
[true_positive]: 31 F1 avg: 0.35
[false_positive]: 38
[true_negative]: 2
[false_negative]: 2

[All messages]
[messages evaluated]: 4974
[correct evaluations]: 3771 (3243 positives and 528 negatives)
[model]: sub(polaritySum(repeatInputString(x)), sub(protectedLog(if_then_else(hasEmoticons(repeatInputString(x)), cos(hashtagPolaritySum(x)), mul(positiveHashtags(x), add(0.022232080287345024,
-0.37724008898609984))))), 1.8336740571089738))
[accuracy]: 0.76
[precision_avg]: 0.73 Accuracy: 0.76
[recall_avg]: 0.64 Precision avg: 0.73
[f1_avg]: 0.66 Recall avg: 0.64
[true_positive]: 3243 F1 avg: 0.66
[false_positive]: 973
[true_negative]: 528
[false_negative]: 230

[Script ends after 35 seconds]
```





# Resultados parciais - Treino

```
## Results ##
[total tweets]: 5098 [3640 positives and 1458 negatives]
[best fitness]: 0.7744213417026284 [3382 positives and 566 negatives]
[function]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[best precision positive]: 0.9333333333333333
[best precision negative]: 0.9583333333333334
[best precision avg]: 0.8377594928393115
[best precision avg function]: add(add(1.1979514138630538, sub(negativeHashtags(repeatInputString(repeatInputString(x))), negativeWordsQuantity(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))), exp(add(positiveWordsQuantity(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))), hashtagPolaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))
[best recall positive]: 1.0
[best recall negative]: 1.0
[best recall avg]: 0.6586619484767633
[best recall avg function]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[best f1 positive]: 0.854687894869851
[best f1 negative]: 0.49852133502323615
[best f1 avg]: 0.6753719930089833
[best f1 avg function]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)

Script ends after 1.49e+03 seconds
```





# Resultados parciais - Treino

```
## Results ##
[total tweets]: 5098 [3640 positives and 1458 negatives]
[best fitness]: 0.7744213417026284 [3382 positives and 566 negatives]
[function]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[best precision positive]: 0.9333333333333333
[best precision negative]: 0.9583333333333334
[best precision avg]: 0.8377594928393115
[best precision avg function]: add(add(1.1979514138630538, sub(negativeHashtags(repeatInputString(repeatInputString(x))), negativeWordsQuantity(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))), exp(add(positiveWordsQuantity(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))), hashtagPolaritySum(repeatInputString(repeatInputString(repeatInputString(repeatInputString(x))))))))))
[best recall positive]: 1.0
[best recall negative]: 1.0
[best recall avg]: 0.658661948
[best recall avg function]: polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[best f1 avg]: 0.854
[best f1 avg function]: (repeatInputString(repeatInputString(x))), 0.85727076397959)
Script ended
```

Modelo (melhor acurácia) [77%]

Modelo (melhor precisão média) [83%]

Modelo (melhor recall médio) [65%]

Modelo (melhor F1 médio) [67%]







# Resultados parciais - Teste

```
[Tweets2013 messages]
[messages evaluated]: 2173
[correct evaluations]: 1686 (1458 positives and 228 negatives)
[model]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[accuracy]: 0.78
[precision_avg]: 0.73
[recall_avg]: 0.65
[f1_avg]: 0.67
[true_positive]: 1458
[false_positive]: 373
[true_negative]: 228
[false_negative]: 114
```

Accuracy: 0.78  
Precision avg: 0.73  
Recall avg: 0.65  
F1 avg: 0.67

```
[Tweets2014 messages]
[messages evaluated]: 1184
[correct evaluations]: 986 (919 positives and 67 negatives)
[model]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[accuracy]: 0.83
[precision_avg]: 0.69
[recall_avg]: 0.63
[f1_avg]: 0.65
[true_positive]: 919
[false_positive]: 135
[true_negative]: 67
[false_negative]: 63
```

Accuracy: 0.83  
Precision avg: 0.69  
Recall avg: 0.63  
F1 avg: 0.65

```
[SMS2013 messages]
[messages evaluated]: 886
[correct evaluations]: 563 (445 positives and 118 negatives)
[model]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[accuracy]: 0.64
[precision_avg]: 0.67
[recall_avg]: 0.6
[f1_avg]: 0.58
[true_positive]: 445
[false_positive]: 276
[true_negative]: 118
[false_negative]: 47
```

Accuracy: 0.64  
Precision avg: 0.67  
Recall avg: 0.6  
F1 avg: 0.58

```
[LiveJournal2014 messages]
[messages evaluated]: 731
[correct evaluations]: 532 (401 positives and 131 negatives)
[model]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[accuracy]: 0.73
[precision_avg]: 0.77
[recall_avg]: 0.69
[f1_avg]: 0.68
[true_positive]: 401
[false_positive]: 173
[true_negative]: 131
[false_negative]: 26
```

Accuracy: 0.73  
Precision avg: 0.77  
Recall avg: 0.69  
F1 avg: 0.68

```
[Tweets2014 messages]
[messages evaluated]: 73
[correct evaluations]: 33 (31 positives and 2 negatives)
[model]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[accuracy]: 0.45
[precision_avg]: 0.47
[recall_avg]: 0.49
[f1_avg]: 0.35
[true_positive]: 31
[false_positive]: 38
[true_negative]: 2
[false_negative]: 2
```

Accuracy: 0.45  
Precision avg: 0.47  
Recall avg: 0.49  
F1 avg: 0.35

```
[SMS2013 messages]
[messages evaluated]: 4974
[correct evaluations]: 3767 (3223 positives and 544 negatives)
[model]: add(polaritySum(repeatInputString(repeatInputString(x))), 0.85727076397959)
[accuracy]: 0.76
[precision_avg]: 0.73
[recall_avg]: 0.65
[f1_avg]: 0.66
[true_positive]: 3223
[false_positive]: 957
[true_negative]: 544
[false_negative]: 250
```

Accuracy: 0.76  
Precision avg: 0.73  
Recall avg: 0.65  
F1 avg: 0.66

[Script ends after 34.2 seconds]





# Modificações no processo

- Classificador era binário (positivo e negativo somente);
- SemEval considera, também, a classificação das mensagens neutras;
- Somente o cálculo do F1 final do evento considera somente mensagens positivas e negativas.



# Modificações no processo

- Classificador modificado para carregar e classificar mensagens neutras.

<b>Terminologia</b>	<b>Descrição</b>
Verdadeiro Positivo (VP)	Modelo retornou Positivo e a classe real é Positivo
Verdadeiro Negativo (VN)	Modelo retornou Negativo e a classe real é Negativo
Verdadeiro Neutro (VNt)	Modelo retornou Neutro e a classe real é Neutro
Falso Positivo (FP)	Modelo retornou Positivo e a classe real não é Positivo
Falso Negativo (FN)	Modelo retornou Negativo e a classe real não é Negativo
Falso Neutro (FNt)	Modelo retornou Neutro e a classe real não é Neutro



# Modificações no processo

- Classificador modificado para carregar e classificar mensagens neutras.

<b>Métrica</b>	<b>Fórmula</b>
Acurácia	$(VP + VN + VNt) / \text{Total de mensagens}$
Precisão positiva (PP)	$VP / \text{Positivos retornados pelo modelo}$
<i>Recall</i> positivo (RP)	$VP / \text{Mensagens positivas}$
F1 positivo (FP)	$2 * (PP * RP) / (PP + RP)$
Precisão negativa (PN)	$VN / \text{Negativos retornados pelo modelo}$
<i>Recall</i> negativo (RN)	$VN / \text{Mensagens negativas}$
F1 negativo (FN)	$2 * (PN * RN) / (PN + RN)$
Precisão neutra (PNt)	$VNt / \text{Neutros retornados pelo modelo}$
<i>Recall</i> neutro (RNt)	$VNt / \text{Mensagens neutras}$
F1 neutro (FNt)	$2 * (PNt * RNt) / (PNt + RNt)$
Precisão média	$(PP + PN + PNt) / 3$
<i>Recall</i> médio	$(RP + RN + RNt) / 3$
F1 médio	$(FP + FN + FNt) / 3$
F1 médio SemEval	$(FP + FN) / 2$



# Modificações no processo

- Modificação da função de *fitness*: F1 (positivo e negativo)
  - Mesma função utilizada em SemEval 2014.
- Balanceamento da base de treinamento
  - Base muito desbalanceada, dificulta o treinamento do modelo.



# Modificações no processo

- Inclusão de novos dicionários
  - Novos emoticons (emoticonsWithPolarity.txt)
  - Palavras negação (negating-word-list.txt)



emoticonsWithPolarity.txt



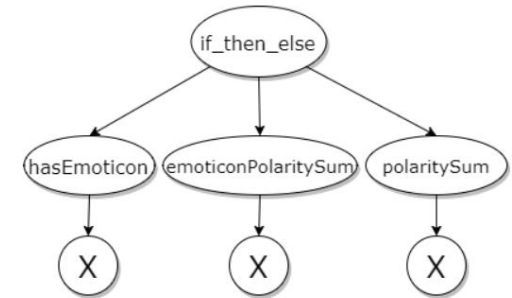
negating-word-list.txt



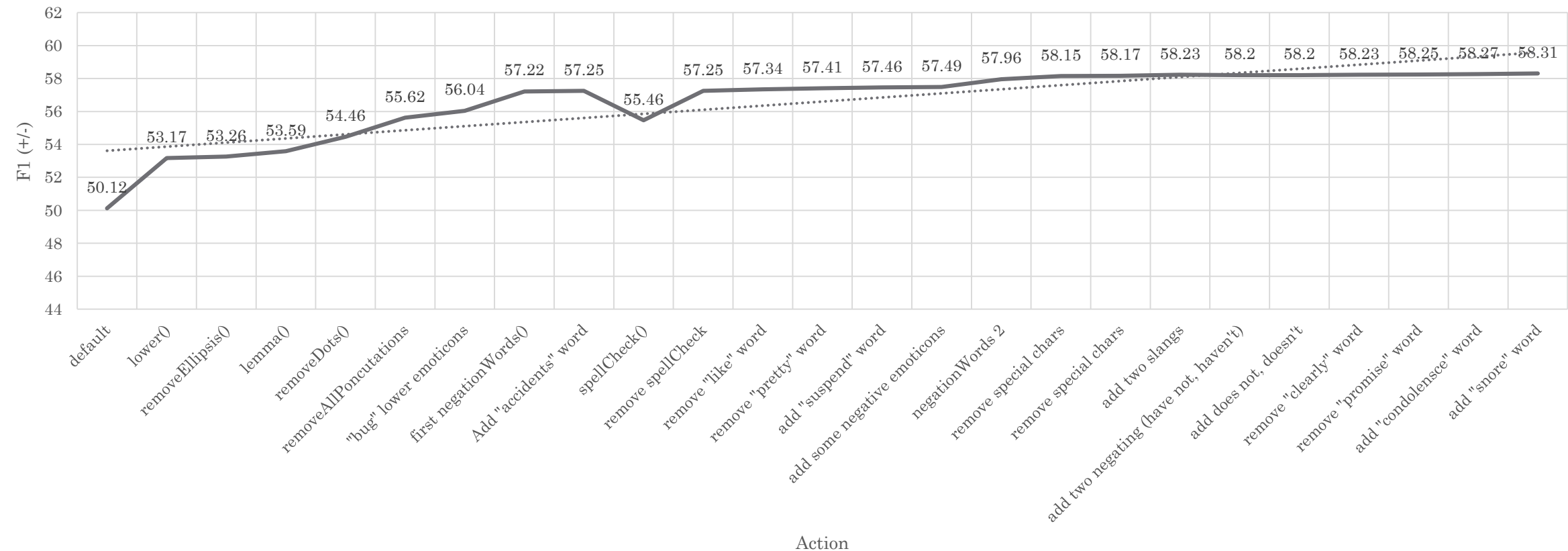
# Modificações no processo

- Inclusão de novas funções
  - stemming
  - lemmatization
  - removeLinks
  - removeEllipsis
  - negatingWords
  - removeAllPunctuations

# Teste com novas funções



F1 avg (+/-) Model A - All messages







# Treino – Modelo 1

```
## Results ##
```

```
[total tweets]: 4200 [1400 positives, 1400 negatives and 1400 neutrals]
```

```
[best fitness (F1 avg (+/-))]: 0.642794441591997 [2604 correct evaluations] [901  
positives, 886 negatives and 817 neutrals]
```

```
## Model ##
```

```
add(polaritySum(removeStopWords(removeEllipsis(removeAllPunctuation(removeAllPunctuation(re  
moveLinks(removeAllPunctuation(replaceNegatingWords(removeEllipsis(removeStopWords(replace  
NegatingWords(removeEllipsis(x)))))))))), sub(mul(exp(if_then_else(True, -1.6617453540075866, -  
0.1240560689118353)),  
negativeWordsQuantity(replaceNegatingWords(removeAllPunctuation(replaceNegatingWords(x))),  
negativeWords(removeAllPunctuation(stemmingText(x))))))
```



[Modelo 1]

# Testes – Twitter2013

[Twitter2013 messages]

[messages evaluated]: 3813

[correct evaluations]: 2300 (990 positives, 361 negatives and 949 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5734

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6032
Precisão	0.6618	0.4303	0.6421	0.578
Recall	0.6298	0.6007	0.5787	0.6303
F1	0.6454	0.5014	0.6087	0.5852

Terminologia	Quantidade
Verdadeiro positivo	990
Falso positivo	506
Verdadeiro negativo	361
Falso negativo	478
Verdadeiro neutro	949
Falso neutro	529



[Modelo 1]

# Testes – Twitter2013

[Twitter2013 messages]

[messages evaluated]: 3813

[correct evaluations]: 2300 (990 positives, 361 negatives and 949 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5734

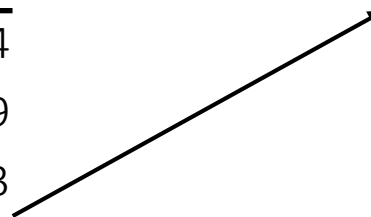
## SemEval 2014 – Twitter2013

1	TeamX-B-constrained	72.12
2	NRC-Canada-B-constrained	70.75
3	coooolll-B-constrained	70.40

...

35	DAEDALUS-B-unconstrained	58.94
36	GPLSI-B-constrained	57.49
37	DejaVu-B-constrained	57.43
38	BUAP-B-constrained	56.85
39	IBM_EG-B-constrained	54.51

38º: 0.5734





[Modelo 1]

# Testes – Twitter2013

[Negative phrase]: '@1DsHotTamale ~.~t u cant just tweet sum1 GUESS WHO IMMA SEE THURSDAY and NIT TWEET THEM BACK!! >.< lol'

[Polarity calculated]: 0.0

[Negative phrase]: '@laurensackett14 nooooo I am possibly going to be in dayton tomorrow night!!! :('

[Polarity calculated]: 0.0

[Negative phrase]: 'way too amped to sleep right now. it is physically impossible for me to take the SATs tomorrow'

[Polarity calculated]: 0.18980740970862975

[Negative phrase]: 'AUG 9TH St Practice Day. We havent reached St Patricks Day yet the snakes are still in Ireland - come in and get bitten! \$4 Snake Bites'

[Polarity calculated]: 0.0

[Negative phrase]: 'Gators cant get caught looking ahead to March: So tell me when does the NCAA Tournament start? <http://t.co/2BC1V6qR>'

[Polarity calculated]: 0.0

[Negative phrase]: '1st debate showed emperor has no clothes...Wonder how the court jester shoeless Joe will do against Ryan? #gop'

[Polarity calculated]: 1.0

[Negative phrase]: '@bdd9 Every day from work Monday had the Paley screening Tuesday had to run errands tonight auditions ran late. No break yet. :('

[Polarity calculated]: 1.1898074097086297

[Negative phrase]: 'I dont even feel like going to LCC on Saturday.'

[Polarity calculated]: 0.0

[Negative phrase]: '@Mc\_Squlzzy @Fresh\_Prince01 -\_\_- shid i may not be able 2 take screenshots of it but everybody @s me. Peyton Siva kikd me this morn #NoLie'

[Polarity calculated]: 0.0



[Modelo 1]

# Testes – Twitter2014

[Twitter2014 messages]

[messages evaluated]: 1853

[correct evaluations]: 1075 (591 positives, 120 negatives and 364 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5502

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.5801
Precisão	0.719	0.3561	0.5245	0.5332
Recall	0.6018	0.5941	0.5441	0.58
F1	0.6552	0.4453	0.5341	0.5449

Terminologia	Quantidade
Verdadeiro positivo	591
Falso positivo	231
Verdadeiro negativo	120
Falso negativo	217
Verdadeiro neutro	364
Falso neutro	330



[Modelo 1]

# Testes – Twitter2014

[Twitter2014 messages]

[messages evaluated]: 1853

[correct evaluations]: 1075 (591 positives, 120 negatives and 364 neutrals)

**[f1 avg SemEval (positive and negative)]: 0.5502**

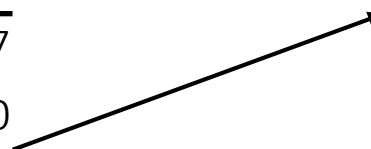
## SemEval 2014 – Twitter2014

1	TeamX-B-constrained	70.96
2	cooooll-B-constrained	70.14
3	RTRGO-B-constrained	69.95

...

40	SAP-RI-B-constrained	55.47
41	UMCC_DLSI_Sem-constrained	55.40
42	IBM_EG-B-constrained	52.26
43	Alberta-B-constrained	52.06
44	Isis_lif-B-constrained	52.02

42º: 0.5502





[Modelo 1]

# Testes – Twitter2014

```
[Negative phrase]: 'Your plans of attending the Great Yorkshire Show may have been washed out because of the weather, so how about... http://t.co/fEsAtbk8'  
[Polarity calculated]: 1.0  
[Negative phrase]: 'I wasnt around for Hot Jam, why is it even on a monday'  
[Polarity calculated]: 0.18980740970862975  
[Negative phrase]: '@rhymesayers a close 2nd is playing nothing but RSE on my drive to Soundset from California. Then nothing but RSE on the way back.'  
[Polarity calculated]: 0.0  
[Negative phrase]: 'Having the NY Marathon on Sunday is like having a parade in Raccoon city right after the T-Virus went airborne.'  
[Polarity calculated]: 1.0  
[Negative phrase]: 'Dont know why Im being a melt and just go Circoloco tomorrow'  
[Polarity calculated]: 0.0  
[Negative phrase]: 'RNDM has a beef with music videos Debut album ""Acts"" out on Oct 30, 2012  
https://t.co/aP2yNM2S'  
[Polarity calculated]: 0.0  
[Negative phrase]: '@VivaVHS Haha. Ive got to cut down mate, not looking forward to going through the WARNERS. Might try and sort small set tomorrow VESTRON.'  
[Polarity calculated]: 0.0  
[Negative phrase]: 'GC Event Update: Fridays event Fire in the Ashes, with Jonathan Kozol & Brian Jones, has been cancelled.'  
[Polarity calculated]: 0.0  
[Negative phrase]: 'Catelynn looked like a straight up street walker the 1st season of teen mom.'  
[Polarity calculated]: 0.0
```



[Modelo 1]

# Testes – SMS2013

[SMS2013 messages]

[messages evaluated]: 2093

[correct evaluations]: 1435 (286 positives, 208 negatives and 941 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5642

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6856
Precisão	0.5663	0.5843	0.7638	0.6381
Recall	0.5813	0.5279	0.7796	0.6296
F1	0.5737	0.5547	0.7716	0.6333

Terminologia	Quantidade
Verdadeiro positivo	286
Falso positivo	219
Verdadeiro negativo	208
Falso negativo	148
Verdadeiro neutro	941
Falso neutro	291





[Modelo 1]

# Testes – SMS2013

[SMS2013 messages]

[messages evaluated]: 2093

[correct evaluations]: 1435 (286 positives, 208 negatives and 941 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5642

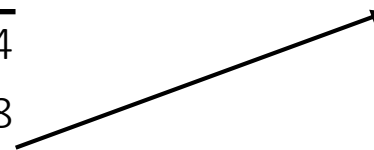
## SemEval 2014 – SMS2013

1	NRC-Canada-B-constrained	70.28
2	cooooll-B-constrained	67.68
3	RTRGO-B-constrained	67.51

...

29	SINAI-B-constrained	57.34
30	SAIL-B-constrained	56.98
31	senti.ue-B-unconstrained-late	56.16
32	KUNLPLab-B-constrained	55.89
33	DejaVu-B-constrained	55.57

31º: 0.5642





[Modelo 1]

# Testes – SMS2013

[Negative phrase]: 'Yar he quite clever but aft many guesses lor. He got ask me 2 bring but i thk darren not so willing 2 go. Aiya they thk leona still not attach wat.'

[Polarity calculated]: 0.0

[Negative phrase]: 'cannot . i dont have it with me now'

[Polarity calculated]: 0.0

[Negative phrase]: 'Havent yet. Think ard 8 plus n eat until 10 plus lah. Is it convenient if i come ard 10plus?'

[Polarity calculated]: 1.0

[Negative phrase]: 'Oh no now look like gonna rain'

[Polarity calculated]: 0.0

[Negative phrase]: 'I just finished my work. My foot injured just now. so painful. good night see you'

[Polarity calculated]: 0.18980740970862975

[Negative phrase]: 'not sure'

[Polarity calculated]: 0.0

[Negative phrase]: 'Can. Dunno wat to get 4 her...'

[Polarity calculated]: 0.0

[Negative phrase]: 'Huh so fast... Dat means u havent finished painting?'

[Polarity calculated]: 1.0

[Negative phrase]: 'Expected he will know cos u will tell him. But didnt know its so fast =) but if act as if i got bf also not gd. Deprive me of other chances haha...'

[Polarity calculated]: 0.18980740970862975

[Negative phrase]: 'me in class now. wats up ? cannot talk. call u when i finish'

[Polarity calculated]: 0.0

[Negative phrase]: 'Huh i cant thk of more oredi how many pages do we have?'

[Polarity calculated]: 0.0



[Modelo 1]

# Testes – LiveJournal

[LiveJournal2014 messages]

[messages evaluated]: 1142

[correct evaluations]: 739 (251 positives, 177 negatives and 311 neutrals)

[f1 avg SemEval (positive and negative)]: 0.64

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6471
Precisão	0.7583	0.658	0.5738	0.6634
Recall	0.5878	0.5822	0.7567	0.6422
F1	0.6623	0.6178	0.6527	0.6442

Terminologia	Quantidade
Verdadeiro positivo	251
Falso positivo	80
Verdadeiro negativo	177
Falso negativo	92
Verdadeiro neutro	311
Falso neutro	231



[Modelo 1]

# Testes – LiveJournal

[LiveJournal2014 messages]

[messages evaluated]: 1142

[correct evaluations]: 739 (251 positives, 177 negatives and 311 neutrals)

[f1 avg SemEval (positive and negative)]: 0.64

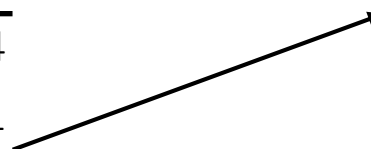
## SemEval 2014 – LiveJournal

1	NRC-Canada-B-constrained	74.84
2	CISUC_KIS-B-constrained-late	74.46
3	SentiKLUE-B-constrained	73.99

...

31	Citius-B-unconstrained	64.54
32	UPV-ELiRF-B-constrained	64.11
33	KUNLPLab-B-constrained	63.77
34	Citius-B-constrained	62.40
35	Isis_lif-B-constrained	61.09

33º: 0.64





[Modelo 1]

# Testes – LiveJournal

```
[Negative phrase]: 'LLLINKKK LLLINKKK i have not slept very much this week .'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: 'Oh god ... I can not imagine what you must be going through right now .'
```

```
[Polarity calculated]: 1.0
```

```
[Negative phrase]: 'They said they are not really hiring till next month or something .'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: 'I do not know if I can , I have to work on Sunday ...'
```

```
[Polarity calculated]: 1.0
```

```
[Negative phrase]: 'People also do not like to look at relisted auctions , and I relsited two .'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: 'The Royal Rainbow does not go there .'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: 'I did not know you had a baby , I guess it has been a while since we spoke .'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: '(I do not altogether buy the `` true trolls know they are trolls axiom.)'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: 'Well , the gist of it is I am still undecided , and that is why I had not thrown anything away yet .'
```

```
[Polarity calculated]: 0.18980740970862975
```

```
[Negative phrase]: '`` Nope -- can not happen to me ... ZZZZT !!!'
```

```
[Polarity calculated]: 0.0
```

```
[Negative phrase]: 'I never found mushrooms though , which would be cool .'
```

```
[Polarity calculated]: 1.0
```

```
[Negative phrase]: 'I dont have too many interests to post anyway ... ;-).'
```

```
[Polarity calculated]: 1.0
```



[Modelo 1]

# Testes – Sarcasm

[Twitter2014Sarcasm messages]

[messages evaluated]: 86

[correct evaluations]: 34 (19 positives, 7 negatives and 8 neutrals)

[f1 avg SemEval (positive and negative)]: 0.384

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.3953
Precisão	0.4634	0.4667	0.2667	0.3989
Recall	0.5758	0.175	0.6154	0.4554
F1	0.5135	0.2545	0.3721	0.3801

Terminologia	Quantidade
Verdadeiro positivo	19
Falso positivo	22
Verdadeiro negativo	7
Falso negativo	8
Verdadeiro neutro	8
Falso neutro	22



[Modelo 1]

# Testes – Sarcasm

[Twitter2014Sarcasm messages]

[messages evaluated]: 86

[correct evaluations]: 34 (19 positives, 7 negatives and 8 neutrals)

[f1 avg SemEval (positive and negative)]: 0.384

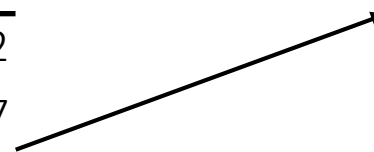
## SemEval 2014 – LiveJournal

1	NRC-Canada-B-constrained	58.16
2	SAIL-B-constrained	57.26
3	TeamX-B-constrained	56.50

...

41	columbia_nlp-B-constrained	40.02
42	University-of-Warwick-B-constrained	39.77
43	UPV-ELiRF-B-constrained	37.46
44	IITPatna-B-constrained	36.73
45	DAEDALUS-B-unconstrained	35.26

43º: 0.384



# Testes – Sarcasm



[Modelo 1]

[Negative phrase]: 'Uhg, my procedure isnt even until tomorrow, and the clinic is already screwing up. Good signs, definitely good'

[Polarity calculated]: 2.0

[Negative phrase]: 'Thanks manager for putting me on the schedule for Sunday'

[Polarity calculated]: 0.0

[Negative phrase]: 'Not stoked at all for youth group tomorrow'

[Polarity calculated]: 0.0

[Negative phrase]: 'Single awareness day is on Friday and I cant wait! #ValentinesDayCanSuckIt'

[Polarity calculated]: 0.0

[Negative phrase]: '@MetroNorth wall to wall people on the platform at South Norwalk waiting for the 8:08. Thanks for the Sat. Sched. Great sense'

[Polarity calculated]: 1.0

[Negative phrase]: 'Work tomorrow is gonna be so fun #tired'

[Polarity calculated]: 1.1898074097086297

[Negative phrase]: 'On the bright side we have school today... Tomorrow and the day after ! #killmenow'

[Polarity calculated]: 1.0

[Negative phrase]: 'its supposed to snow from midnight tonight until 6pm tomorrow? oh well thats friggin awesome'

[Polarity calculated]: 0.18980740970862975

[Negative phrase]: 'Oh goodie its gonna be a snow storm tomorrow morning! Fun commute coming! Winter is awesome!'

[Polarity calculated]: 2.0

[Negative phrase]: 'Running 3 miles at 730am is what Im really looking forward to tomorrow. #asthmaticproblems'

[Polarity calculated]: 0.0





[Modelo 1]

# Testes – All messages

[All messages]

[messages evaluated]: 8987

[correct evaluations]: 5584 (2137 positives, 874 negatives and 2573 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5792

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6213
Precisão	0.6689	0.481	0.6473	0.5991
Recall	0.6095	0.5672	0.653	0.6099
F1	0.6378	0.5205	0.6502	0.6028

Terminologia	Quantidade
Verdadeiro positivo	2137
Falso positivo	1058
Verdadeiro negativo	874
Falso negativo	943
Verdadeiro neutro	2573
Falso neutro	1402



# Treino – Modelo 2

```
## Results ##
```

```
[total tweets]: 4200 [1400 positives, 1400 negatives and 1400 neutrals]
```

```
[best fitness (F1 avg (+/-))]: 0.6368247476035865 [2553 correct evaluations] [925 positives, 775 negatives and 853 neutrals]
```

```
## Model ##
```

```
if_then_else(hasEmoticons(stemmingText(x)),  
emoticonsPolaritySum(removeEllipsis(removeStopWords(removeEllipsis(stemmingText(x))))),  
polaritySum(removeAllPunctuation(removeStopWords(replaceNegatingWords(removeEllipsis(removeEllipsis(x)))))))
```



[Modelo 2]

# Testes – Twitter2013

[Twitter2013 messages]

[messages evaluated]: 3813

[correct evaluations]: 2300 (990 positives, 361 negatives and 949 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5793

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6103
Precisão	0.6752	0.4646	0.61	0.5832
Recall	0.6571	0.5241	0.597	0.5927
F1	0.666	0.4926	0.6034	0.5873

Terminologia	Quantidade
Verdadeiro positivo	1033
Falso positivo	497
Verdadeiro negativo	315
Falso negativo	363
Verdadeiro neutro	979
Falso neutro	626



[Modelo 2]

# Testes – Twitter2013

[Twitter2013 messages]

[messages evaluated]: 3813

[correct evaluations]: 2300 (990 positives, 361 negatives and 949 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5793

## SemEval 2014 – Twitter2013

1	TeamX-B-constrained	72.12
2	NRC-Canada-B-constrained	70.75
3	coooolll-B-constrained	70.40

...

35	DAEDALUS-B-unconstrained	58.94
36	GPLSI-B-constrained	57.49
37	DejaVu-B-constrained	57.43
38	BUAP-B-constrained	56.85
39	IBM_EG-B-constrained	54.51

36º: 0.5793



[Modelo 2]

# Testes – Twitter2013

[Negative phrase]: '@1DsHotTamale ~.~t u cant just tweet sum1 GUESS WHO IMMA SEE THURSDAY and NIT TWEET THEM BACK!! >.< lol'

[Polarity calculated]: 1

[Negative phrase]: 'Sydney Dalton 1st Bieber now 1D? youre such an attention seeker. you have nothing else better to do than ripping up posters. FUCK YOU'

[Polarity calculated]: 0

[Negative phrase]: 'way too amped to sleep right now. it is physically impossible for me to take the SATs tomorrow'

[Polarity calculated]: 0

[Negative phrase]: 'Trey Burke has been suspended for the Northern Michigan game (exhibition) tomorrow. <http://t.co/oefkAE1W>'

[Polarity calculated]: 0

[Negative phrase]: 'Becoming dangerously obsessed with one of tomorrows Melodifestivalen songs. Im sure you can see why. <http://t.co/UItTiPrg>'

[Polarity calculated]: 0

[Negative phrase]: 'AUG 9TH St Practice Day. We havent reached St Patricks Day yet the snakes are still in Ireland - come in and get bitten! \$4 Snake Bites'

[Polarity calculated]: 0

[Negative phrase]: 'Gators cant get caught looking ahead to March: So tell me when does the NCAA Tournament start? <http://t.co/2BC1V6qR>'

[Polarity calculated]: 0

[Negative phrase]: '1st debate showed emperor has no clothes...Wonder how the court jester shoeless Joe will do against Ryan? #gop'

[Polarity calculated]: 1



[Modelo 2]

# Testes – Twitter2014

[Twitter2014 messages]

[messages evaluated]: 1853

[correct evaluations]: 1075 (591 positives, 120 negatives and 364 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5612

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.5904
Precisão	0.7336	0.4	0.5026	0.5454
Recall	0.6141	0.5248	0.5755	0.5714
F1	0.6685	0.454	0.5366	0.553

Terminologia	Quantidade
Verdadeiro positivo	603
Falso positivo	219
Verdadeiro negativo	106
Falso negativo	159
Verdadeiro neutro	385
Falso neutro	381



[Modelo 2]

# Testes – Twitter2014

[Twitter2014 messages]

[messages evaluated]: 1853

[correct evaluations]: 1075 (591 positives, 120 negatives and 364 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5612

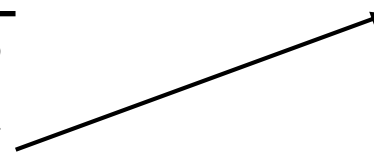
## SemEval 2014 – Twitter2014

1	TeamX-B-constrained	70.96
2	cooooll-B-constrained	70.14
3	RTRGO-B-constrained	69.95

...

36	Indian_Institute_of_Technology-Patna-B-const	57.25
37	DejaVu-B-constrained	57.02
38	GPLSI-B-constrained	56.06
39	BUAP-B-constrained	55.76
40	SAP-RI-B-constrained	55.47

38º: 0.5612



# Testes – Twitter2014



[Modelo 2]

```
[Negative phrase]: 'Your plans of attending the Great Yorkshire Show may have been washed out because of the
weather, so how about... http://t.co/fEsAtbk8'
[Polarity calculated]: 1
[Negative phrase]: 'I wasnt around for Hot Jam, why is it even on a monday'
[Polarity calculated]: 0
[Negative phrase]: '@rhymesayers a close 2nd is playing nothing but RSE on my drive to Soundset from California.
Then nothing but RSE on the way back.'
[Polarity calculated]: 0
[Negative phrase]: 'Having the NY Marathon on Sunday is like having a parade in Raccoon city right after the T-
Virus went airborne.'
[Polarity calculated]: 1
[Negative phrase]: 'Having to work a Sunday but a Sunday of the Edinburgh Derby #grim'
[Polarity calculated]: 0
[Negative phrase]: 'Dont know why Im being a melt and just go Circoloco tomorrow'
[Polarity calculated]: 0
[Negative phrase]: 'RNDM has a beef with music videos Debut album ""Acts"" out on Oct 30, 2012
https://t.co/aP2yNM2S'
[Polarity calculated]: 0
[Negative phrase]: '@VivaVHS Haha. Ive got to cut down mate, not looking forward to going through the WARNERS.
Might try and sort small set tomorrow VESTRON.'
[Polarity calculated]: 0
[Negative phrase]: 'GC Event Update: Fridays event Fire in the Ashes, with Jonathan Kozol & Brian Jones, has
been cancelled.'
[Polarity calculated]: 0
```





[Modelo 2]

# Testes – SMS2013

[SMS2013 messages]

[messages evaluated]: 2093

[correct evaluations]: 1435 (286 positives, 208 negatives and 941 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5667

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6823
Precisão	0.5662	0.6337	0.7415	0.6471
Recall	0.5996	0.4873	0.7796	0.6222
F1	0.5824	0.5509	0.7601	0.6312

Terminologia	Quantidade
Verdadeiro positivo	295
Falso positivo	226
Verdadeiro negativo	192
Falso negativo	111
Verdadeiro neutro	941
Falso neutro	328



[Modelo 2]

# Testes – SMS2013

[SMS2013 messages]

[messages evaluated]: 2093

[correct evaluations]: 1435 (286 positives, 208 negatives and 941 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5667

## SemEval 2014 – SMS2013

1	NRC-Canada-B-constrained	70.28
2	coooolll-B-constrained	67.68
3	RTRGO-B-constrained	67.51

...

29	SINAI-B-constrained	57.34
30	SAIL-B-constrained	56.98
31	senti.ue-B-unconstrained-late	56.16
32	KUNLPLab-B-constrained	55.89
33	DejaVu-B-constrained	55.57

31º: 0.5667

# Testes – SMS2013



[Modelo 2]

[Negative phrase]: 'Yar he quite clever but aft many guesses lor. He got ask me 2 bring but i thk darren not so willing 2 go. Aiya they thk leona still not attach wat.'

[Polarity calculated]: 0

[Negative phrase]: 'cannot . i dont have it with me now'

[Polarity calculated]: 0

[Negative phrase]: 'Havent yet. Think ard 8 plus n eat until 10 plus lah. Is it convenient if i come ard 10plus?'

[Polarity calculated]: 1

[Negative phrase]: 'Oh no now look like gonna rain'

[Polarity calculated]: 0

[Negative phrase]: 'I just finished my work. My foot injured just now. so painful. good night see you'

[Polarity calculated]: 1

[Negative phrase]: 'not sure'

[Polarity calculated]: 0

[Negative phrase]: 'Can. Dunno wat to get 4 her...'

[Polarity calculated]: 0

[Negative phrase]: 'Expected he will know cos u will tell him. But didnt know its so fast =) but if act as if i got bf also not gd. Deprive me of other chances haha...'

[Polarity calculated]: 1

[Negative phrase]: 'me in class now. wats up ? cannot talk. call u when i finish'

[Polarity calculated]: 0

[Negative phrase]: 'U cant pressure me ill make u fat hee... OK lar i dun say anything let my dad cook as much as he likes.'

[Polarity calculated]: 0



[Modelo 2]

# Testes – LiveJournal

[LiveJournal2014 messages]

[messages evaluated]: 1142

[correct evaluations]: 739 (251 positives, 177 negatives and 311 neutrals)

[f1 avg SemEval (positive and negative)]: 0.6311

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6357
Precisão	0.745	0.6996	0.5439	0.6628
Recall	0.6089	0.5132	0.7543	0.6254
F1	0.6701	0.592	0.632	0.6314

Terminologia	Quantidade
Verdadeiro positivo	260
Falso positivo	89
Verdadeiro negativo	156
Falso negativo	67
Verdadeiro neutro	310
Falso neutro	260



[Modelo 2]

# Testes – LiveJournal

[LiveJournal2014 messages]

[messages evaluated]: 1142

[correct evaluations]: 739 (251 positives, 177 negatives and 311 neutrals)

[f1 avg SemEval (positive and negative)]: 0.6311

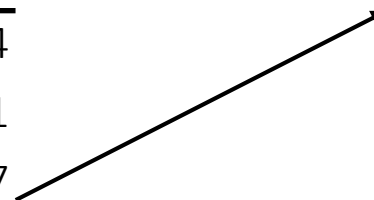
## SemEval 2014 – LiveJournal

1	NRC-Canada-B-constrained	74.84
2	CISUC_KIS-B-constrained-late	74.46
3	SentiKLUE-B-constrained	73.99

...

31	Citius-B-unconstrained	64.54
32	UPV-ELiRF-B-constrained	64.11
33	KUNLPLab-B-constrained	63.77
34	Citius-B-constrained	62.40
35	Isis_lif-B-constrained	61.09

34º: 0.6311





[Modelo 2]

# Testes – LiveJournal

```
[Negative phrase]: 'it sounds really bad but it just couldnt have been worse timing .'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'LLLINKKK LLLINKKK i have not slept very much this week .'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'Oh god ... I can not imagine what you must be going through right now .'
```

```
[Polarity calculated]: 1
```

```
[Negative phrase]: 'it is so hard to be a renaissance woman anymore ... knowledge is so specific anymore , and so much of it .'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'They said they are not really hiring till next month or something .'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'I do not know if I can , I have to work on Sunday ...'
```

```
[Polarity calculated]: 1
```

```
[Negative phrase]: 'People also do not like to look at relisted auctions , and I relsited two .'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'I did not know you had a baby , I guess it has been a while since we spoke .'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'Everyone is doing live stream things , and I keep missing tem !'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: '(I do not altogether buy the `` true trolls know they are trolls axiom.)'
```

```
[Polarity calculated]: 0
```

```
[Negative phrase]: 'Well , the gist of it is I am still undecided , and that is why I had not thrown anything away yet .'
```

```
[Polarity calculated]: 0
```



[Modelo 2]

# Testes – Sarcasm

[Twitter2014Sarcasm messages]

[messages evaluated]: 86

[correct evaluations]: 34 (19 positives, 7 negatives and 8 neutrals)

[f1 avg SemEval (positive and negative)]: 0.3867

Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.3953
Precisão	0.4762	0.6	0.2353	0.4372
Recall	0.6061	0.15	0.6154	0.4571
F1	0.5333	0.24	0.3404	0.3713

Terminologia	Quantidade
Verdadeiro positivo	20
Falso positivo	22
Verdadeiro negativo	6
Falso negativo	4
Verdadeiro neutro	8
Falso neutro	26



[Modelo 2]

# Testes – Sarcasm

[Twitter2014Sarcasm messages]

[messages evaluated]: 86

[correct evaluations]: 34 (19 positives, 7 negatives and 8 neutrals)

[f1 avg SemEval (positive and negative)]: 0.3867

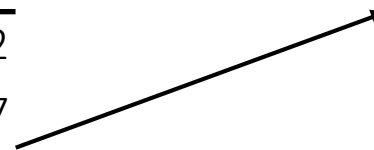
## SemEval 2014 – LiveJournal

1	NRC-Canada-B-constrained	58.16
2	SAIL-B-constrained	57.26
3	TeamX-B-constrained	56.50

...

41	columbia_nlp-B-constrained	40.02
42	University-of-Warwick-B-constrained	39.77
43	UPV-ELiRF-B-constrained	37.46
44	IITPatna-B-constrained	36.73
45	DAEDALUS-B-unconstrained	35.26

43º: 0.3867





# Testes – Sarcasm



[Modelo 2]

```
[Negative phrase]: 'Uhg, my procedure isnt even until tomorrow, and the clinic is already screwing up. Good signs, definitely good'  
[Polarity calculated]: 2  
[Negative phrase]: 'Thanks manager for putting me on the schedule for Sunday'  
[Polarity calculated]: 0  
[Negative phrase]: 'Not stoked at all for youth group tomorrow'  
[Polarity calculated]: 0  
[Negative phrase]: 'Single awareness day is on Friday and I cant wait! #ValentinesDayCanSuckIt'  
[Polarity calculated]: 0  
[Negative phrase]: '@MetroNorth wall to wall people on the platform at South Norwalk waiting for the 8:08. Thanks for the Sat. Sched. Great sense'  
[Polarity calculated]: 1  
[Negative phrase]: 'Work tomorrow is gonna be so fun #tired'  
[Polarity calculated]: 1  
[Negative phrase]: 'On the bright side we have school today... Tomorrow and the day after ! #killmenow'  
[Polarity calculated]: 1  
[Negative phrase]: 'RT @ebenson12: I cant wait to read all the tweets from all of the girls bitching about being single tomorrow! #myfavorite'  
[Polarity calculated]: 0  
[Negative phrase]: 'its supposed to snow from midnight tonight until 6pm tomorrow? oh well thats friggin awesome'  
[Polarity calculated]: 1  
[Negative phrase]: 'Oh goodie its gonna be a snow storm tomorrow morning! Fun commute coming! Winter is awesome!'  
[Polarity calculated]: 2
```



[Modelo 2]

# Testes – All messages

[All messages]

[messages evaluated]: 8987

[correct evaluations]: 5584 (2137 positives, 874 negatives and 2573 neutrals)

[f1 avg SemEval (positive and negative)]: 0.5832

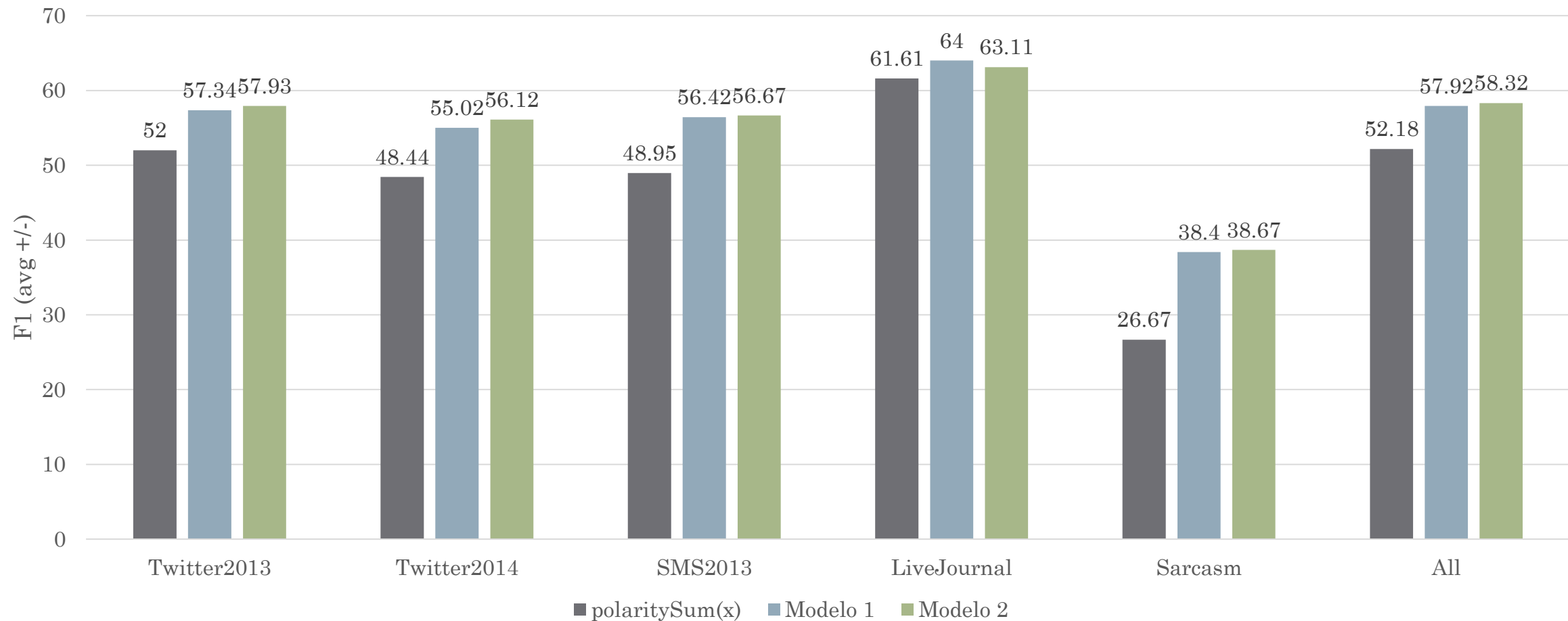
Métrica	Positivo	Negativo	Neutro	Média
Acurácia	-	-	-	0.6241
Precisão	0.6774	0.524	0.618	0.6065
Recall	0.6306	0.5029	0.6657	0.5998
F1	0.6532	0.5132	0.641	0.6025

Terminologia	Quantidade
Verdadeiro positivo	2211
Falso positivo	1053
Verdadeiro negativo	775
Falso negativo	704
Verdadeiro neutro	2623
Falso neutro	1621



# Resultados modelos

F1 (avg +/-) por base





# Resultados – All messages

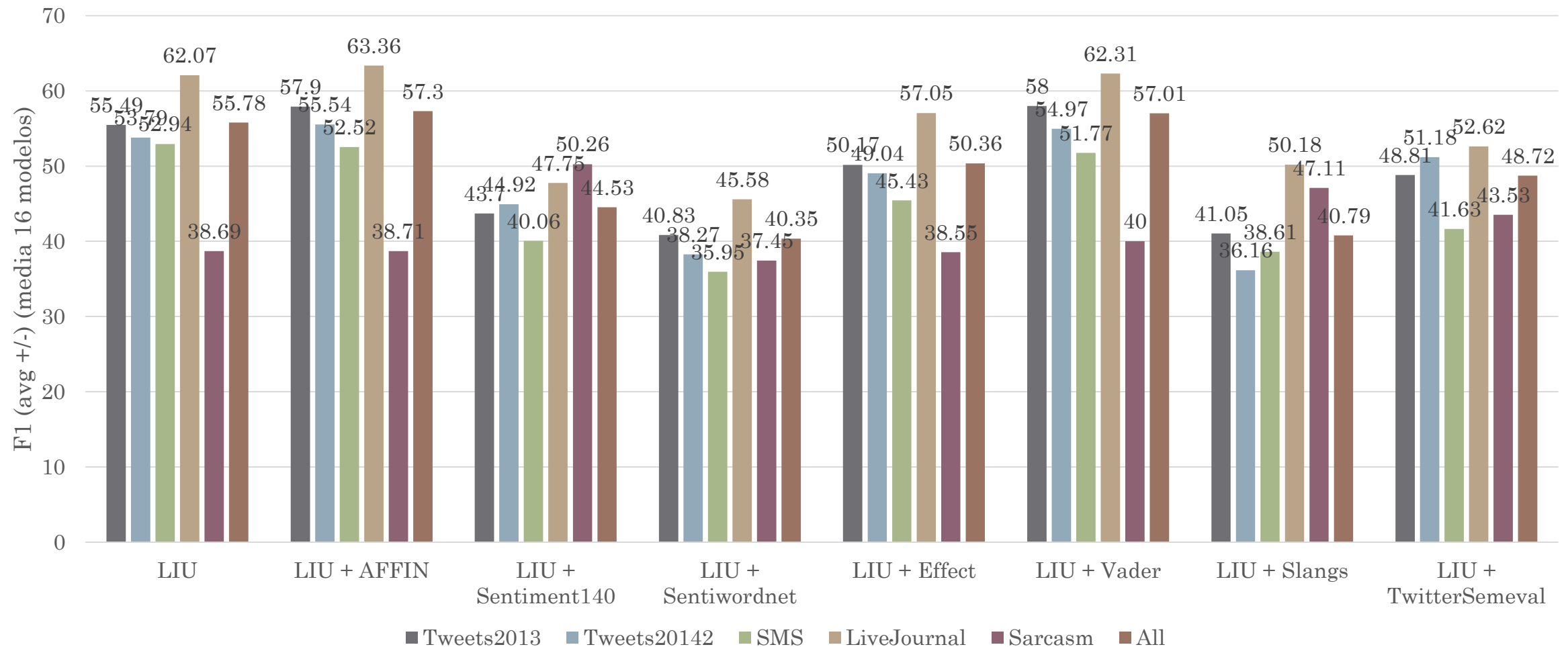
Métrica	polaritySum(x)	Modelo 1	Modelo 2
Acurácia	0.5941	0.6213	<b>0.6241</b>
Precisão (avg)	0.5786	0.5991	<b>0.6065</b>
Recall (avg)	0.5578	<b>0.6099</b>	0.5998
F1 (avg)	0.5622	<b>0.6028</b>	0.6025
F1 (avg +/-)	0.5218	0.5792	<b>0.5832</b>
Verdadeiro positivo	1845	2137	<b>2211</b>
Falso positivo	891	<b>1058</b>	1053
Verdadeiro negativo	659	<b>874</b>	775
Falso negativo	713	<b>943</b>	704
Verdadeiro neutro	<b>2835</b>	2573	2623
Falso neutro	<b>2044</b>	1402	1621

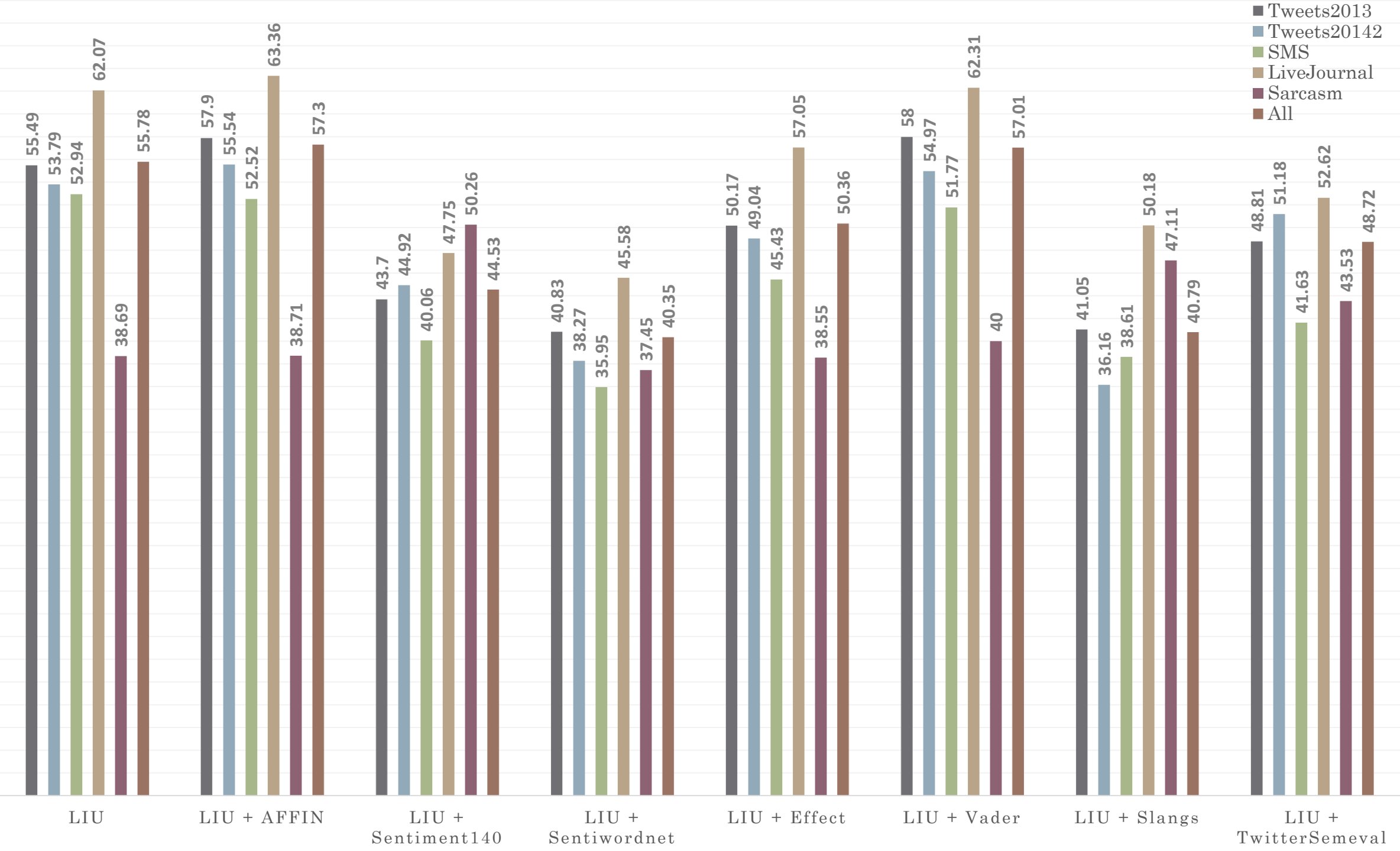
# Resultados II



# Resultados média modelos

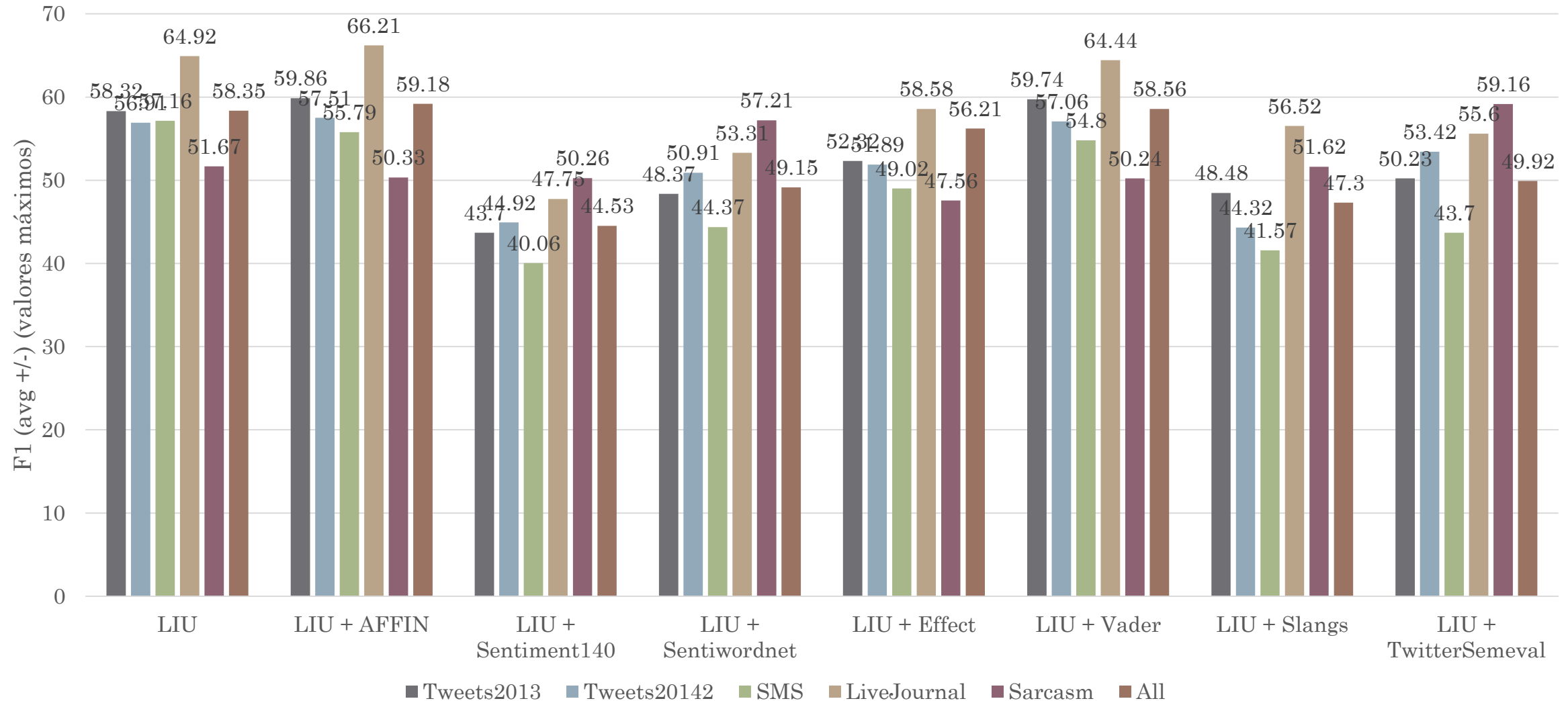
F1 (avg +/-) por base e conjunto de dicionários utilizados



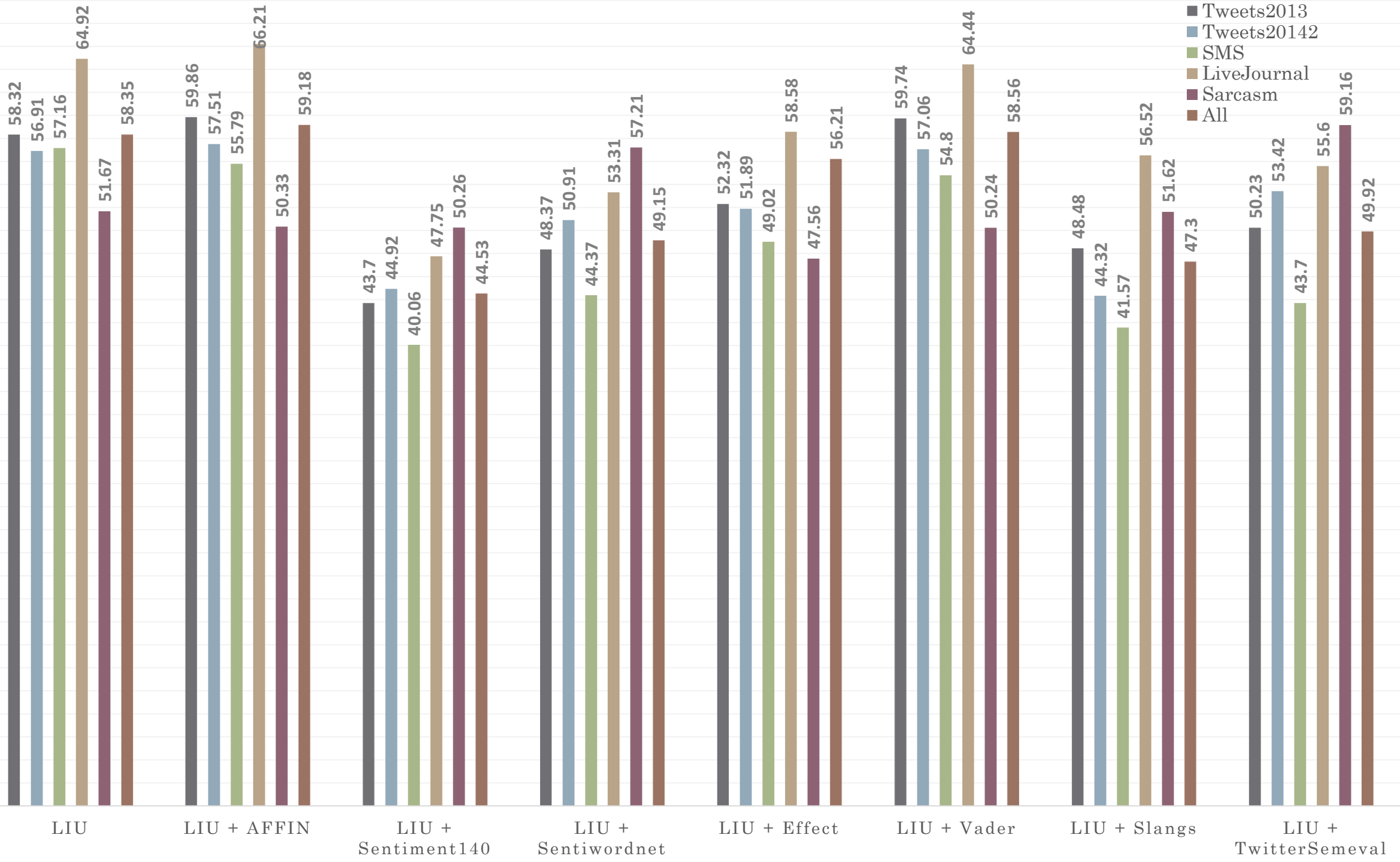




# Resultados máximos modelos







# Resultados III

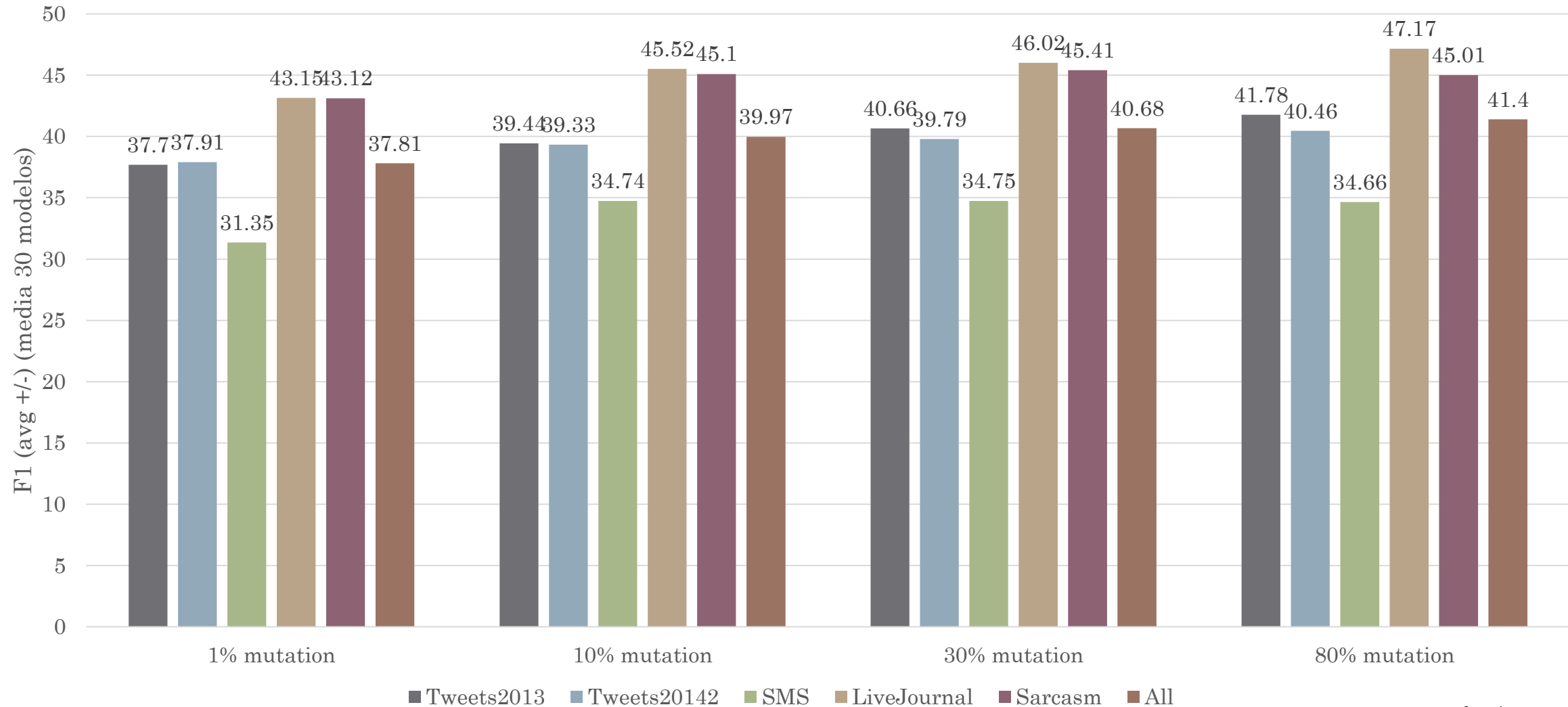
# Parametrização PG

População	Gerações	Crossover	Criação	Op. Mutaçao	Elitismo
50	50	60%	Half and Half	Uniform	Sim

Dicionários	Treinamento	Funções	
LIU	SemEval 2014	positiveHashtags	hasEmoticons
AFFIN	1400 positivas	negativeHashtags	if_then_else
Effect Lexicon	1400 negativas	positiveEmoticons	stemmingText
Vader	1400 neutras	negativeEmoticons	removeStopWords
SlangSD		polaritySum	removeLinks
Sentiment140		hashtagPolaritySum	removeEllipsis
		emoticonsPolaritySum	removeAllPunctuation
		positiveWordsQuantity	replaceNegatingWords
		negativeWordsQuantity	replaceBoosterWords
		hasHashtag	boostUpperCase

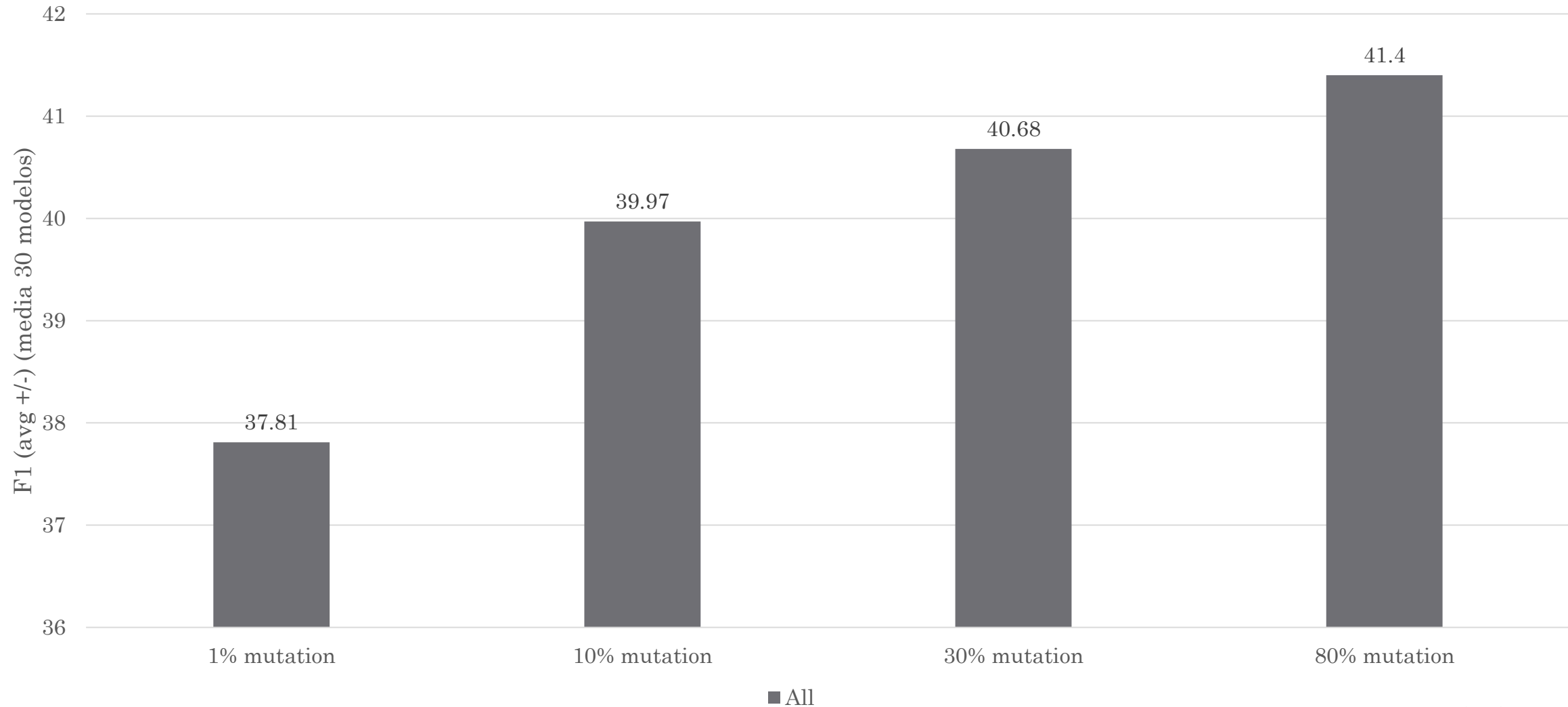


# Resultados parametrizações





# Resultados parametrizações



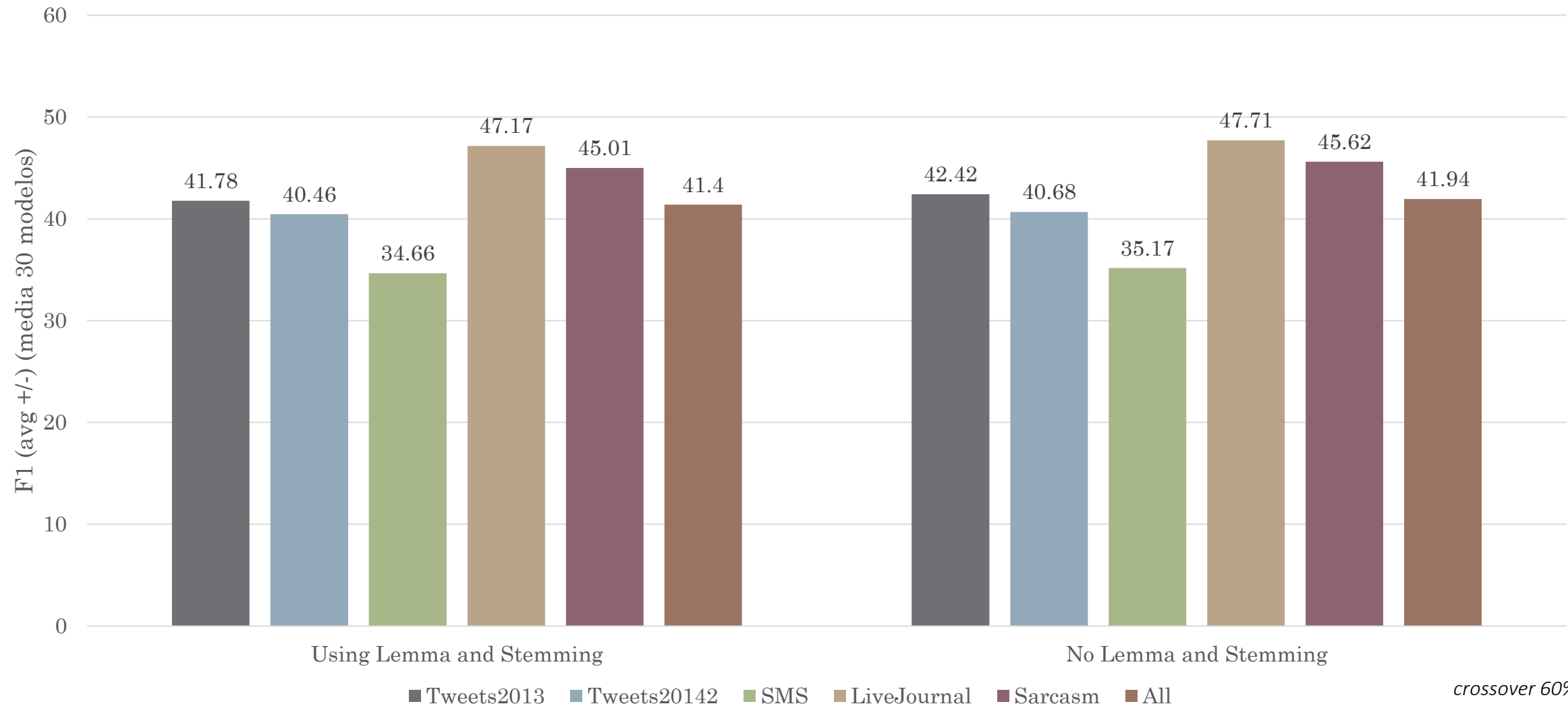
OBS: crossover fixado em 60%

# Otimização de tempo

- Remoção das funções de Lemma e Stemming
- Teste com os melhores parâmetros anteriores
  - Crossover 60%
  - Mutação 80%



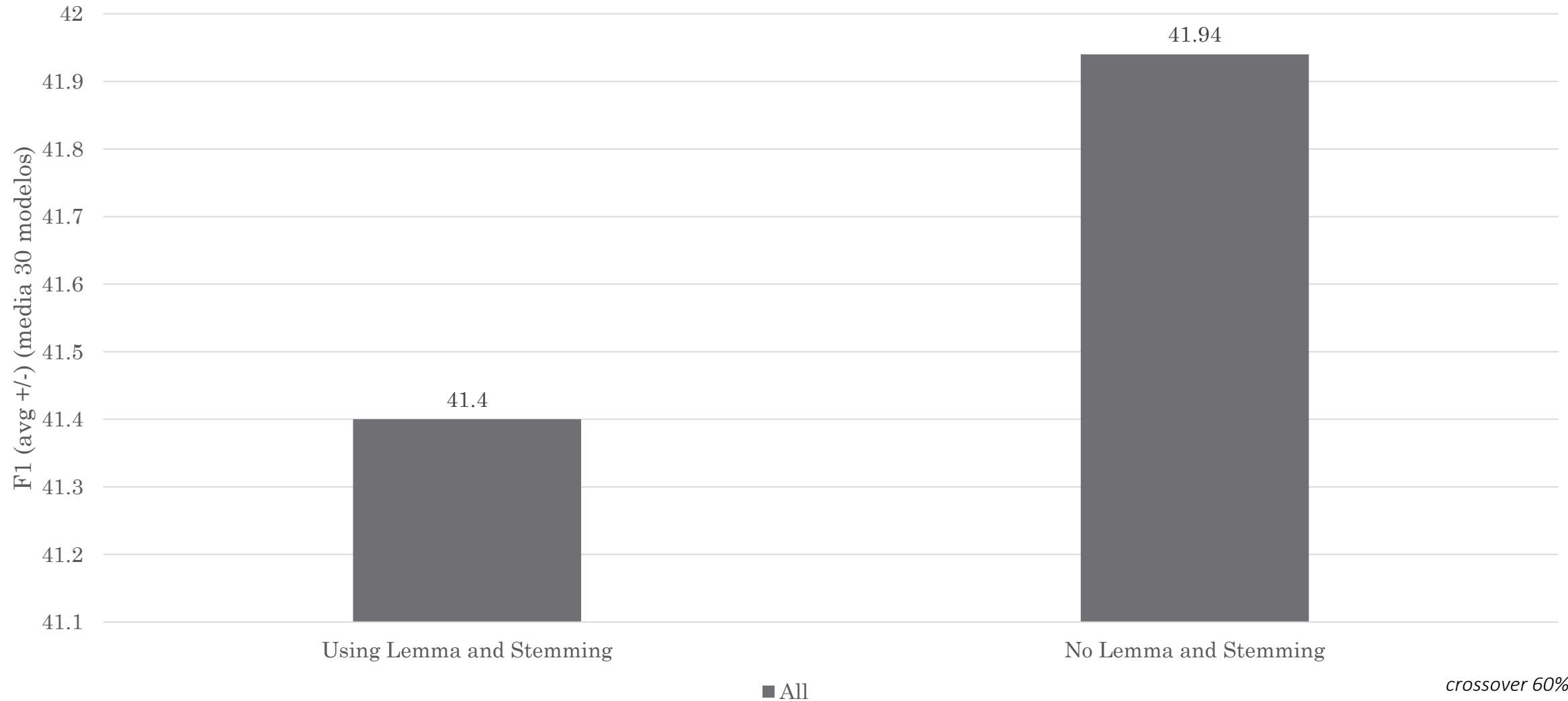
# Comparação dos resultados



*crossover 60%  
mutation 80%*



# Comparação dos resultados



*crossover 60%  
mutation 80%*



# Próximos passos

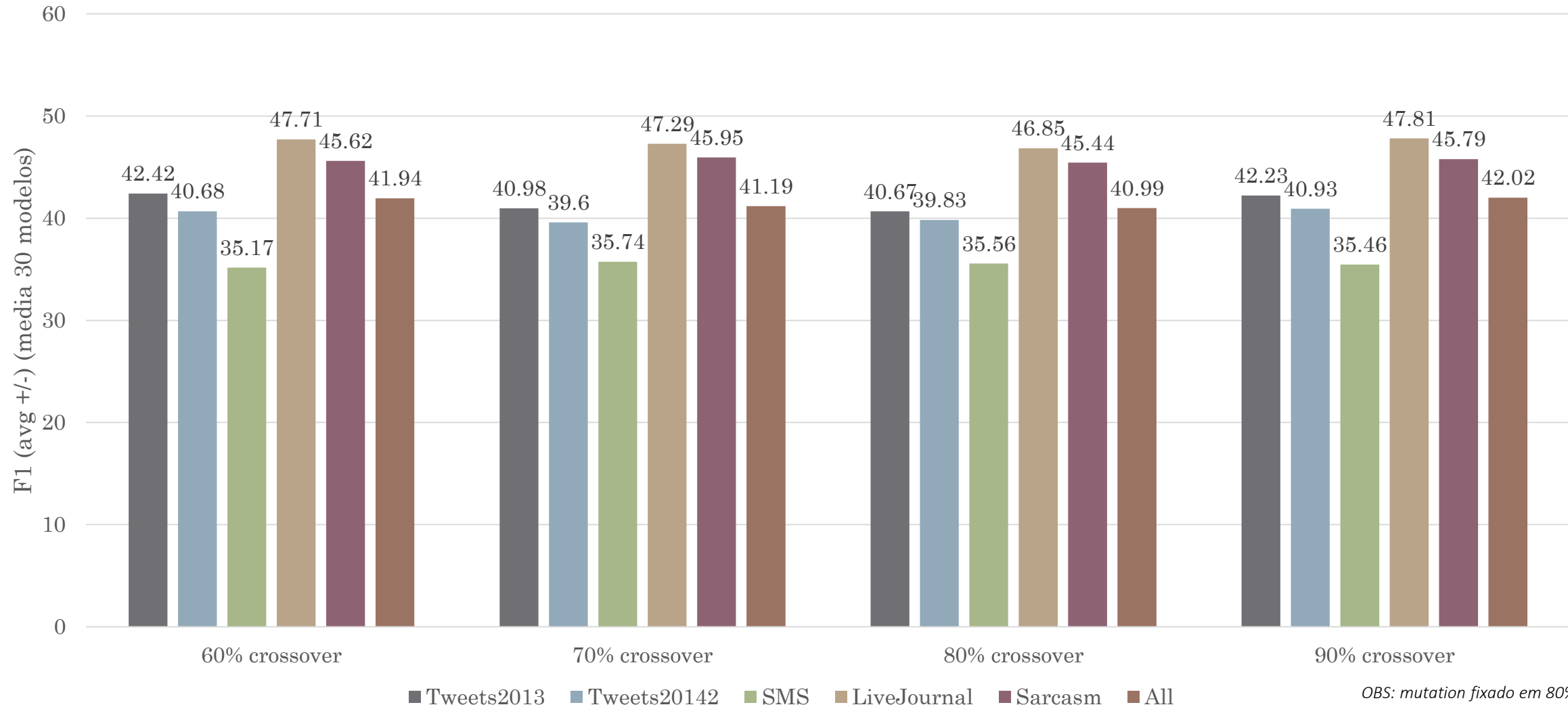
- Parametrizar crossover
- Incrementar valores de gerações e população;
- Parametrizar dicionários

# Parametrização *crossover*

- 60% ... 90%
- Fixar mutação em 80%
- Sem Stemming e Lemma
- Teste com a base balanceada



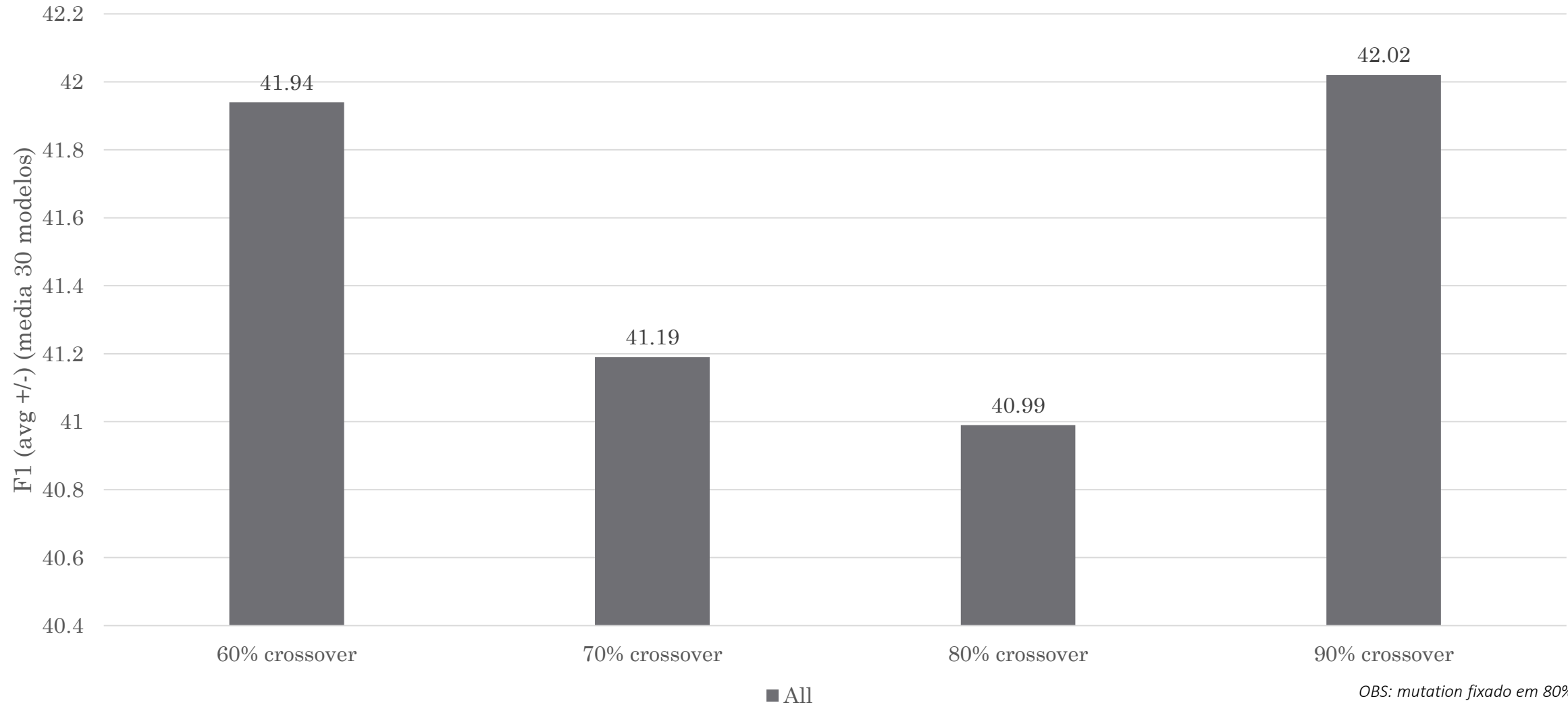
# Resultados parametrizações



OBS: mutation fixado em 80%  
No Stem and Lemma



# Resultados parametrizações

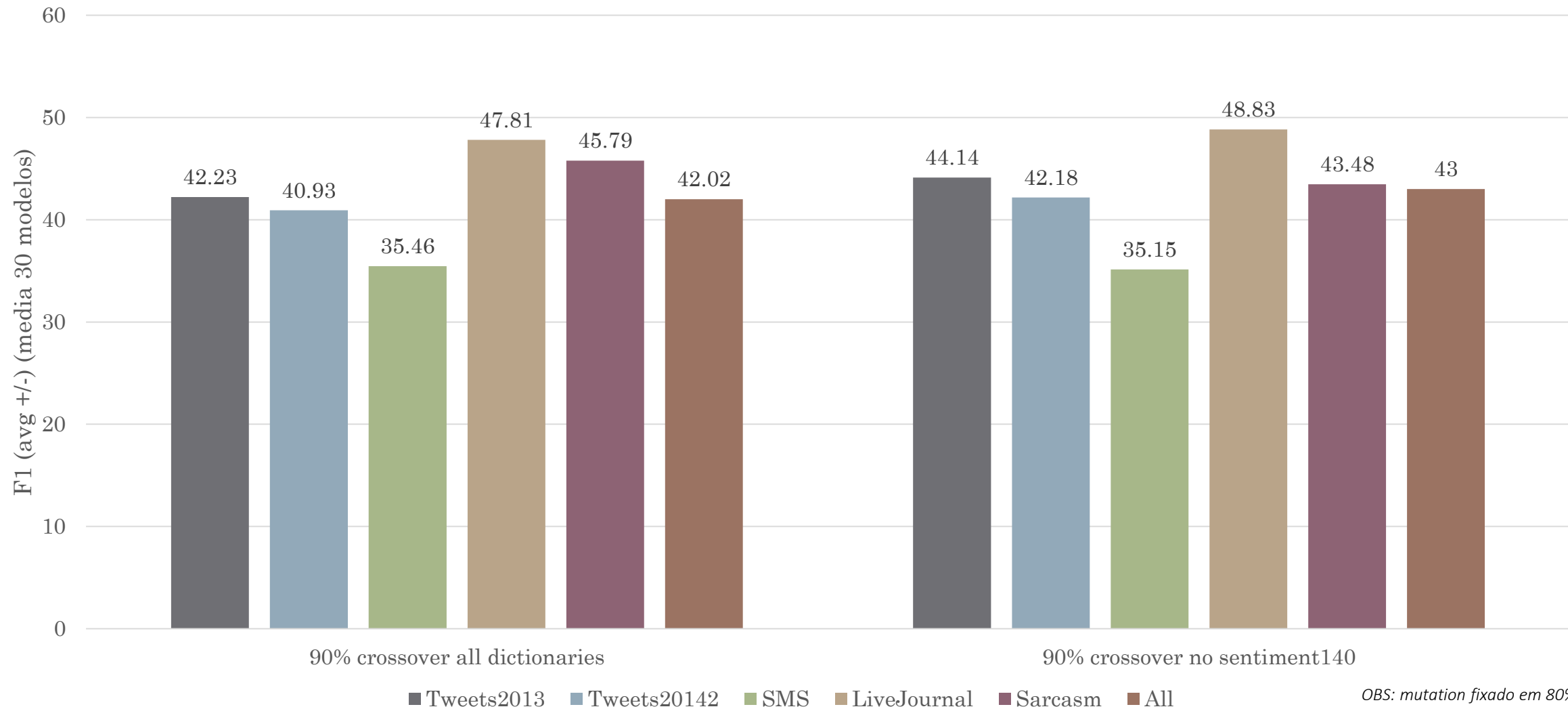


# Parametrização

- Remoção do dicionário sentiment140
  - Obteve piores resultados na parametrização dos dicionários
- Testar com os melhores valores de *crossover* e mutação
  - *crossover* 90%
  - mutação 80%



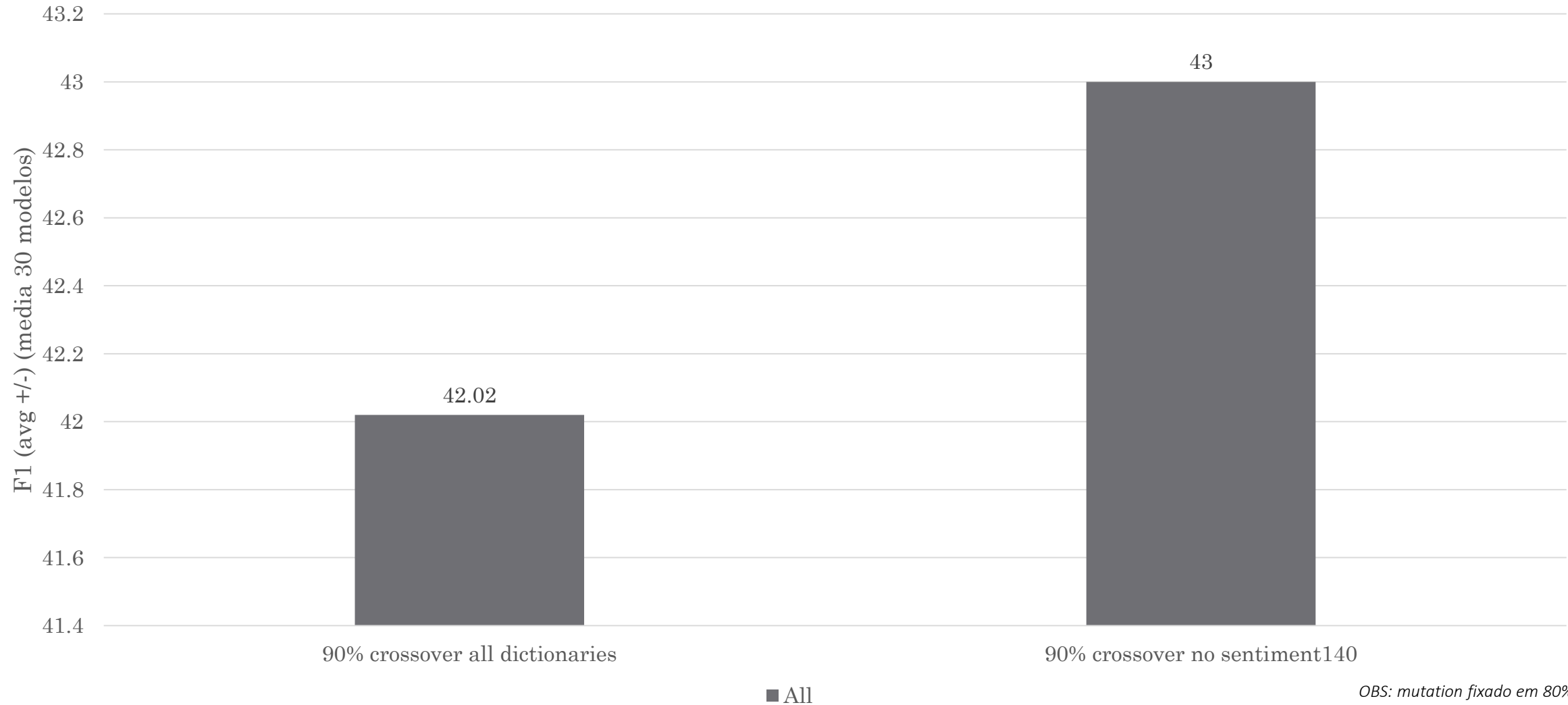
# Remoção *sentiment140*



OBS: mutation fixado em 80%  
No Stem and Lemma



# Remoção *sentiment140*



OBS: mutation fixado em 80%  
No Stem and Lemma

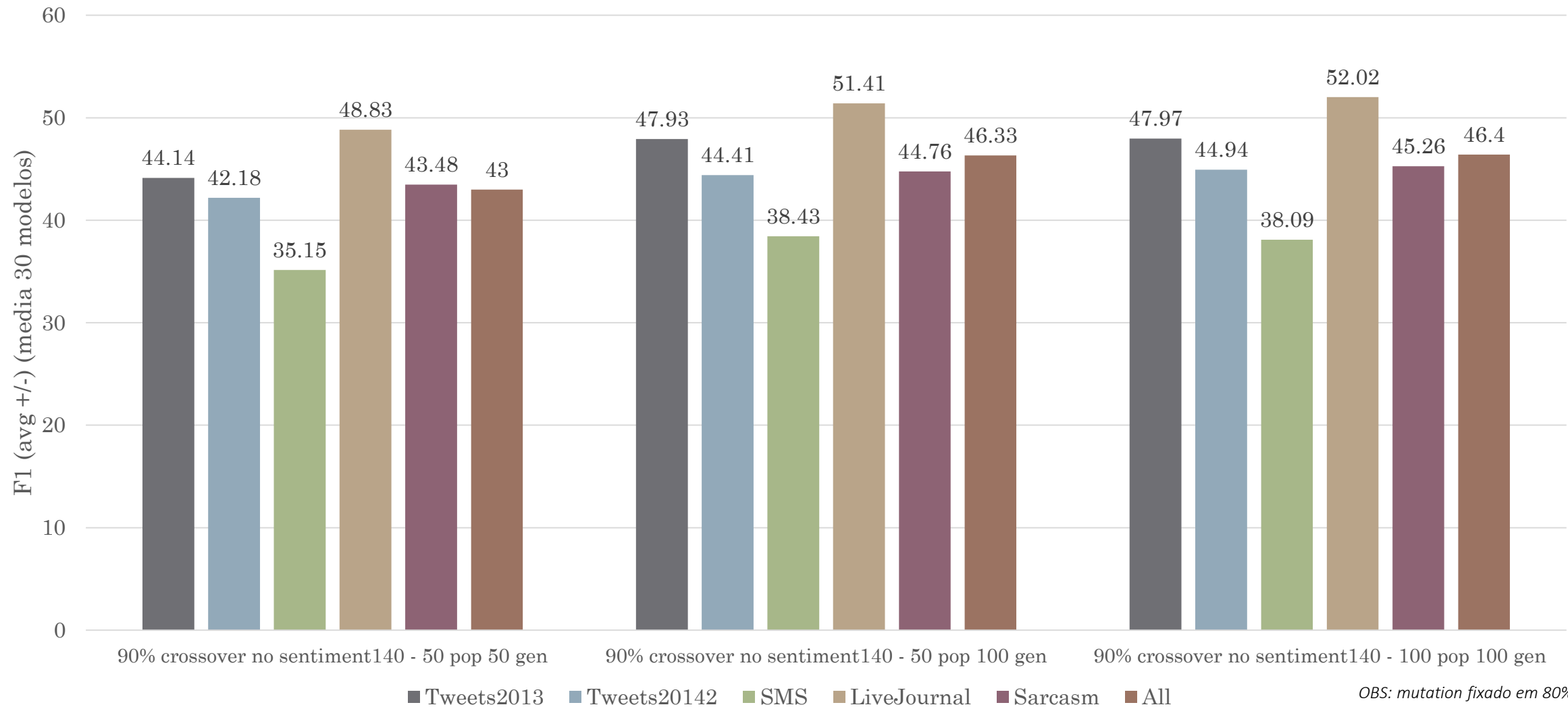
# Parametrização

- Aumento nos parâmetros de população e gerações
  - Teste inicial
    - População mantida em 50
    - Geração ampliada para 100





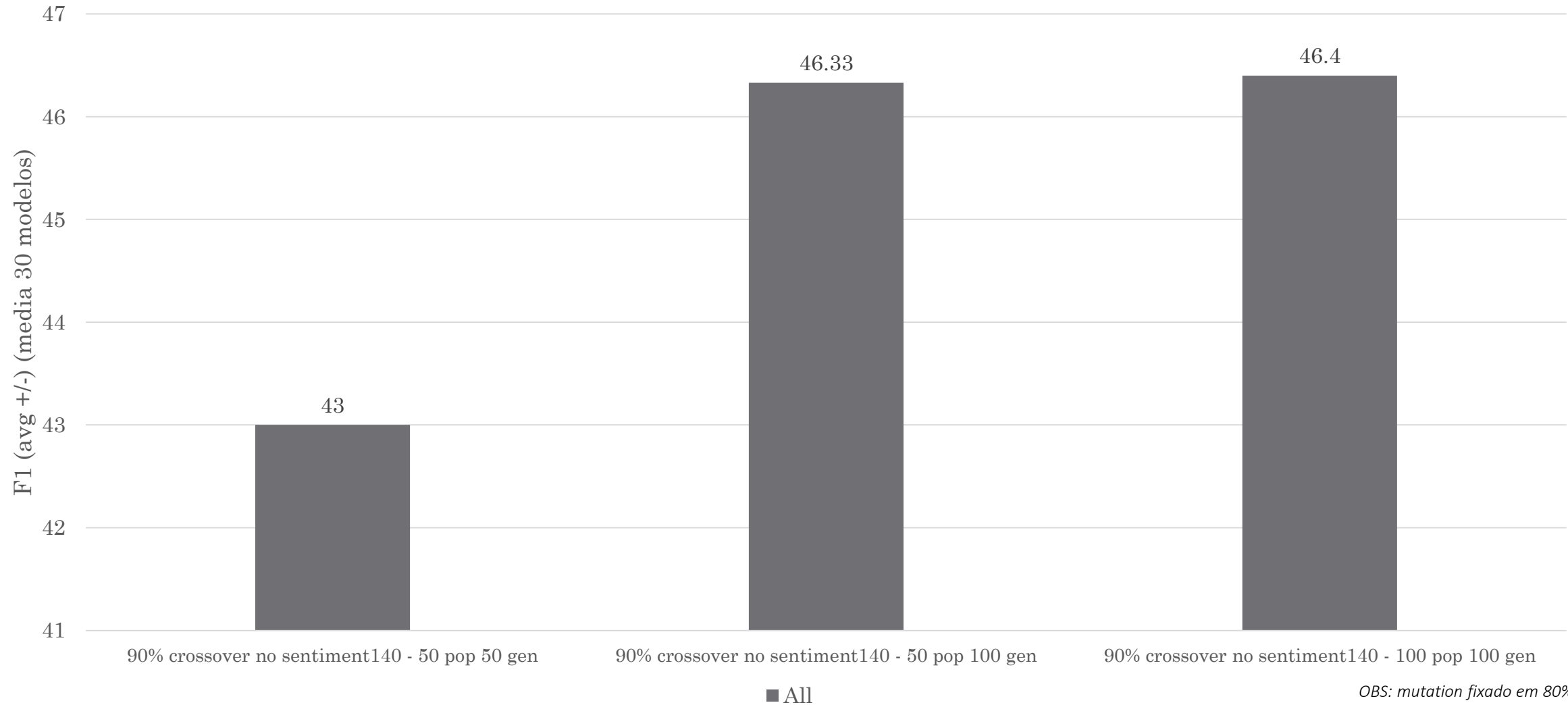
# Resultados parametrizações



OBS: mutation fixado em 80%  
No Stem and Lemma



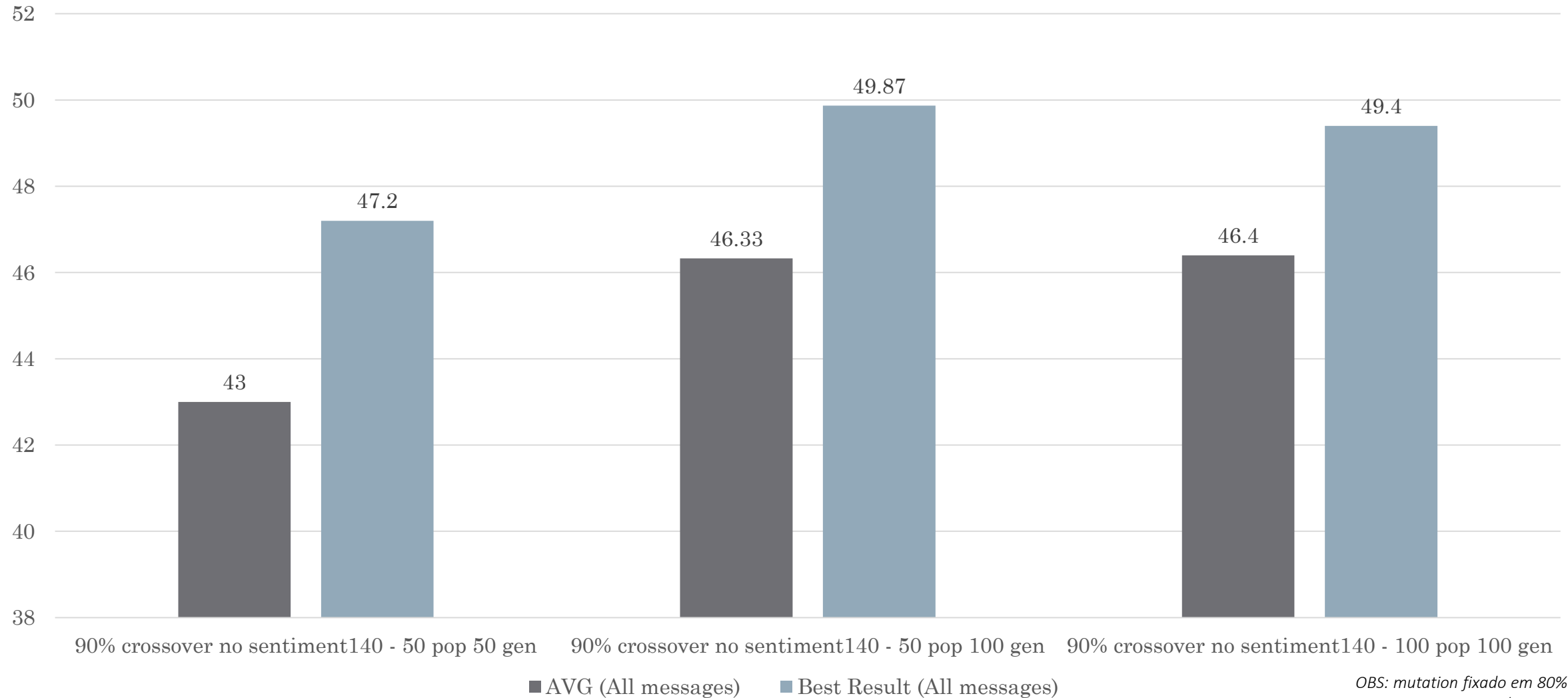
# Resultados parametrizações



OBS: mutation fixado em 80%  
No Stem and Lemma



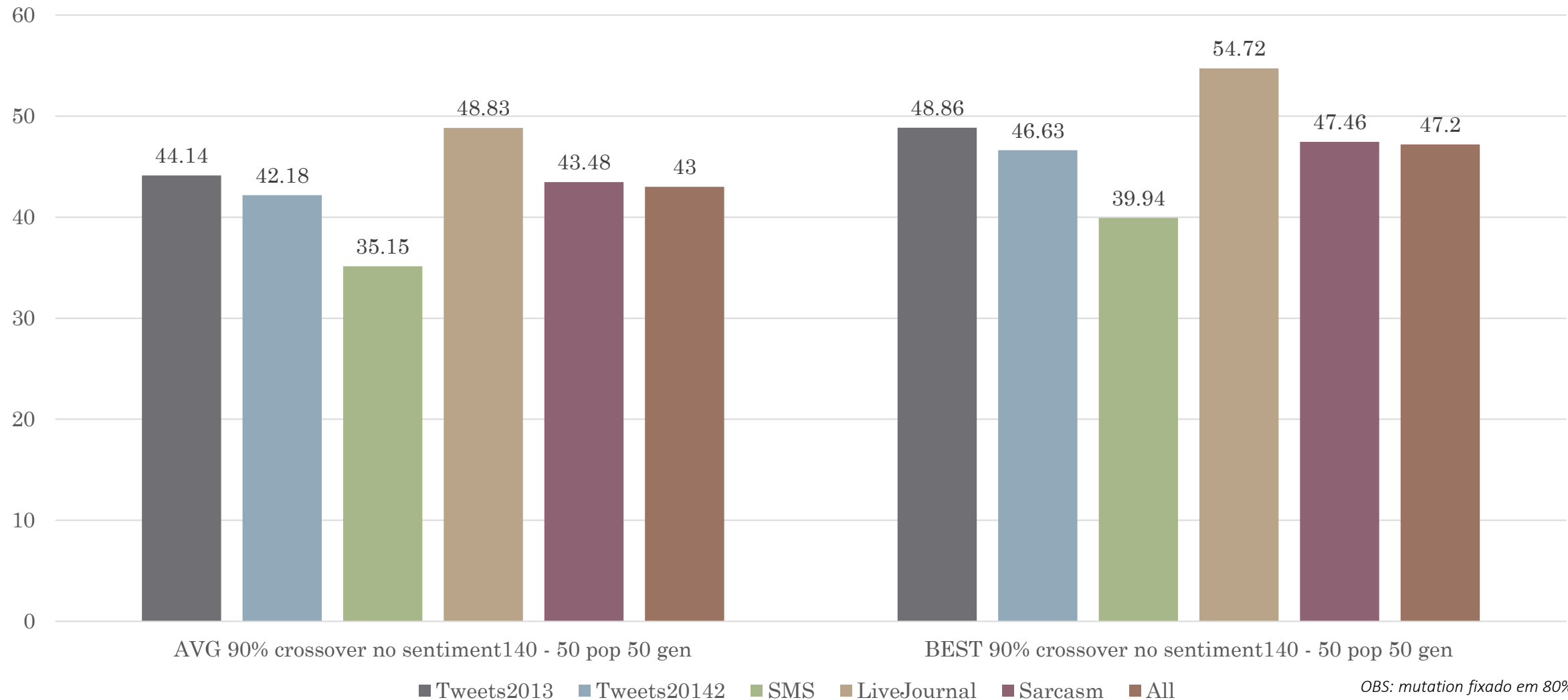
# AVG x Best – All messages



OBS: mutation fixado em 80%  
No Stem and Lemma



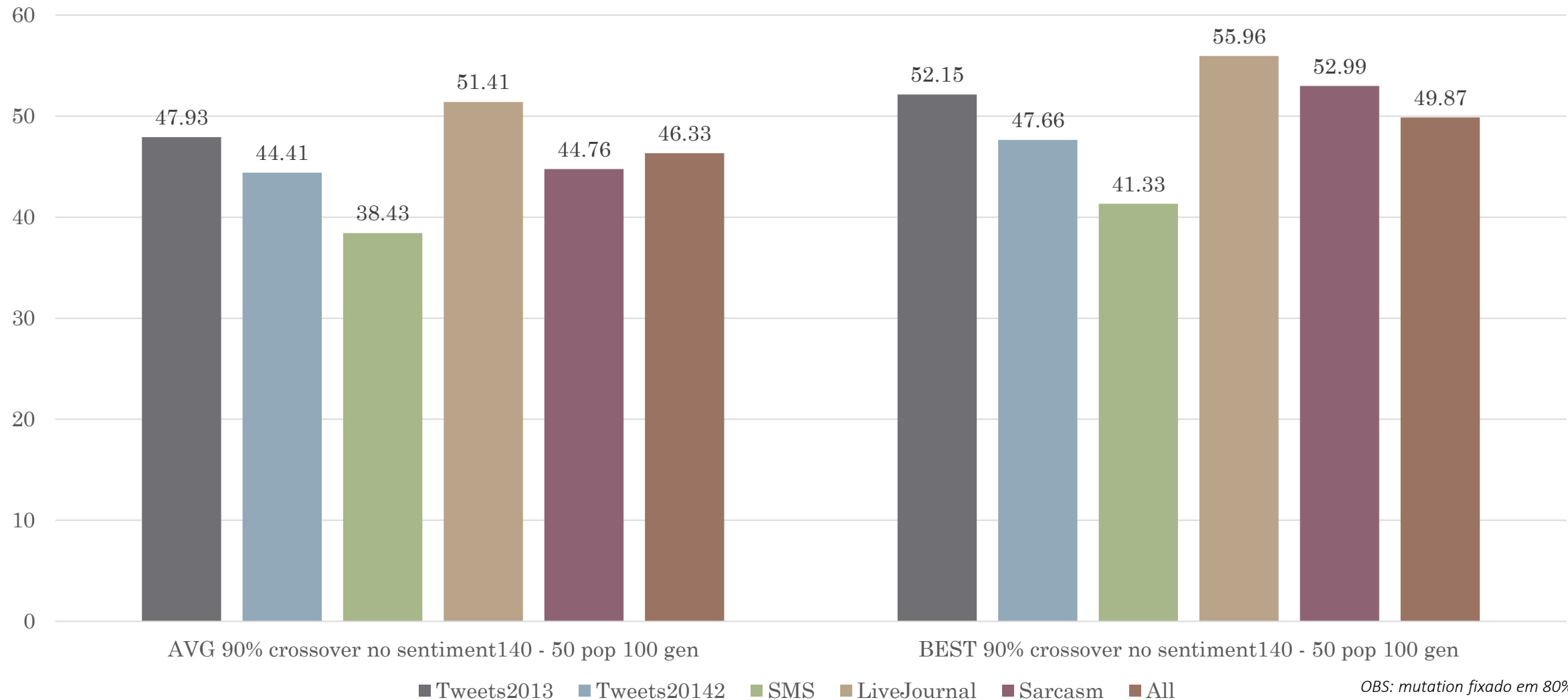
# AVG x Best – 50 pop 50 gen



OBS: mutation fixado em 80%  
No Stem and Lemma



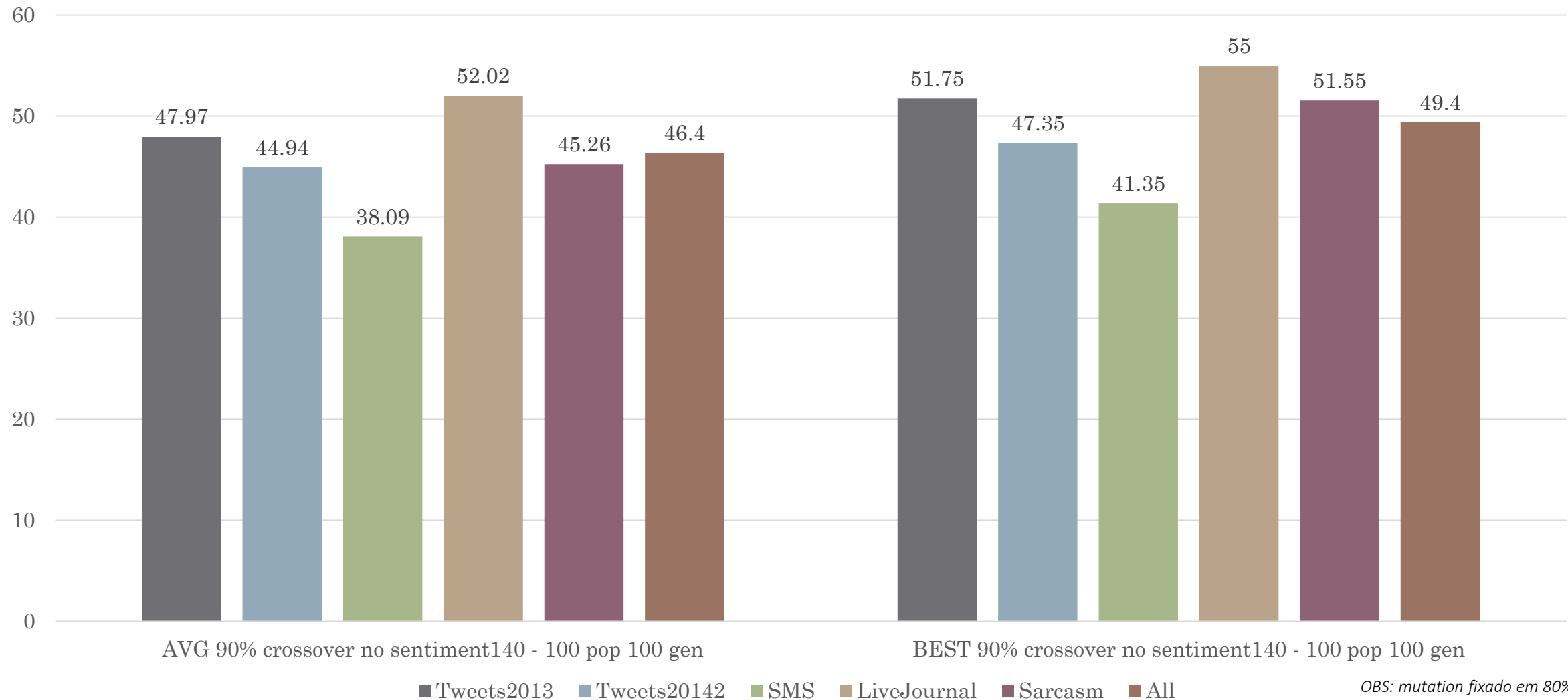
# AVG x Best – 50 pop 100 gen



OBS: mutation fixado em 80%  
No Stem and Lemma



# AVG x Best – 100 pop 100 gen



OBS: mutation fixado em 80%  
No Stem and Lemma

Base	100 gerações			200 gerações			300 gerações			400 gerações		
	F1 avg	F1 max	D.P.	F1 avg	F1 max	D.P	F1 avg	F1 max	D.P	F1 avg	F1 max	D.P
Twitter2013	56.2	58.86	0.99	56.29	59.13	0.62	56.29	<b>59.77</b>	0.84	56.5	59.46	0.91
Twitter2014	54.7	57.11	0.88	54.75	57.06	0.54	54.7	57.11	0.82	54.95	<b>57.16</b>	0.87
SMS	55.38	56.24	2.21	55.83	56.15	0.11	55.71	<b>56.29</b>	0.41	55.85	56.23	0.13
LiveJournal	62.75	64.05	0.93	62.88	<b>64.4</b>	0.35	62.89	64.03	0.34	62.9	64.24	0.39
Sarcasm	37.71	<b>45.61</b>	1.56	37.51	41.31	0.79	37.67	40.59	0.70	37.46	38.18	0.22
All	56.85	58.79	1.11	57.01	59.05	0.46	56.99	<b>59.34</b>	0.65	57.16	59.28	0.65

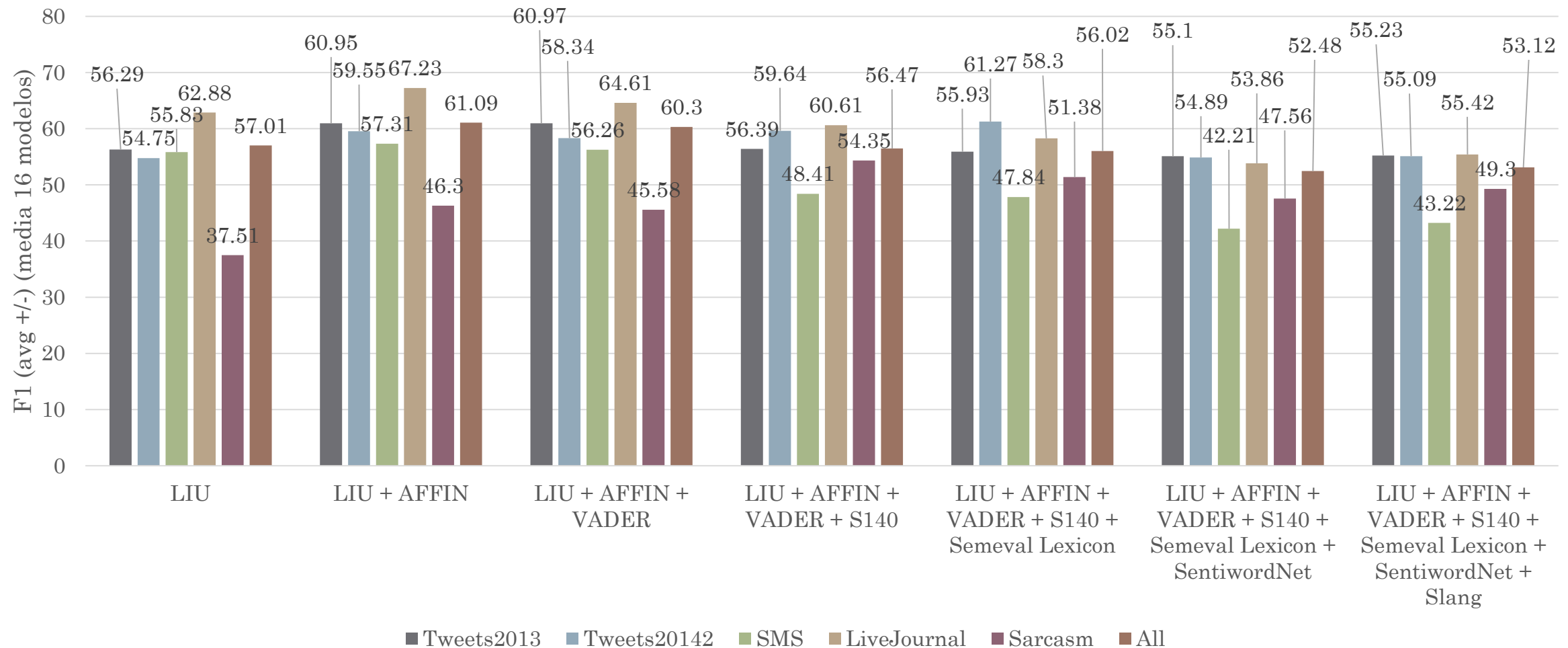
# Resultados IV

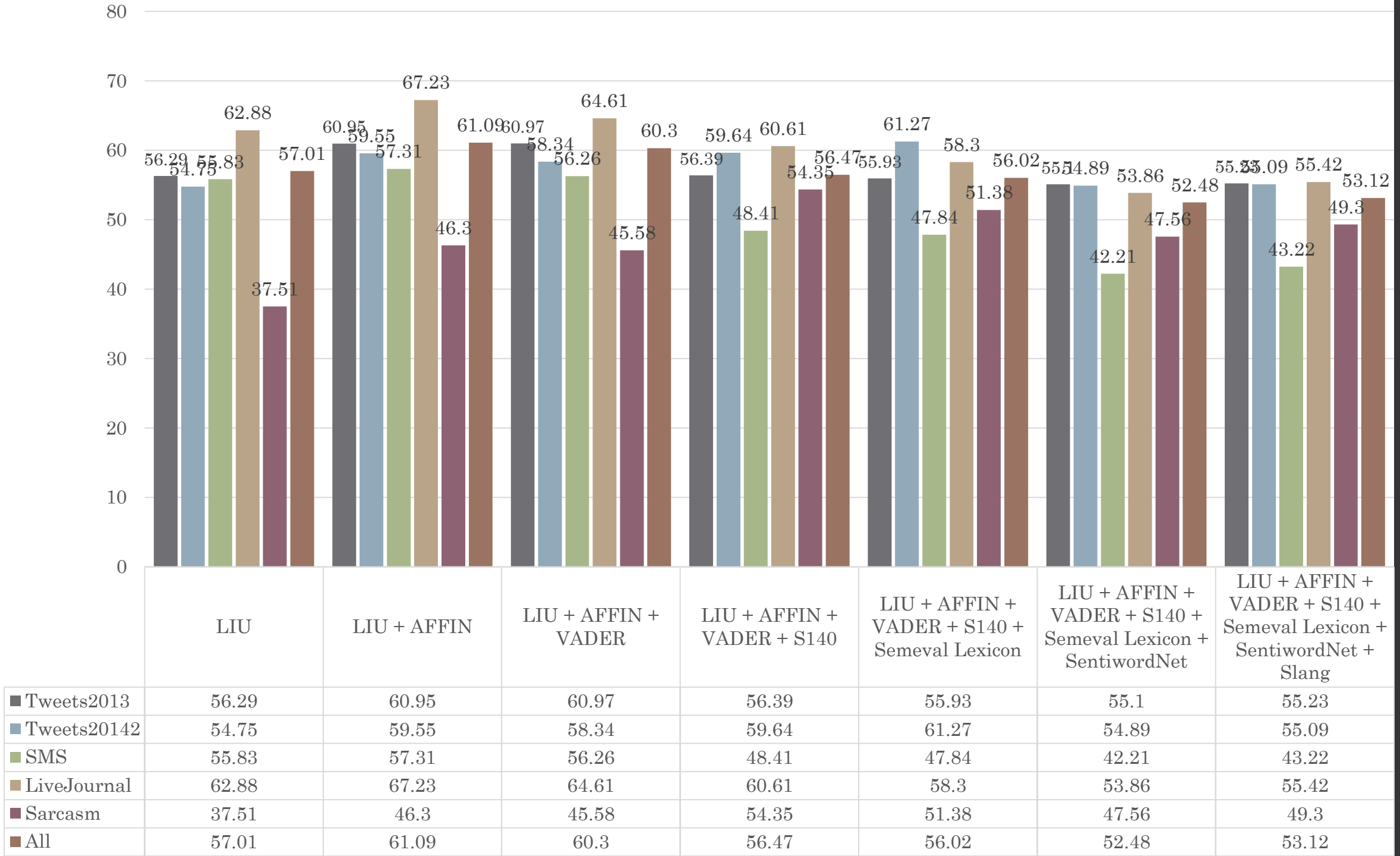


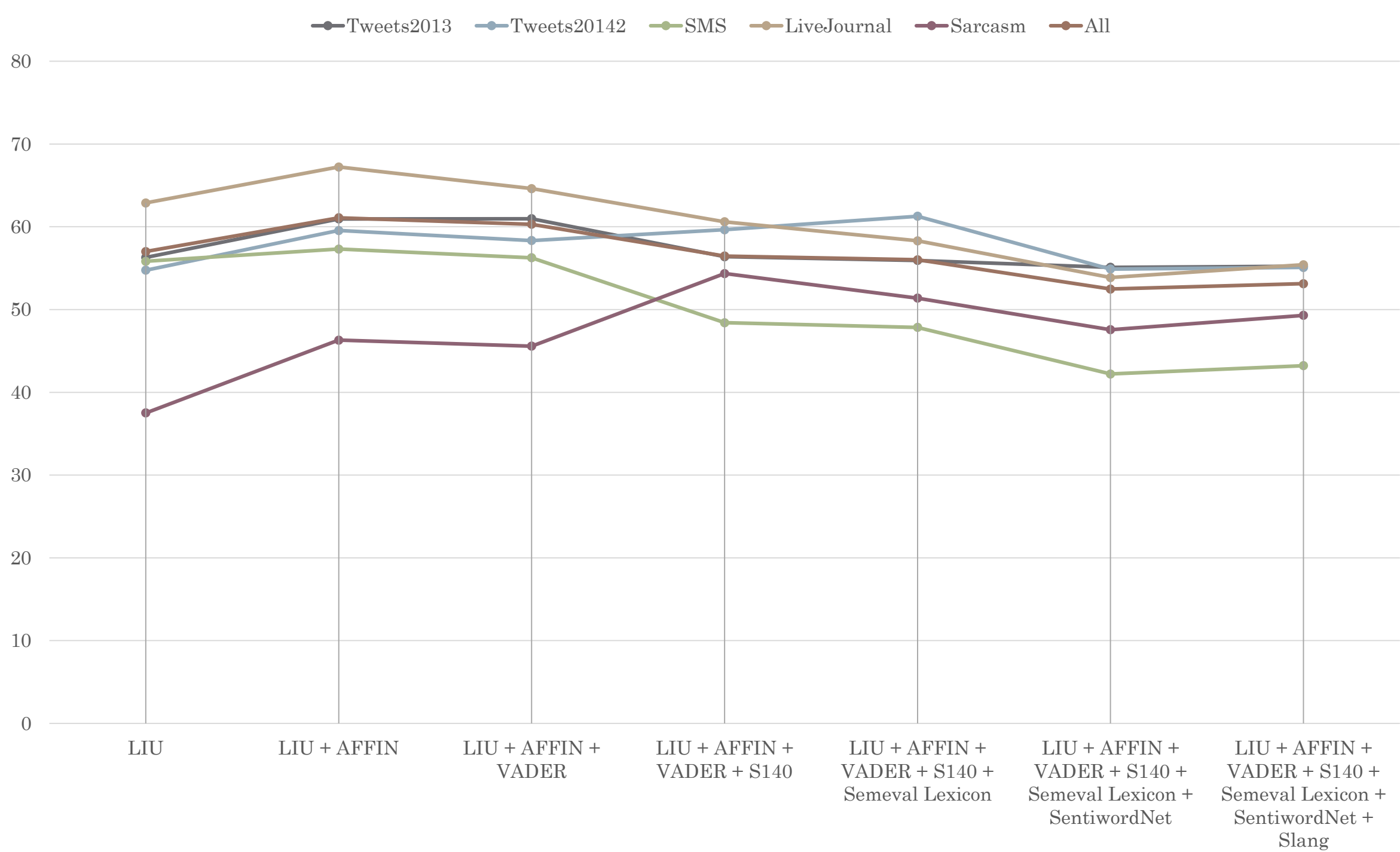


# Resultados média modelos

F1 (avg +/-) por base e conjunto de dicionários utilizados









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