FACULTY OF ECONOMICS AND BUSINESS ADMINISTRATION

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THE ASSOCIATION OF EUROPEAN OPERATIONAL RESEARCH SOCIETIES

Investigating Parallel Implementaions of Genetic Algorithms for Stochastic Part-of-Speech Tagging

Shimanto Rahman, prof. dr. Matthias Bogaert & prof. dr. Dirk Van den Poel

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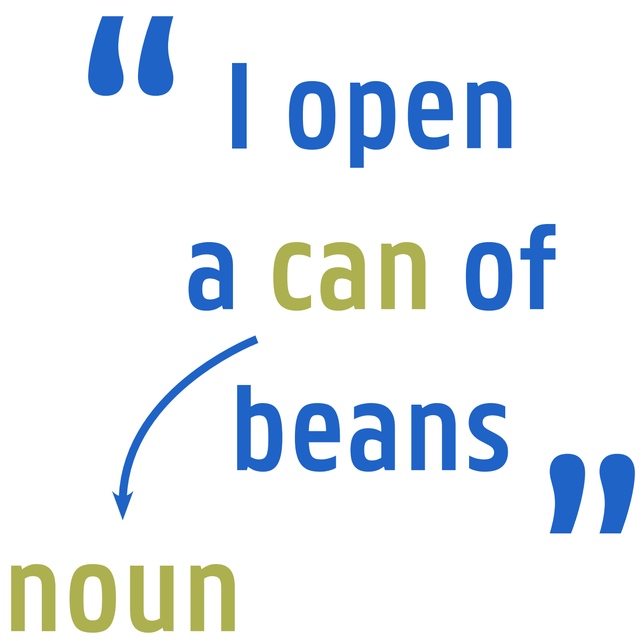
What I will be talking about

01 Problem statement
What is Part-of-Speech tagging? Why is it useful?

02 Methods
Which methods are used? How are they applied?

03 Results
What are the main takeaways?

Words are ambigious



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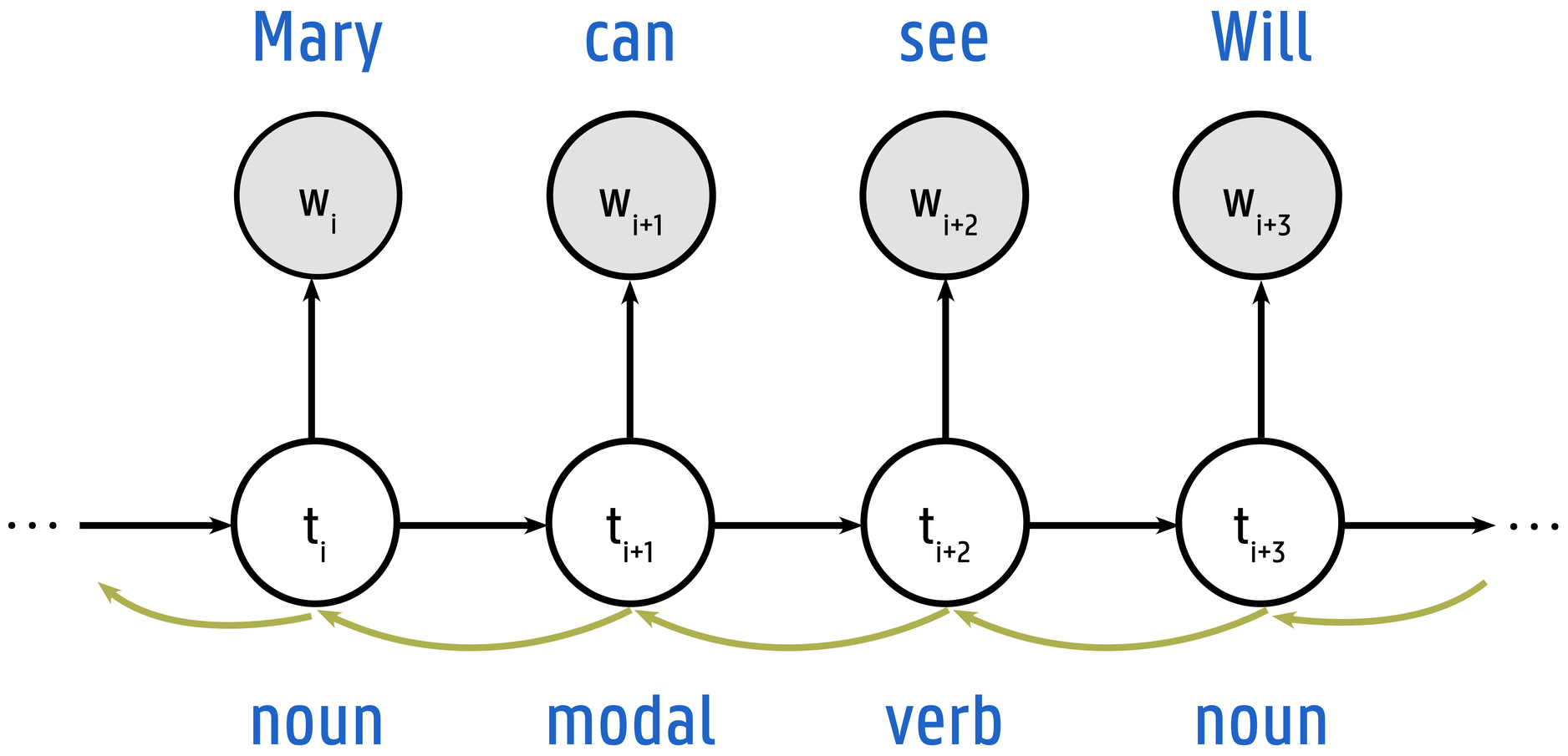
Hidden Markov Model



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Literature Review

Publication	GA	Distributed GA	Cellular GA
Aroujo (2002)	X		
Aroujo (2004)	X		
Aroujo, Luque & Alba (2004)	X	X	
Aroujo, Luque & Alba (2006)	X	X	
This study	X	X	X

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Literature Review

Publication	Token Accuracy	Sentence Accuracy	Unknown Token Accuracy
Aroujo (2002)	X		
Aroujo (2004)	X		
Aroujo, Luque & Alba (2004)	X		
Aroujo, Luque & Alba (2006)	X		
This study	X	X	X

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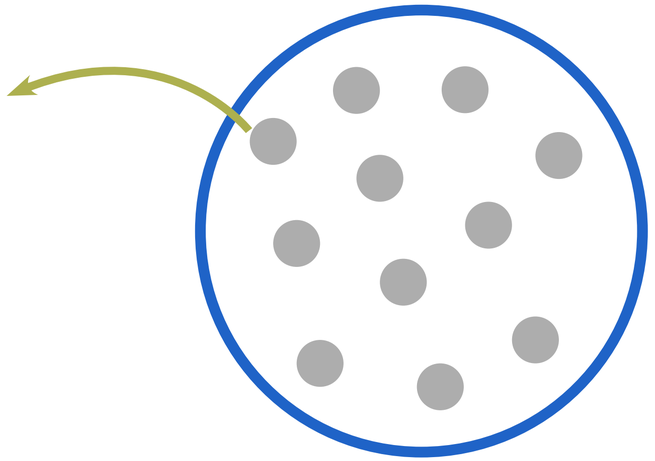
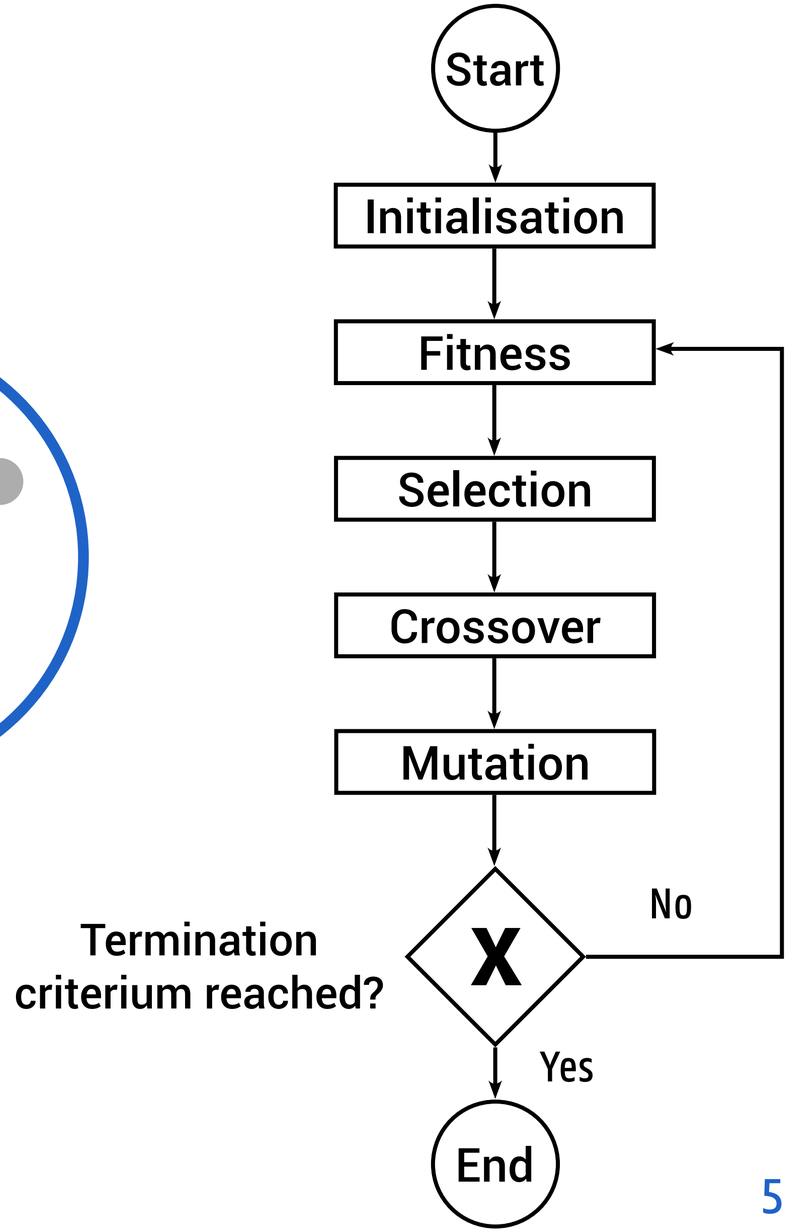
Genetic Algorithm

Tokens	Mary	can	see	Will
Phenotype	NOUN	MODAL	VERB	NOUN
Genotype	0	1	2	0





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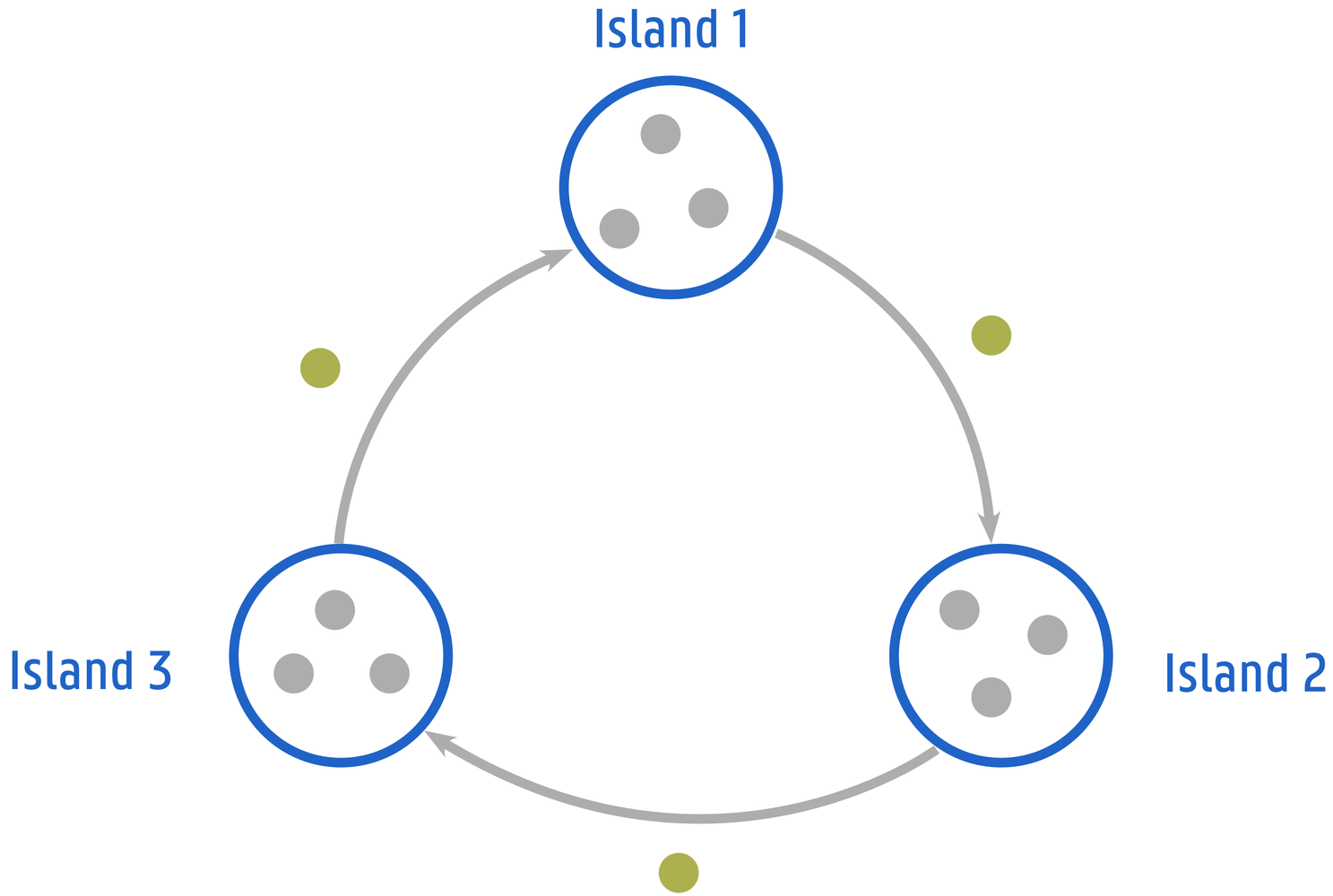
Distributed Genetic Algorithm



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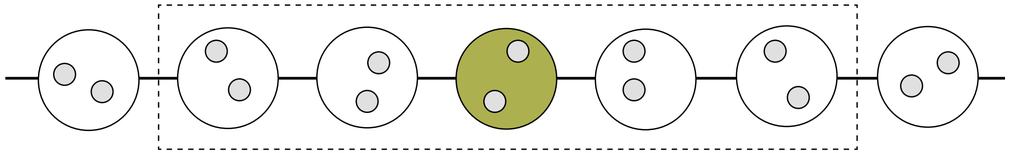
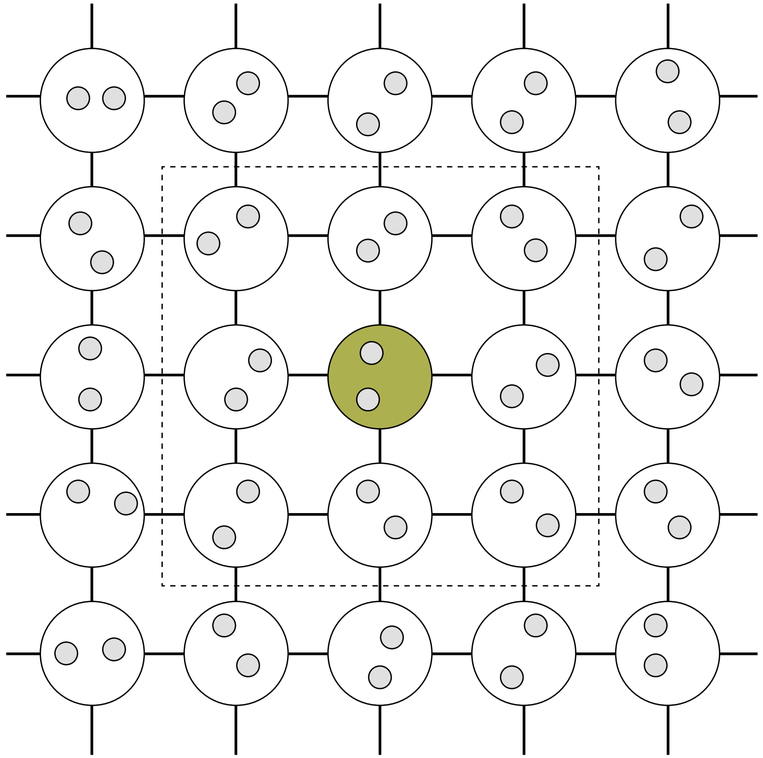
Cellular Genetic Algorithm

Circular



Toroidal



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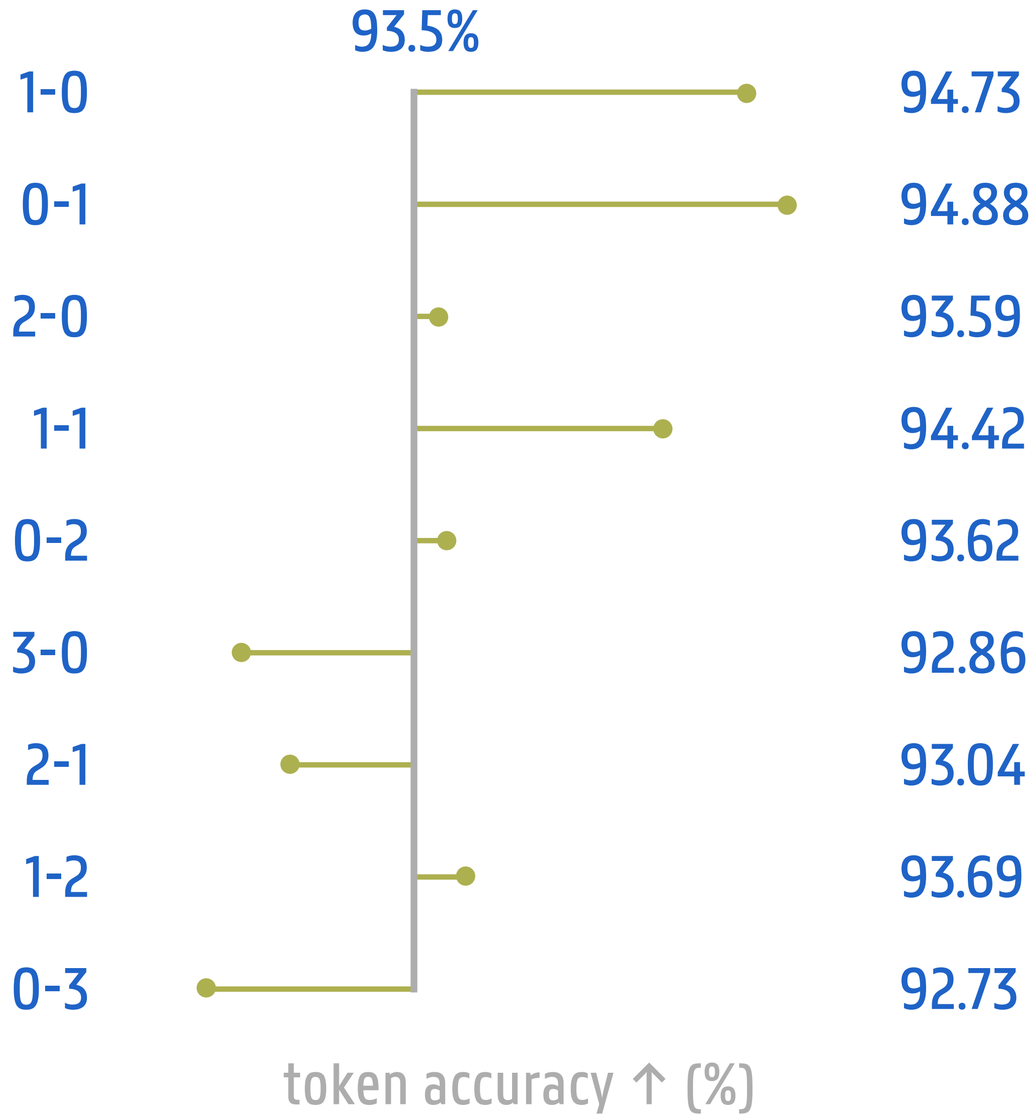
Smaller context sizes perform best



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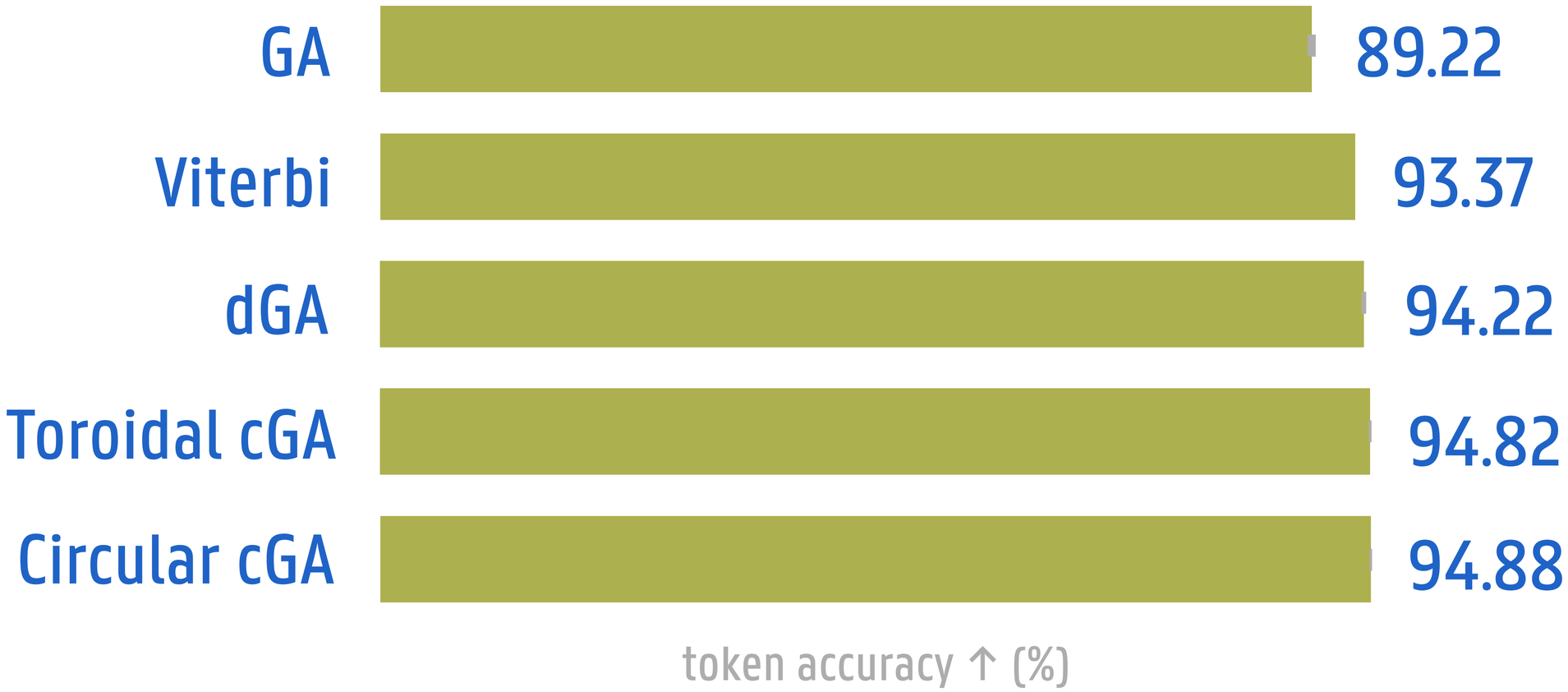
Traditional GA prematurely converges



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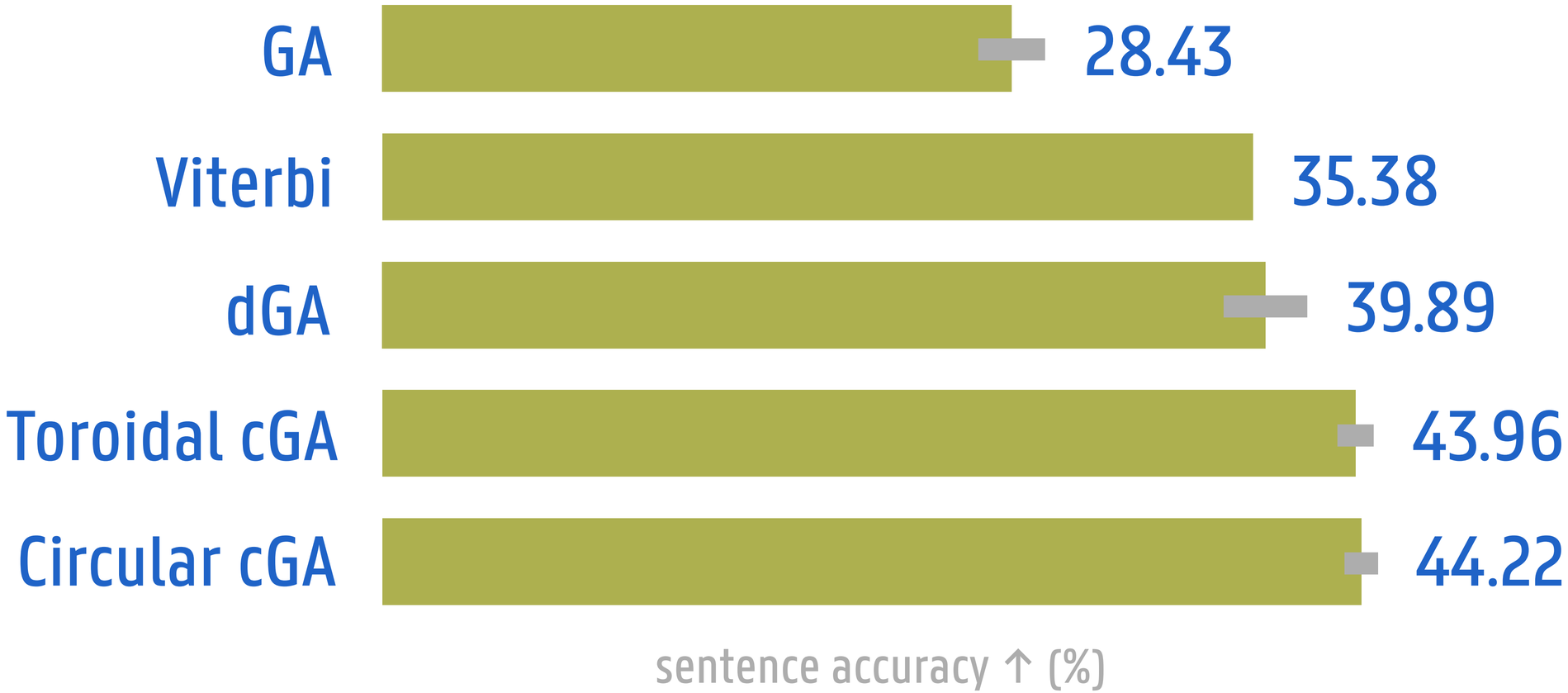
Correctly classifying a sentence remains hard



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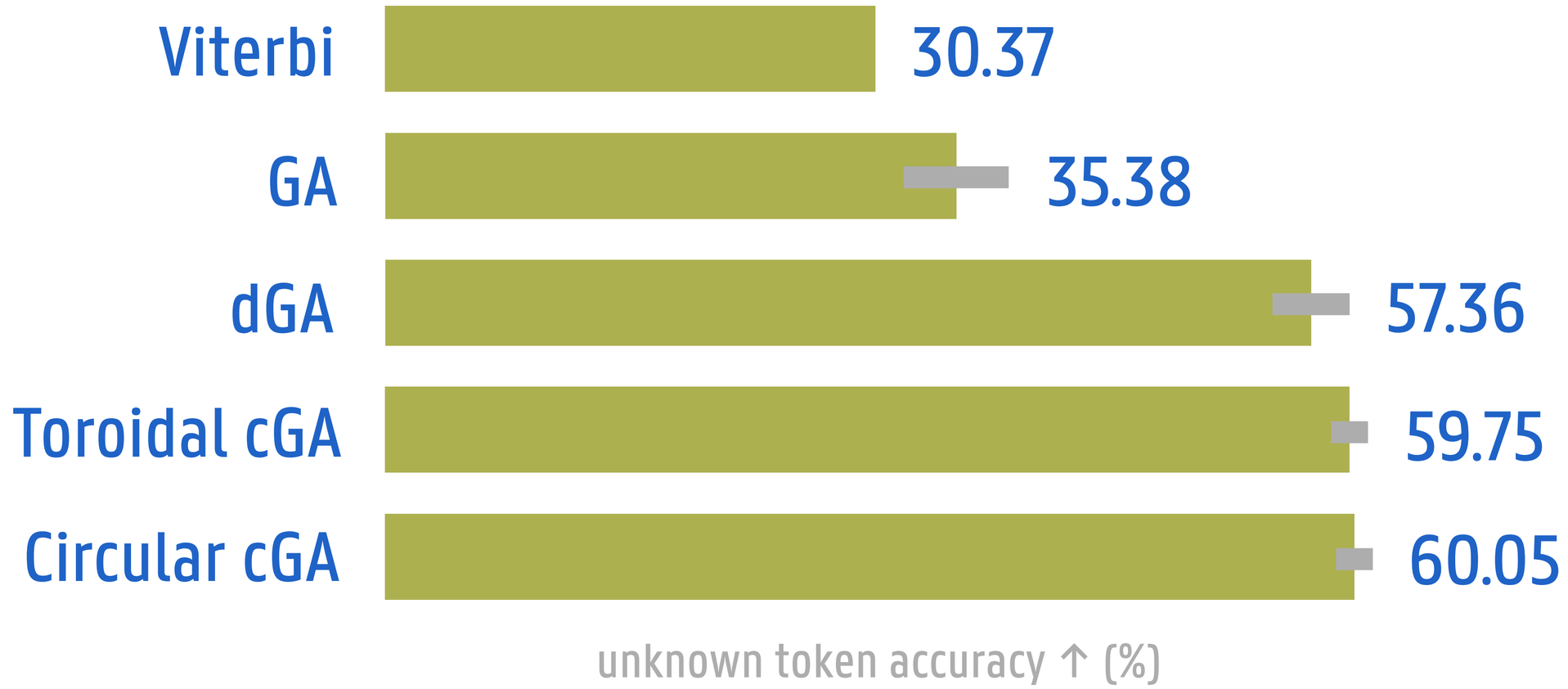
Parallel GAs are more robust against unknown words



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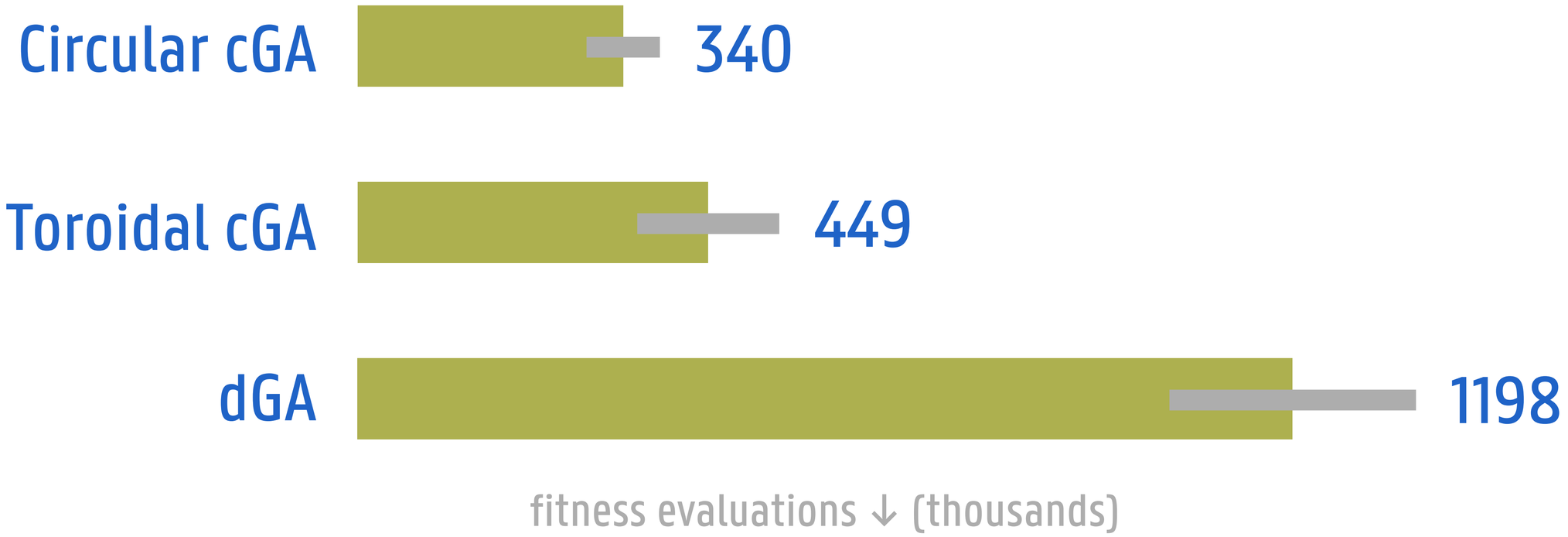
Circular topology converges faster



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Conclusions

1

cGAs perform best

across all performance measures over traditional GAs and dGAs

2

Circular topology

converges faster to a local optimum than a toroidal topology

3

Smaller context sizes

are preferred over larger context sizes for this simple tag set

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Further Research

1

More complex tag sets

may have an effect on the impact on larger context sizes

2

More diverse corpora

will make the generalizability of the study more robust

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