A Practical Algorithm for Topic Modling with Provable Guarantees

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1 Introduction

2 Topic Modelling

3 Algorithm

4 Topic Recovery via Bayes' Rule

5 Efficiently Finding Anchor Words

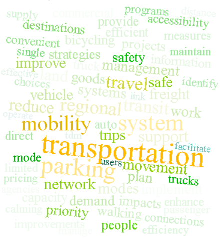
6 Experimental Results

7 Conclusion

Information Overload

Effective Organisation

Topics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priority
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destinations
convenient
bicycling
improve
strategies
goods
vehicle
freight
reduce
work
plan
direct
facilitate
impacts
walking
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efficiency
capacity
modes
support


workforce
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training
technology
industry
industries
clusters
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skills
institutions
improving
metropolitan
entrepreneurs
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technologies
universities
important
skilled
work
data
future
educated
logistics
workers
employers
venture
talent
foundations


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industrial
residential
retail
areas
mixed
activity
district
districts
existing
office
land
services
surrounding
shopping
designated
environmental
concentration
distribution
expansion
business
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accommodate
businesses
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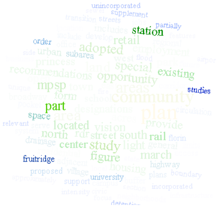
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figure
march
housing
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subarea
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studies
fruitridge
proposed
university
highway

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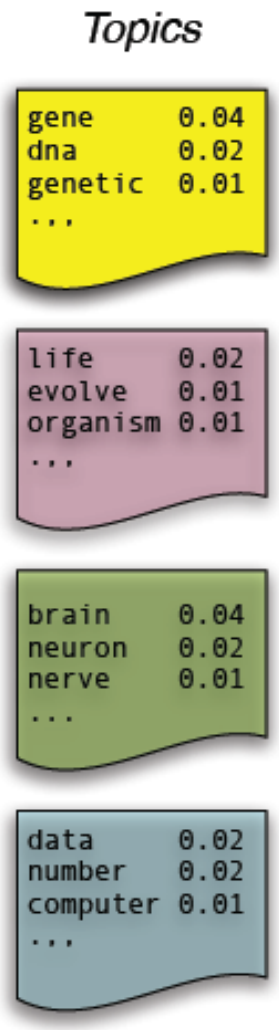
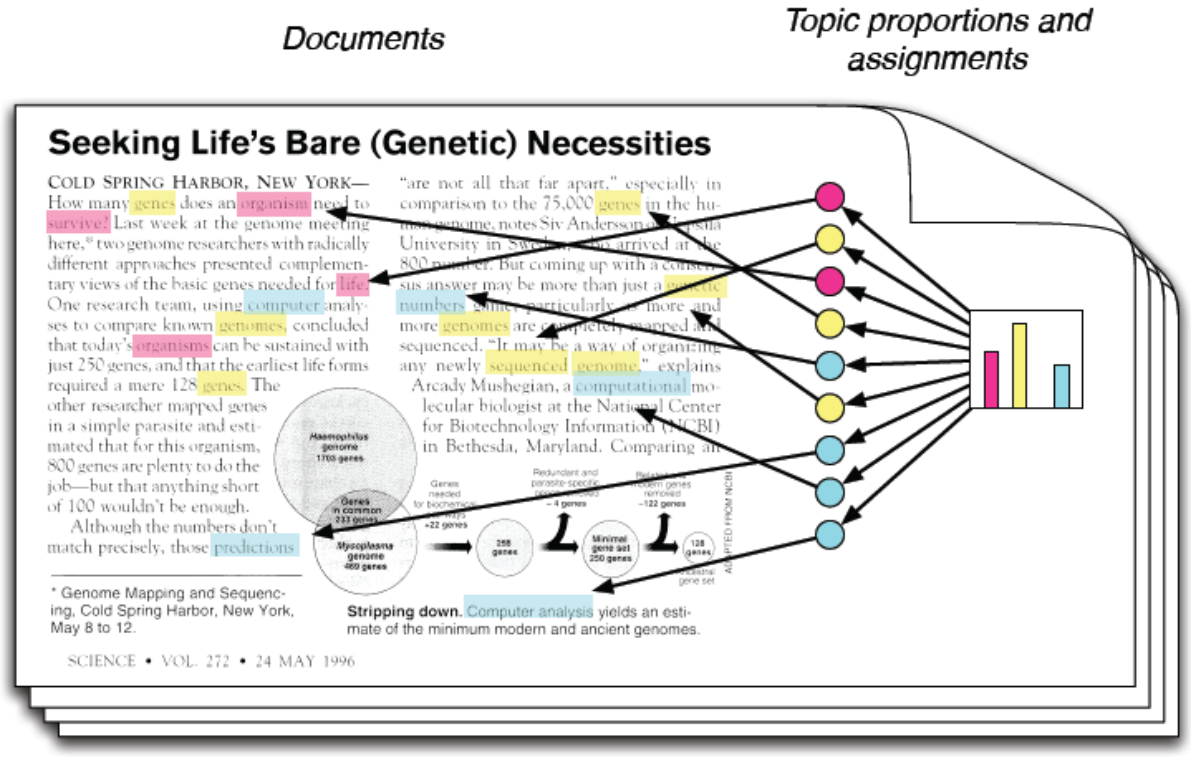
Model of Topics



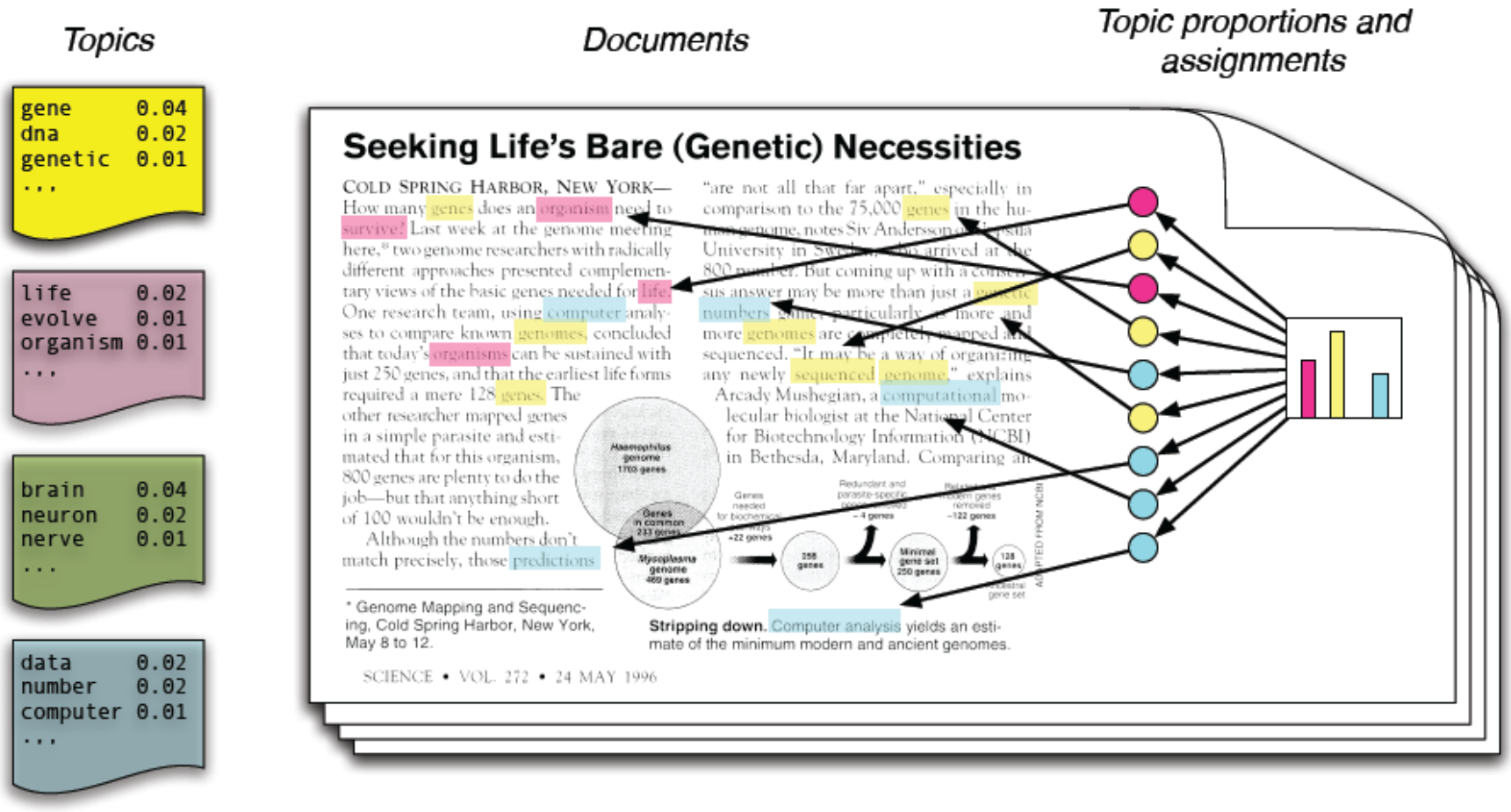
Topics are distributions over words

Model of Documents

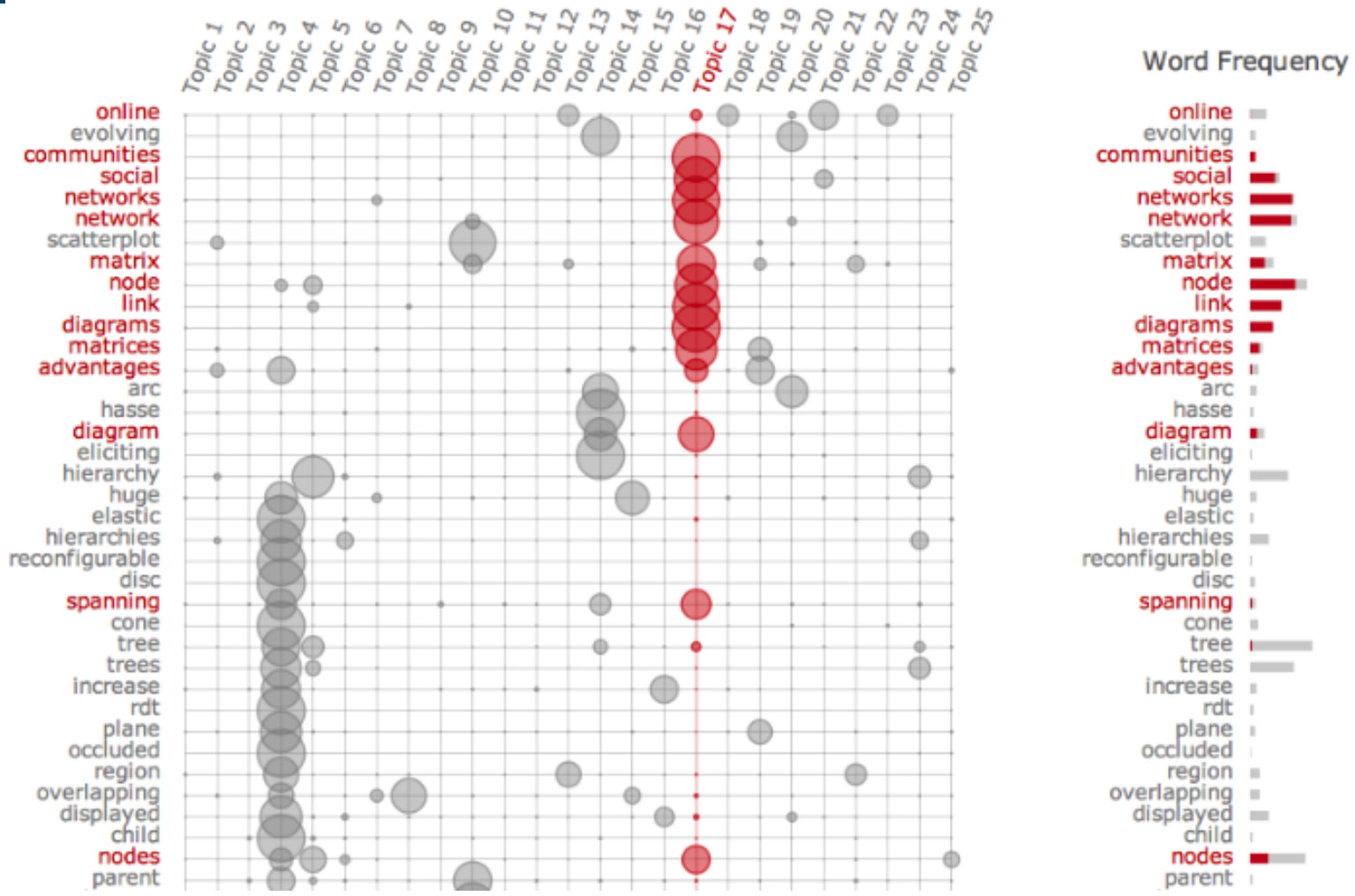
Documents have distribution of topics



Topic Modelling



Word-topic Matrix



Aim: Find document-topic model

Steps

- Assume documents are generated by probabilistic model with unknown variables
- Infer hidden structure onto document
- Situate new document into model

Approximate Inference & Provable Guarantees

- Document-topic inference is NP-hard.
- Approximate techniques used
- Provably polynomial-time algorithms

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Algorithm

Steps

1. Second order moment matrix of word-word co-occurrences
2. Anchor word selection
3. Topic distribution recovery

Assumptions:

- Topics may be correlated
- Word-topic distributions are separable

Anchor Words

LDA

Contributions

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