text data mining

popuplabs

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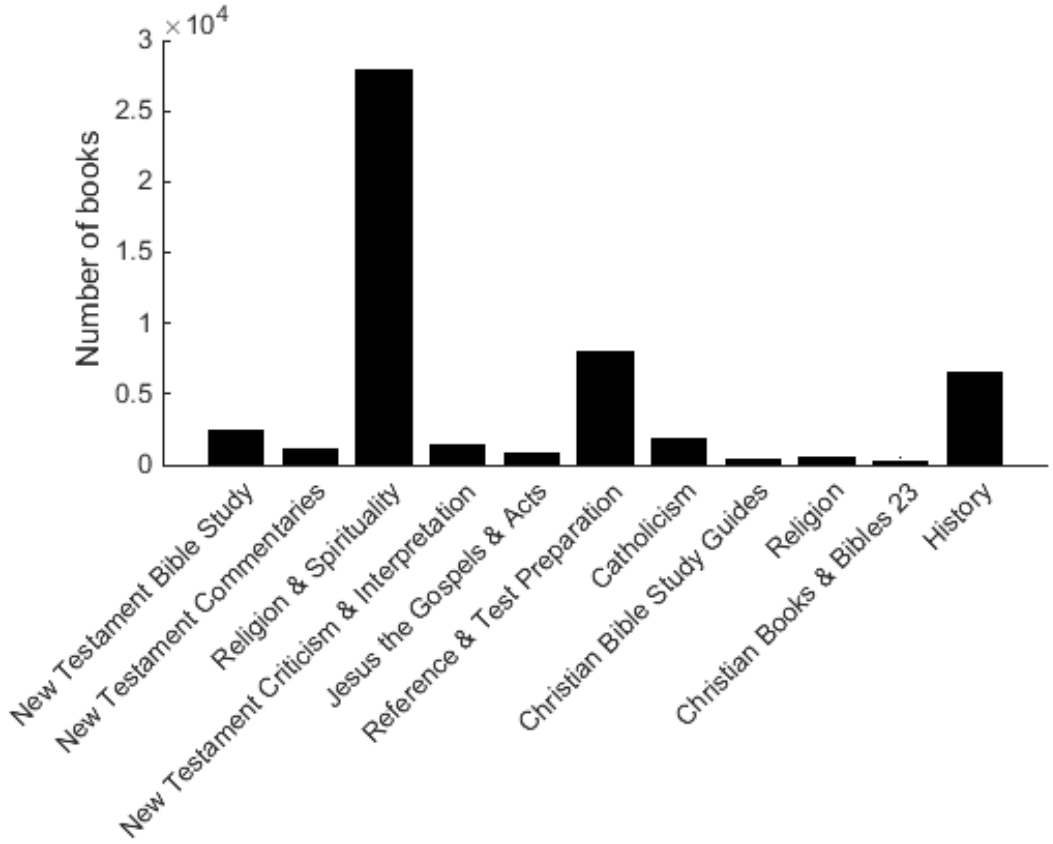
https://github.com/kln-courses/popuplab

IMC|AARHUS UNIVERSITY

- domain knowledge in history, language, literature &c combined with microscopic and (predominantly) qualitative analysis of human cultural manifestations

Gospel of Marc (KJV) $\sim$ 16500 words in 16 chp. on 11 p.

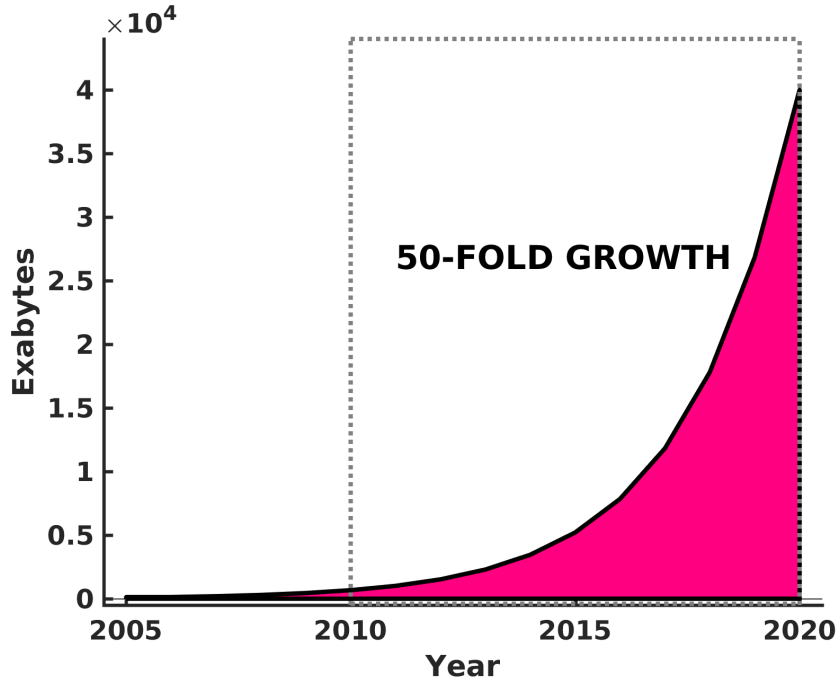


'from the dawn of civilization until 2003, humankind generated five exabytes of data. Now we produce five exabytes every two days ... and the pace is accelerating'

Eric Smith (Google)

'increasingly, scientific breakthroughs will be powered by advanced computing capabilities that help researchers manipulate and explore massive datasets'

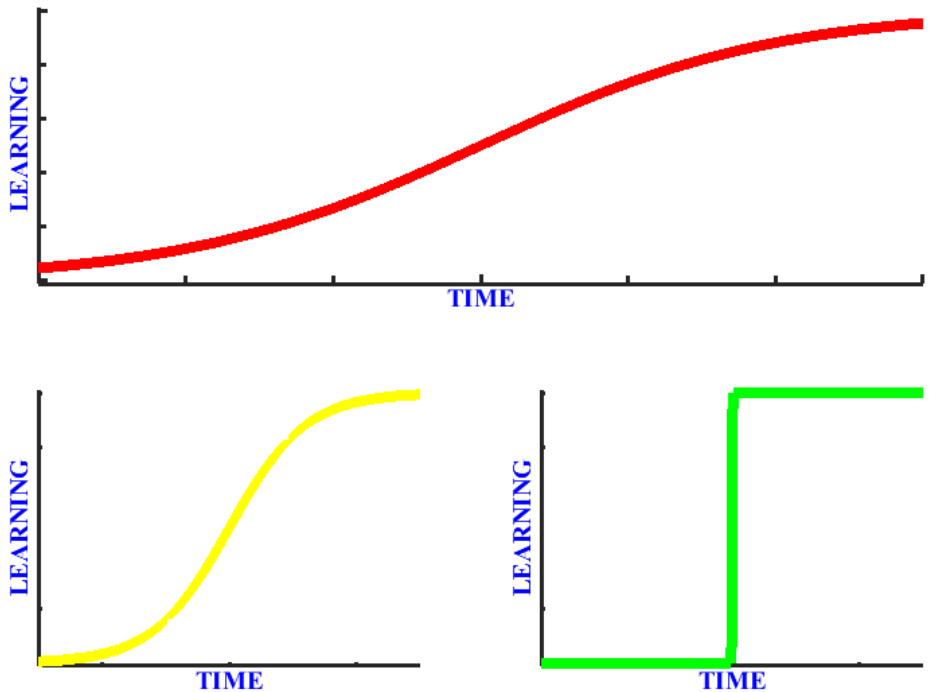
Jim Gray (Fourth Paradigm)



computational sciences are entering the exa-scale era

+

digital technologies are disruptive on a new scale



every knowledge-intensive industry have to "break" the learning curve

INTERVENTION|from the console

GUI → CLI

- novice-friendly visual approach to computer interaction w. a fast learning curve

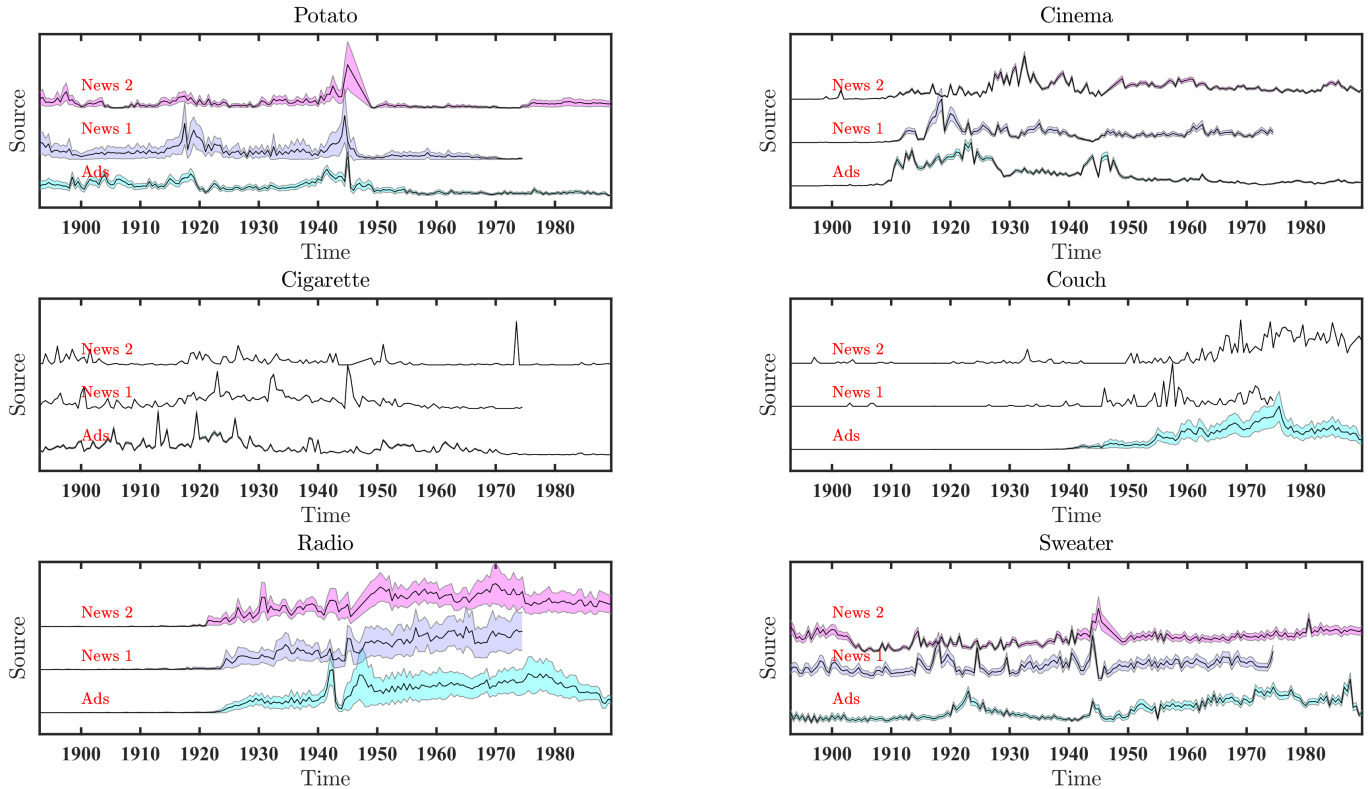
ERROR

- expert-friendly text-based approach to computer interaction w. ++freedom VALID
- CONFLICT break the learning curve through training intensive, non-intuitive, and specialized tools

Pannang Curry 1-2-3!

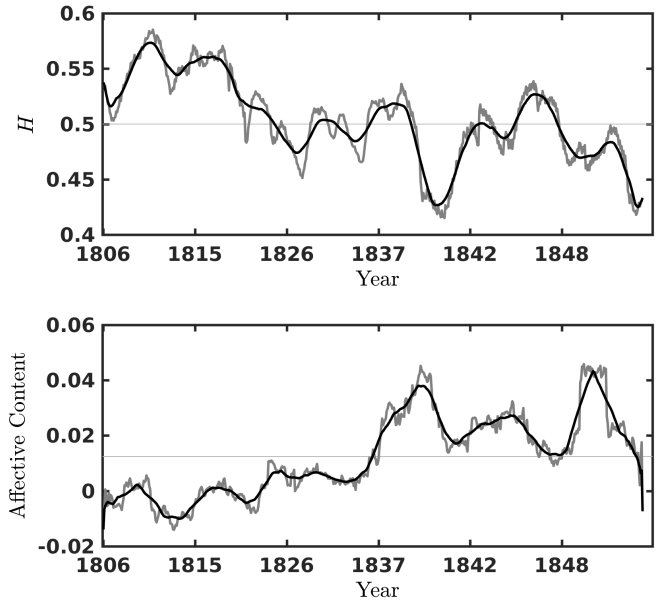
1. Open your right refrigerator door and remove ingredients from the following locations: Door shelf 2, Spot 1; Crisper drawer 1, Spot 3; Crisper drawer 1, Spot 5.
2. Open your third kitchen drawer and remove the utensils labeled "1", "3", "4", "9", and "12".
3. Use your arms to apply utensil 1 to ingredients 1-3. Place ingredients inside utensil 3.

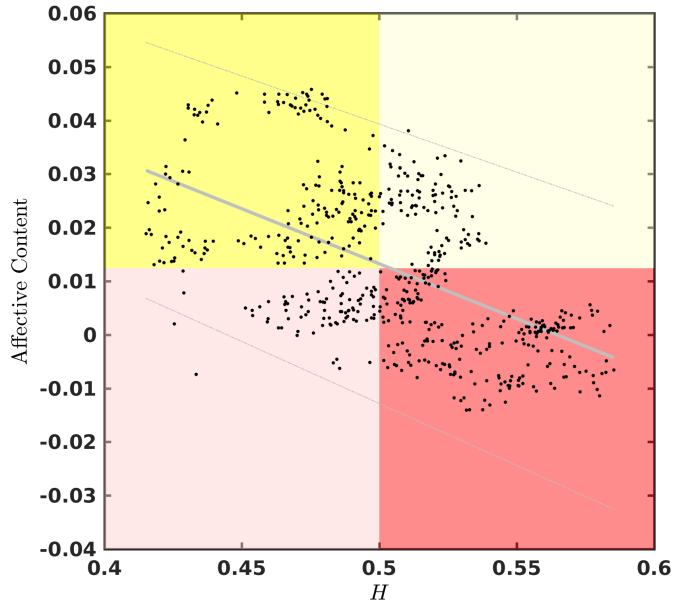
*Note: This recipe uses ShaKL the Shared Kitchen Layout. To use ShaKL, you'll need to have installed ShaKL shelving, cabinetry, and utensils throughout your kitchen and pantry and have basic understanding of ShaKL managers. To learn more, read *Up and Running with ShaKL* (O'Billy Press, 2015). Want to improve ShaKL? Consider contributing to our team.



Digital history and media studies

– prerequisite: humanistic domain experts that use content analysis
– source digitization (newspapers) og super computing change resolution and scale
– technologies create new standards for the domains involved
– share technology, but not data!





Computational literary history

– prerequisite: humanistic domain experts that study writers and literary periods
– high quality digitization of writers, annotation and NLP changes perspective and scale
– technologies that are creating new standards
– sharing of tehcnology and data

Data	Information	Presentation	Knowledge
			

Data

Information

Presentation

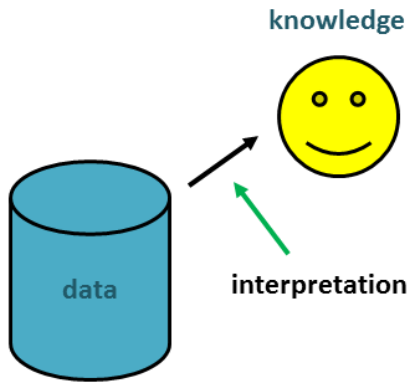
Knowledge

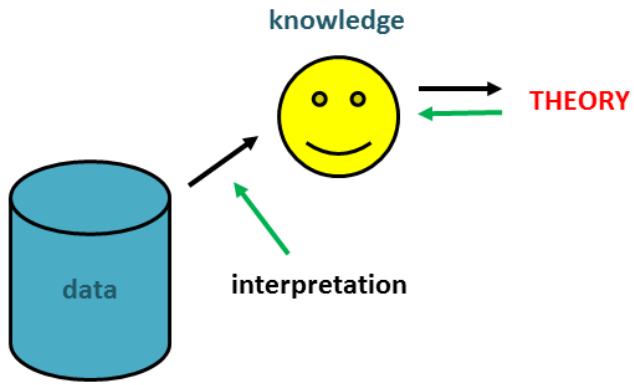
Data

Information

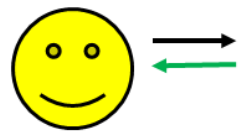
Presentation

Knowledge

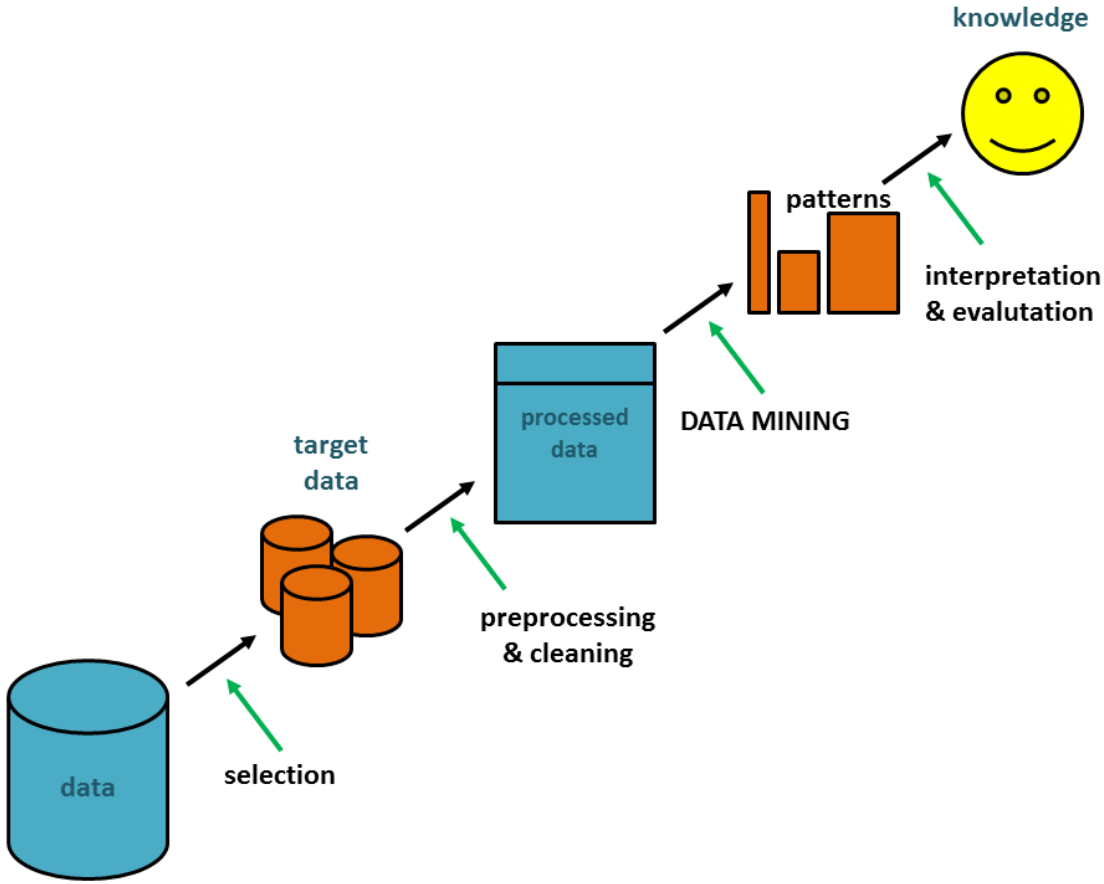

knowledge
data
interpretation

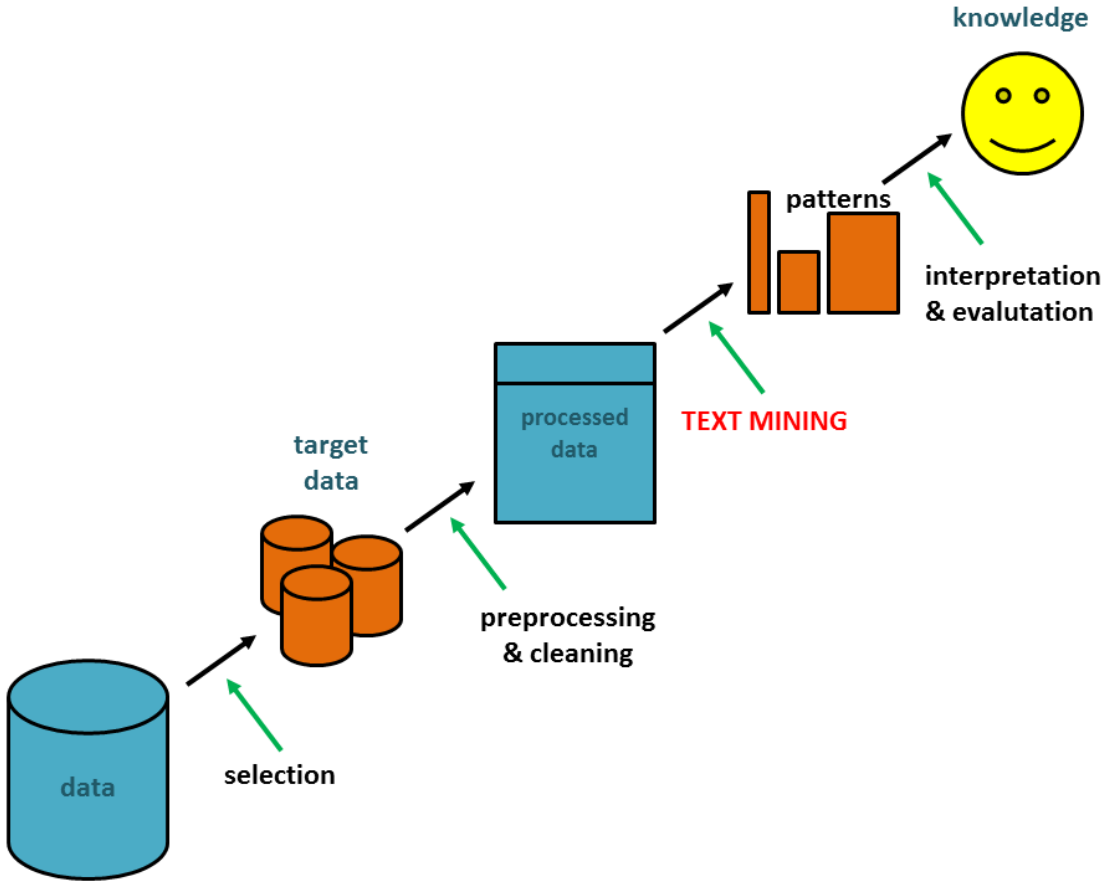

knowledge
THEORY
data
interpretation

knowledge



THEORY


knowledge
patterns
interpretation
& evalutation
processed
data
DATA MINING
target
data
preprocessing
& cleaning
data
selection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`text data mining` $\sim$ text analytics $\sim$ automated text analysis

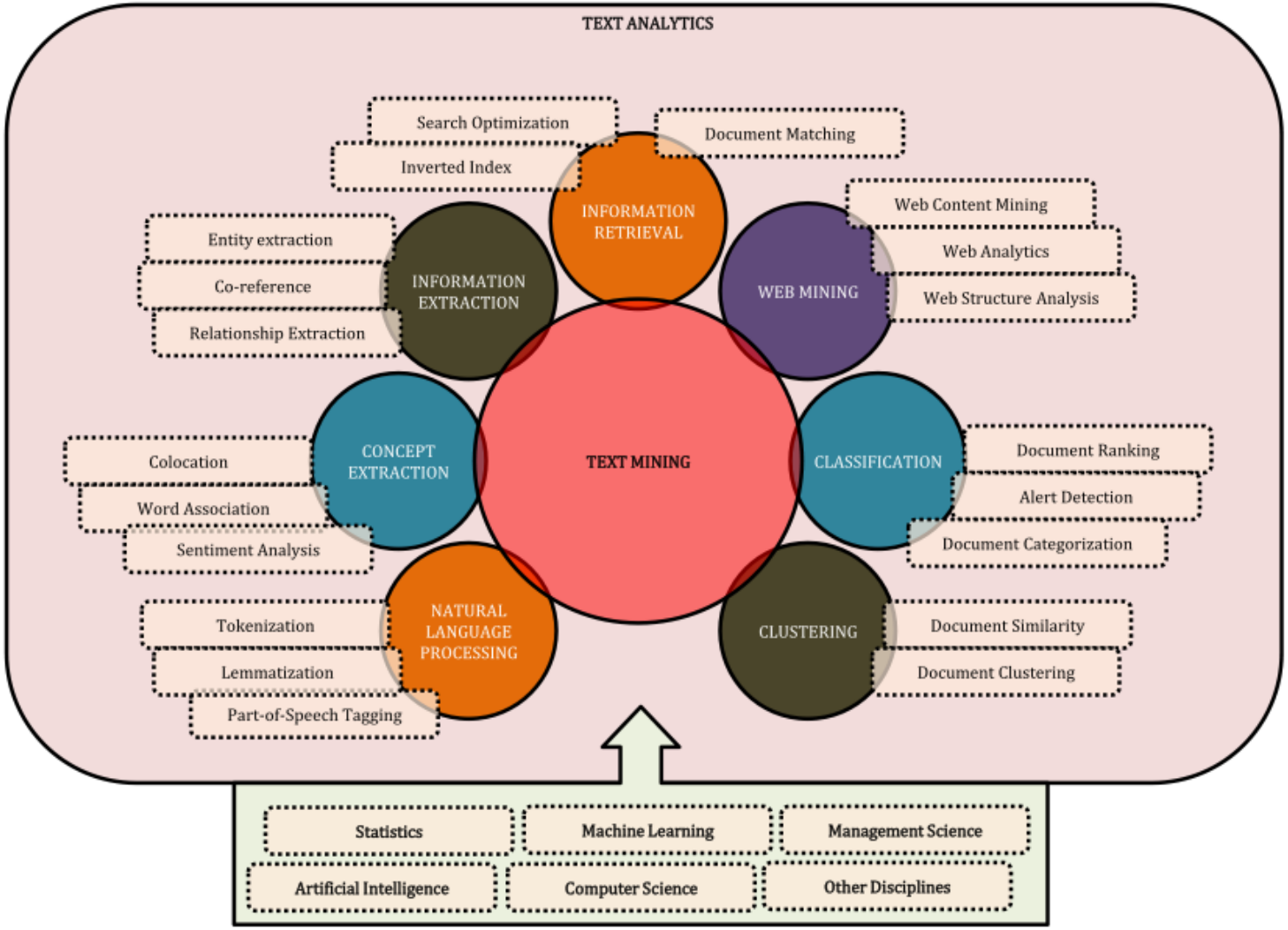
set of data mining[1] techniques for extracting high quality information from large scale text-heavy (unstructured) data sets

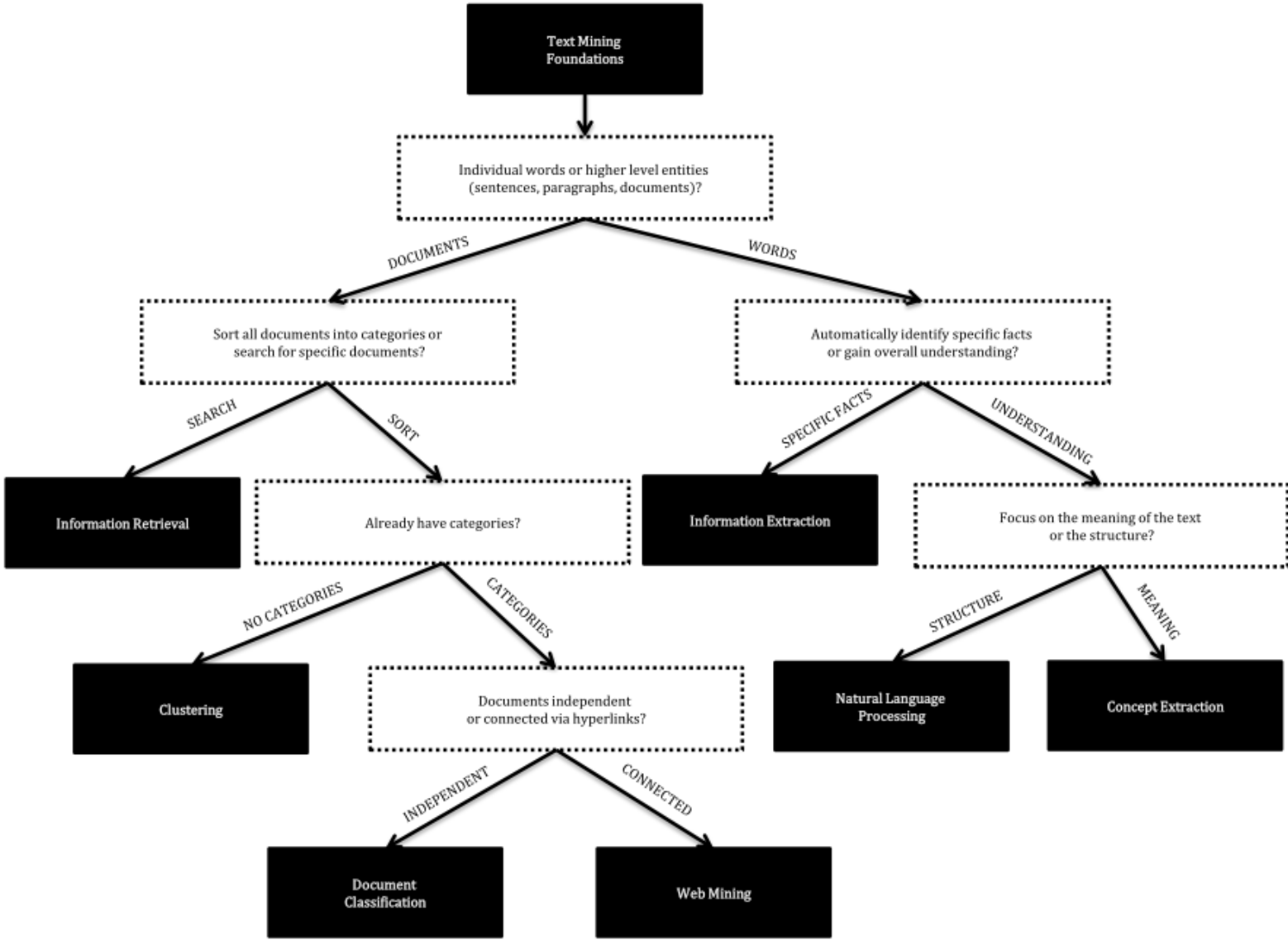
($\sim$ Miner et al 2012)

a tool for discovery and measurement in textual data of prevalent attitudes, concepts, or events

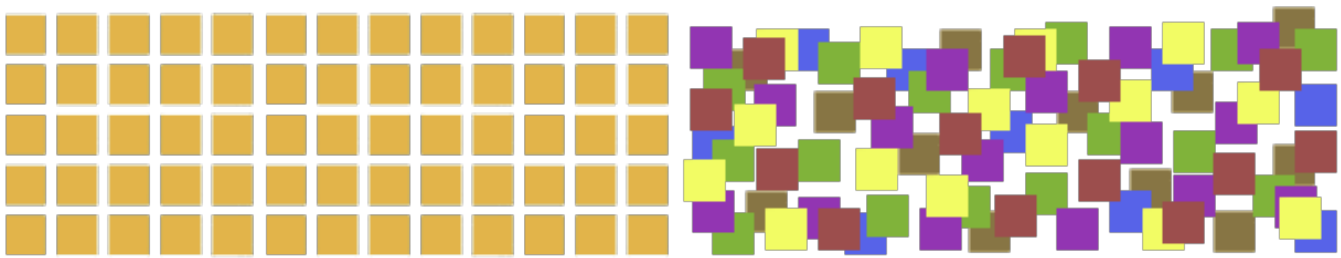
($\sim$ O'Connor, Bamman & Smith 2011)

[1] Fayyad, U. et al (1996). From data mining to knowledge discovery in databases. AI Magazine, 17(3), 37.


TEXT ANALYTICS
Search Optimization
Inverted Index
Document Matching
INFORMATION RETRIEVAL
Entity extraction
Co-reference
Relationship Extraction
INFORMATION EXTRACTION
Web Content Mining
Web Analytics
Web Structure Analysis
WEB MINING
Colocation
Word Association
Sentiment Analysis
CONCEPT EXTRACTION
TEXT MINING
Document Ranking
Alert Detection
Document Categorization
CLASSIFICATION
Tokenization
Lemmatization
Part-of-Speech Tagging
NATURAL LANGUAGE PROCESSING
Document Similarity
Document Clustering
CLUSTERING
Statistics
Machine Learning
Management Science
Artificial Intelligence
Computer Science
Other Disciplines


Text Mining Foundations
Individual words or higher level entities (sentences, paragraphs, documents)?
DOCUMENTS
WORDS
Sort all documents into categories or search for specific documents?
Automatically identify specific facts or gain overall understanding?
SEARCH
SORT
SPECIFIC FACTS
UNDERSTANDING
Information Retrieval
Already have categories?
Information Extraction
Focus on the meaning of the text or the structure?
NO CATEGORIES
CATEGORIES
STRUCTURE
MEANING
Clustering
Documents independent or connected via hyperlinks?
Natural Language Processing
Concept Extraction
INDEPENDENT
CONNECTED
Document Classification
Web Mining

data objects that are described over a set of (qualitative or quantitative) features



fundamental difference between structured data and **unstructured* data**

- word processing files, pdfs, emails, social media posts, digital images, video, and audio

- today $>$ 80% of all data are unstructured

- increased demand for expertise from culture, media and linguistic domains

adequate problem solution requires that we test a range of approaches (algorithms, (hyper-)parameter estimation) - the validation of an approach is an **experiment**

experiment input: code, data sets, hyperparameter values

experiment output: model definition (weights), metric values (experiment comparison), execution logs

`a complex and error-prone process`

$\Rightarrow$ systematically comment your work and process and use version control and source code management


sas


python™

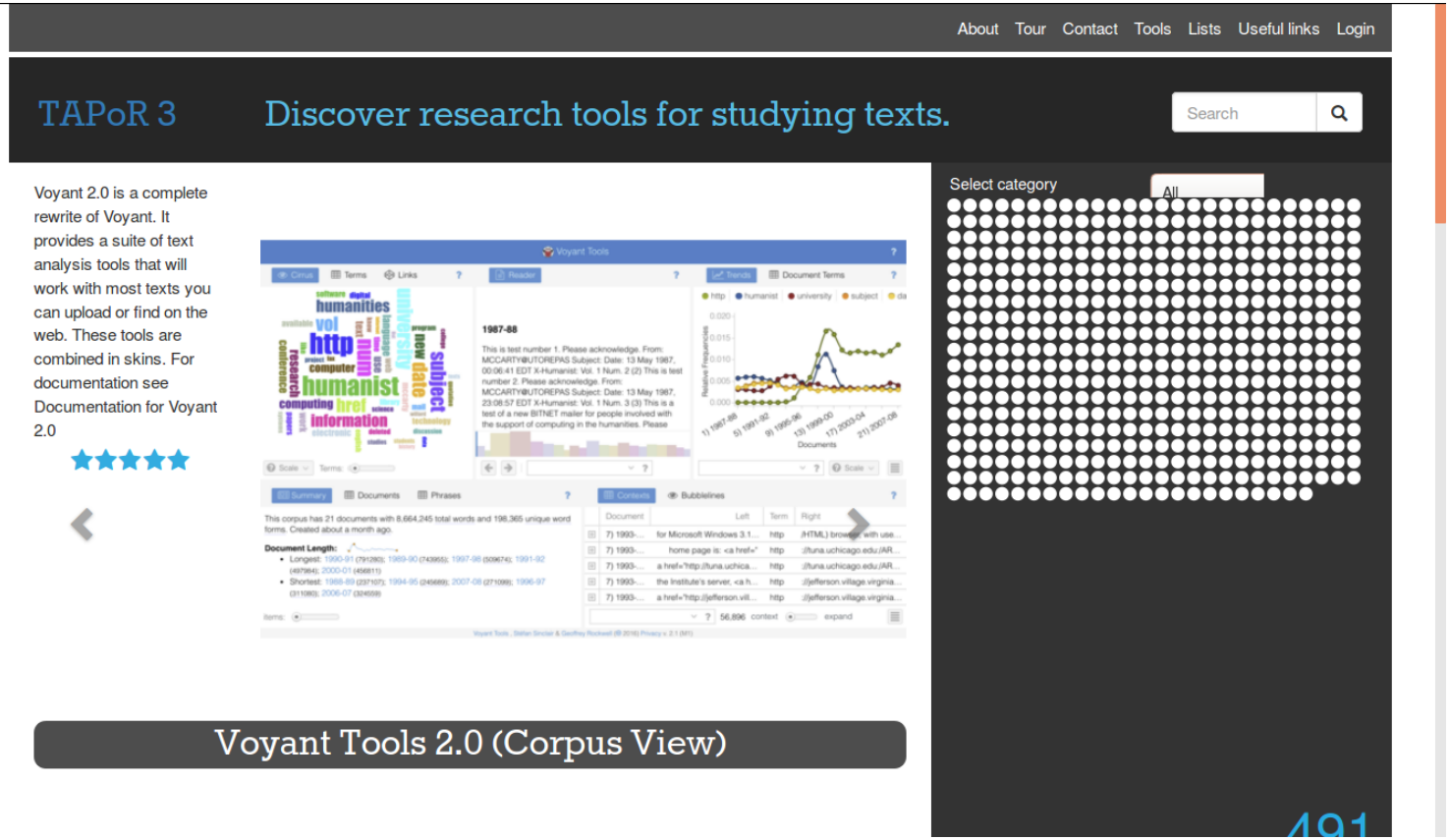

R


MATLAB

rapidminer

tableau

VOYANT
see through your text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Voyant 2.0 is a complete rewrite of Voyant. It provides a suite of text analysis tools that will work with most texts you can upload or find on the web. These tools are combined in skins. For documentation see Documentation for Voyant 2.0
Select category
All
Voyant Tools 2.0 (Corpus View)

"There is no true interpretation of anything; interpretation is a vehicle in the service of human comprehension. The value of interpretation is in enabling others to fruitfully think about an idea"

Andreas Buja