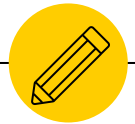
Who wrote it?

Speech Technologies Project, Spring 2016



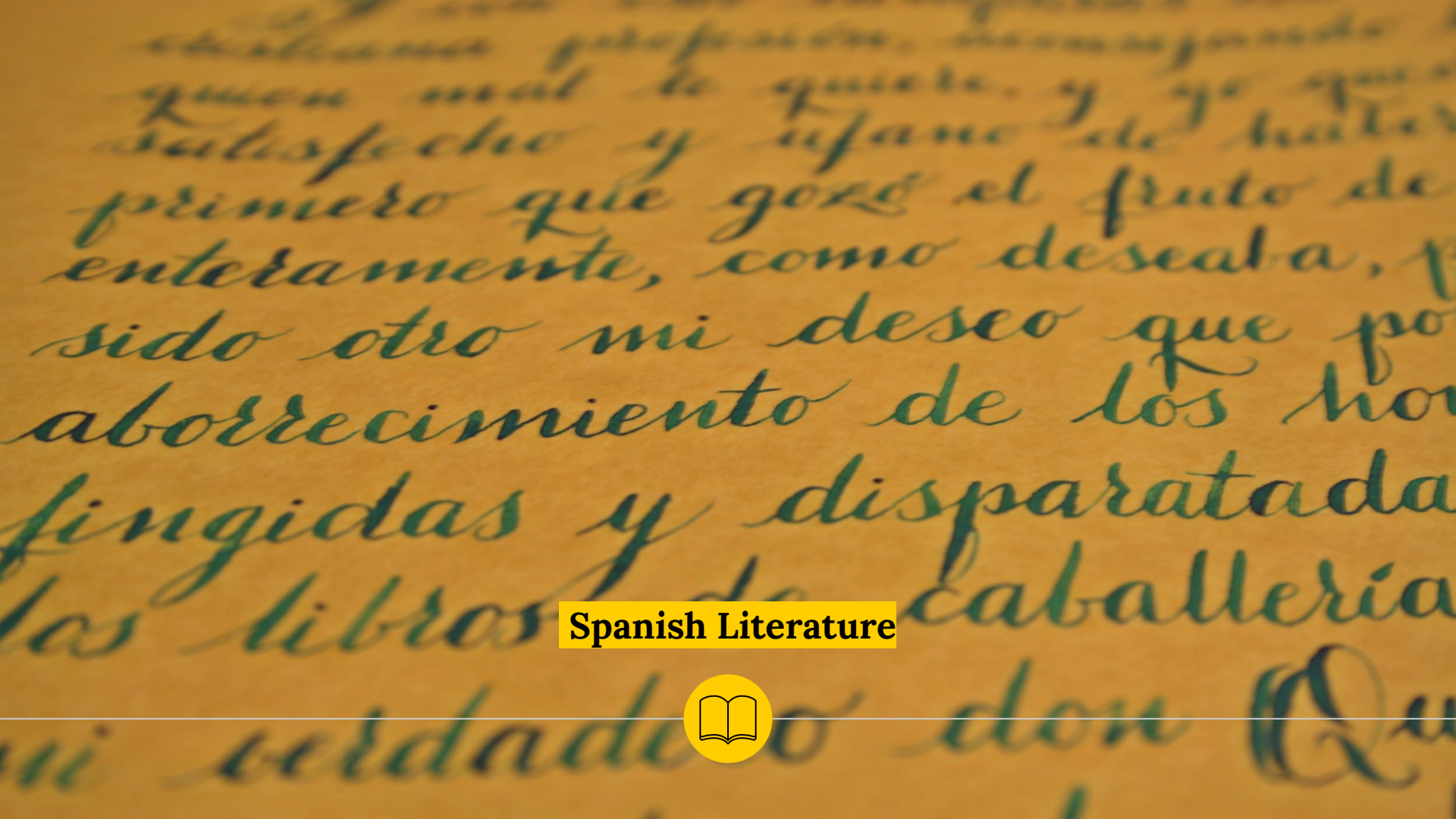
Lucas Rodés

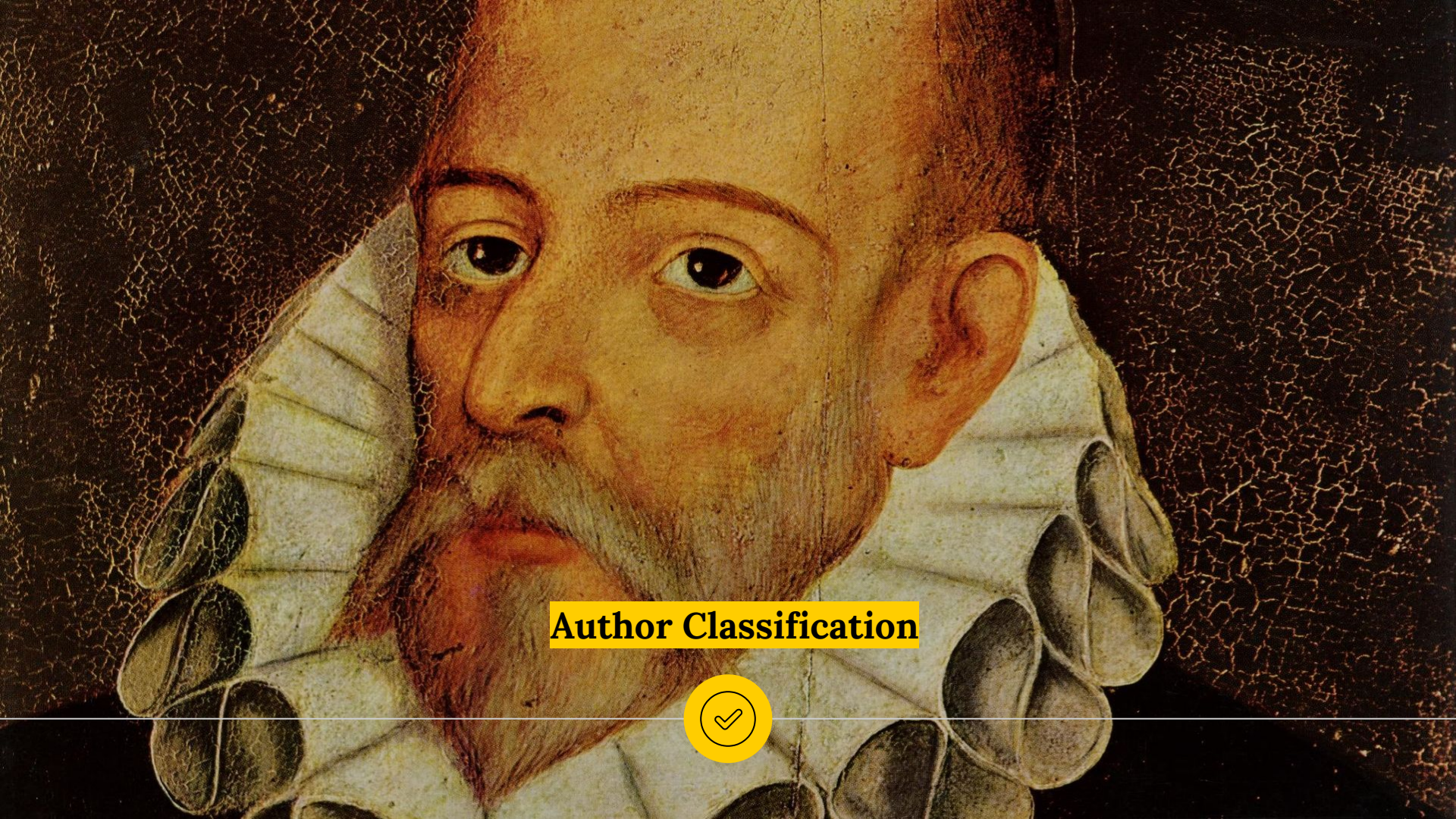
Sergi Liesegang

Outline

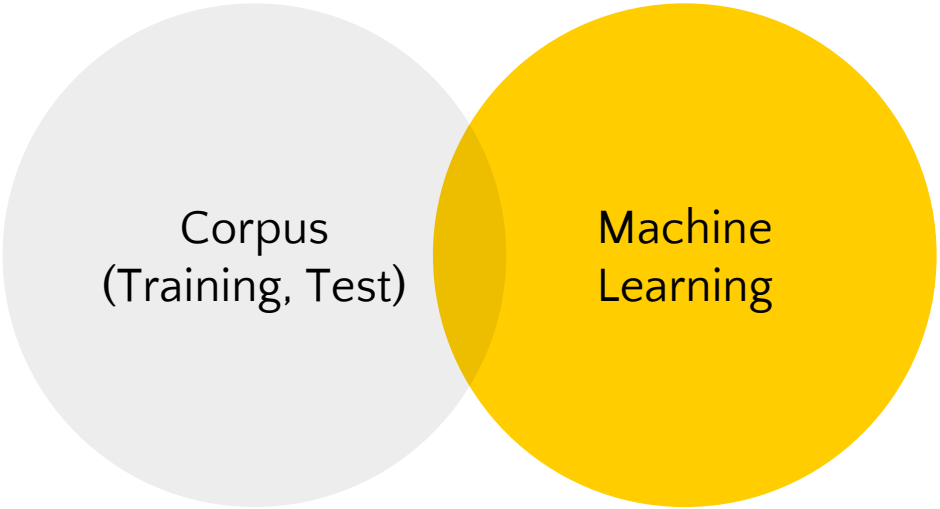
- Introduction
- Corpus
- Classifiers
- Results
- Conclusions. Future Work.

1 Introduction

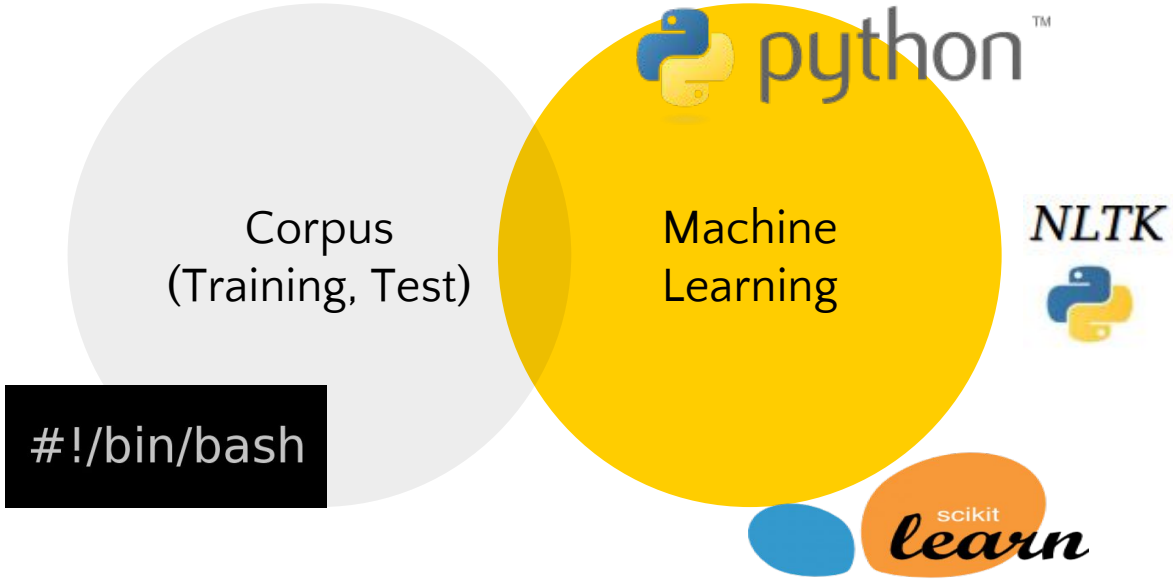

Spanish Literature


Author Classification

1 Scope



1 Tools


Corpus
(Training, Test)
Machine
Learning
python
NLTK
#!/bin/bash
scikit
learn

2 Corpus

2

Database

Author	Epoch	Genre
Miguel de **Cervantes**	Renaissance (C16-17th)	Novel - Poetry - Drama
P. **Calderón de la Barca**	Golden Age - Baroque (C17th)	Drama - Poetry
Felix **Lope de Vega**	Golden Age - Baroque (C17th)	Novel - Poetry - Drama
Francisco de **Quevedo**	Baroque (C17th)	Poetry
G. Adolfo **Becquer**	Romanticism (C19th)	Poetry - Novel
Emilia **Pardo** Bazan	Realism - Naturalism (C19th)	Novel
Benito Pérez **Galdós**	Realism (C19th)	Novel - Drama
Federico **Garcia Lorca**	Generation of 27 (C20th)	Poetry - Drama

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Correlated

3 Classifiers

3

Naive Bayes

Mainstay in text Processing

Simple Categorization

Based on Bag of Words model

Compares elements in texts

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Sparse Matrix as input feature

Word occurrences

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$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

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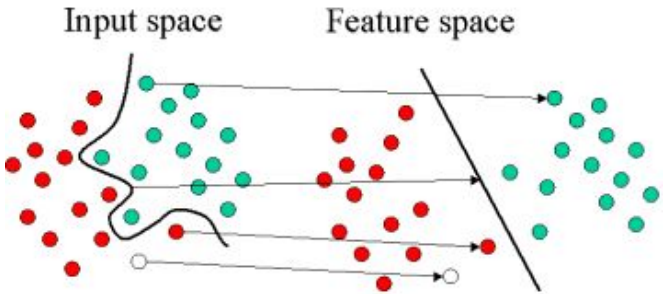
Implemented in Python

Scikit-learn Library

3

Support Vector Machine



Well-known classifier

Finds boundary with maximum class separability.

Kernel

We used **Linear**

Sparse Matrix as input feature

Word occurrences

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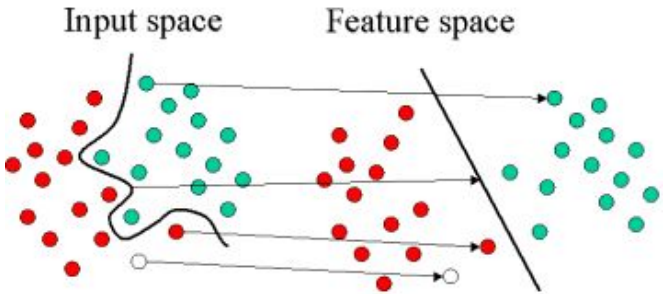
Support Vector Machine



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Grid Search

Optimization method to find best classifier parameters

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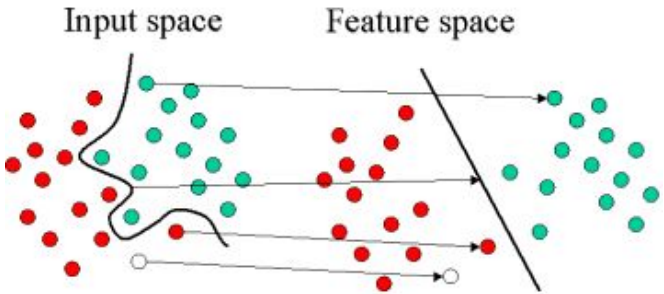
Support Vector Machine



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3 Approaches

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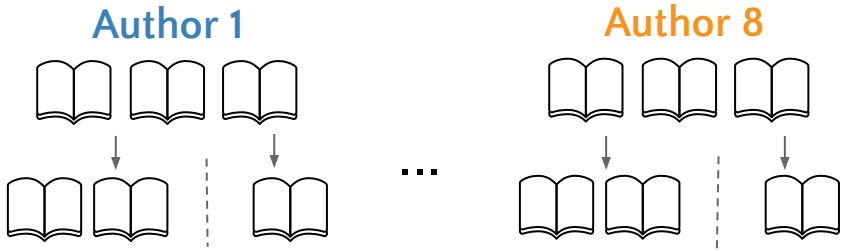
- 66% Training, 33% Test



3 Approaches

- **Download** books
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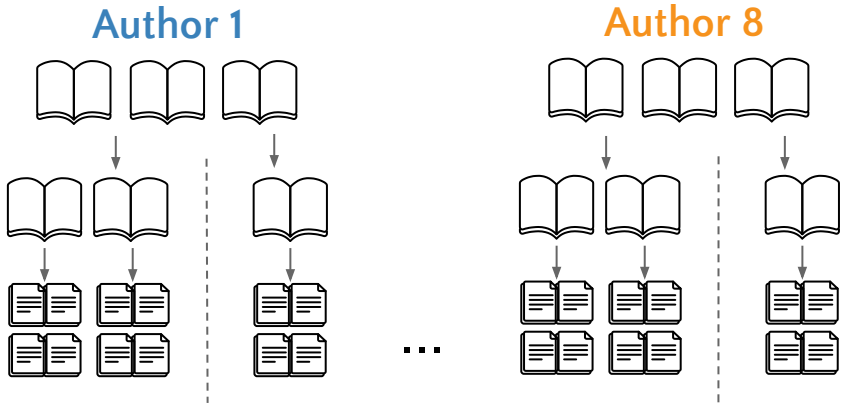
- **Split** in chunks of *L* lines



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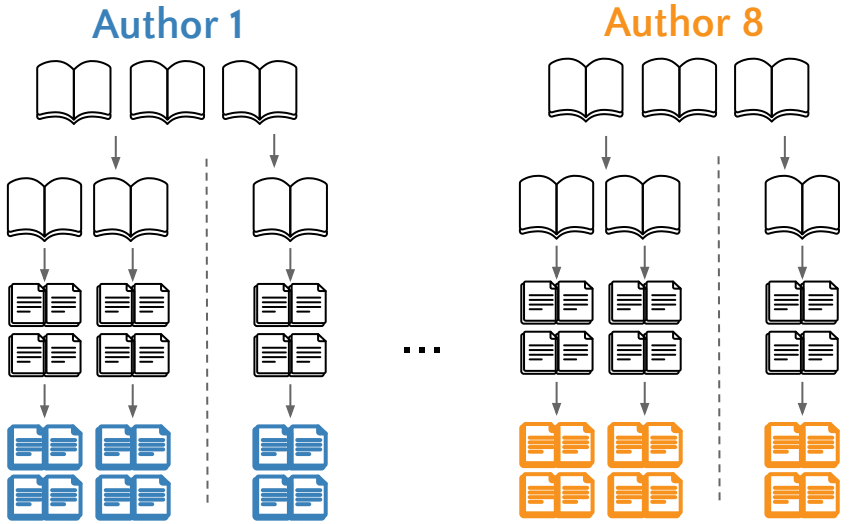
- Labelling



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- **Split** in chunks of *L* lines
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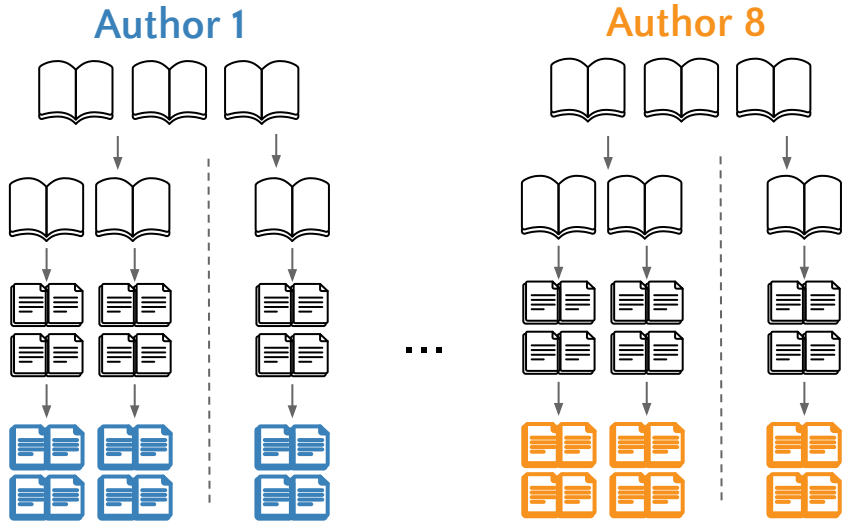
- **Train Classifier**



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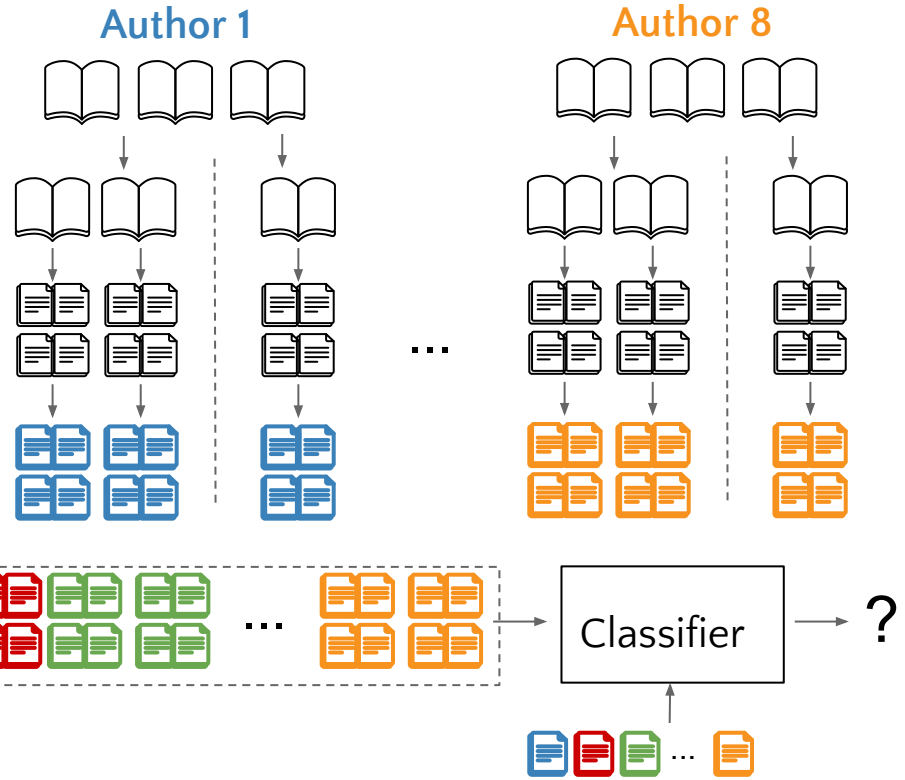

3

Natural Language Modeling

Popular in speech processing

Based on Statistical Learning

Word statistics

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N-gram Model

Unigram, Bigram,
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Smoothing Methods

We have used Add one Smoothing

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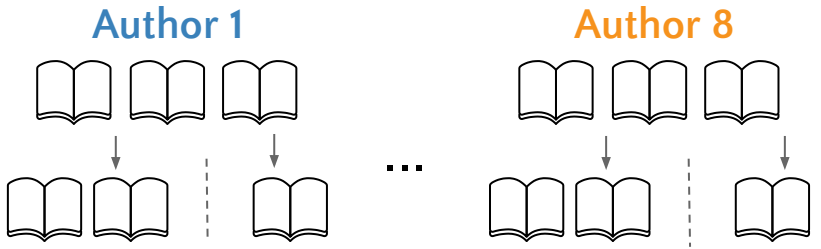

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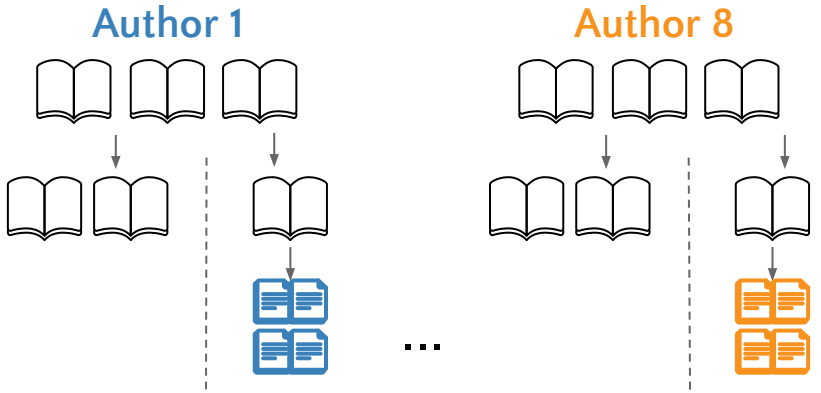
- **Split** Test in chunks & label



3 Approaches

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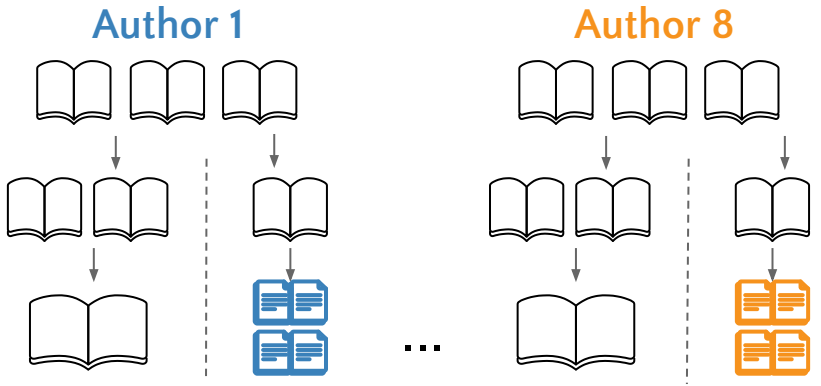
- **Split** Test in chunks & label
- **Merge** Training books



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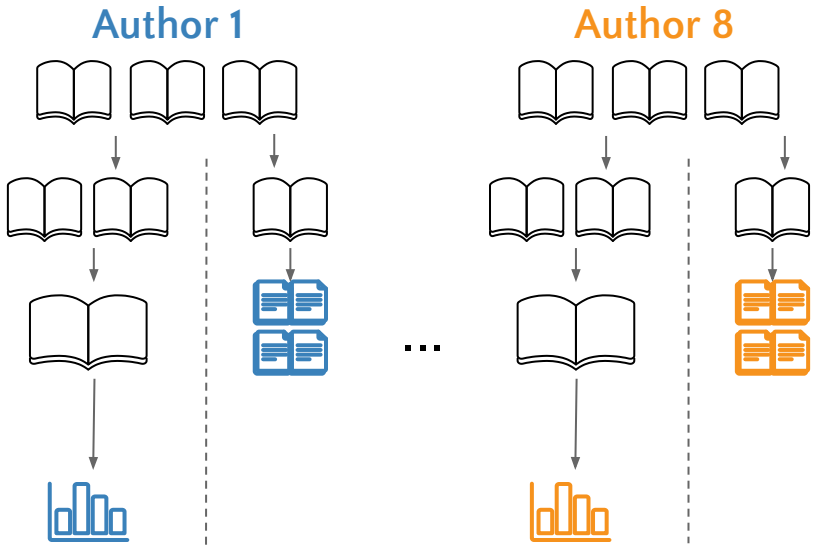
- Obtain **Language Model**



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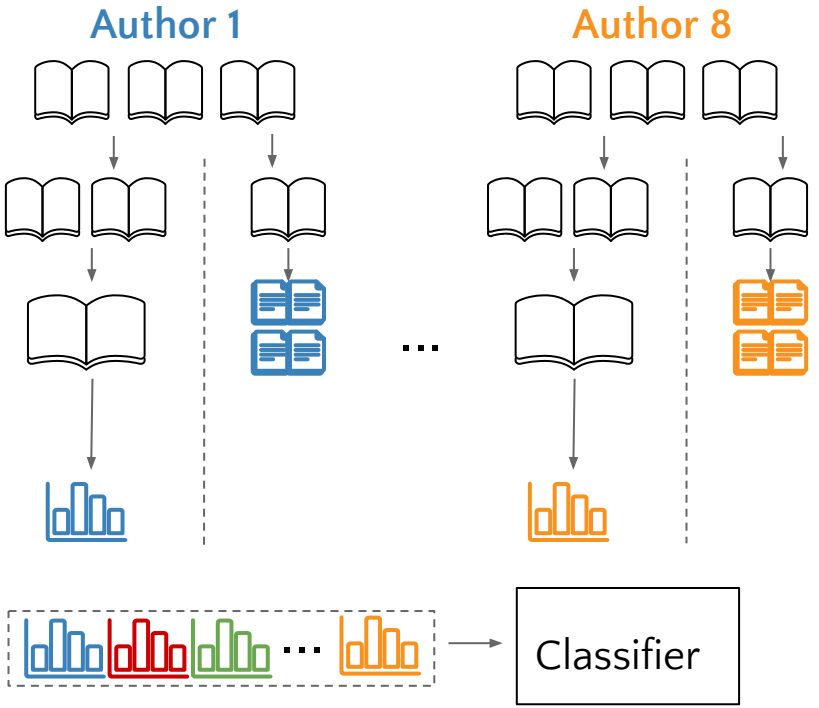

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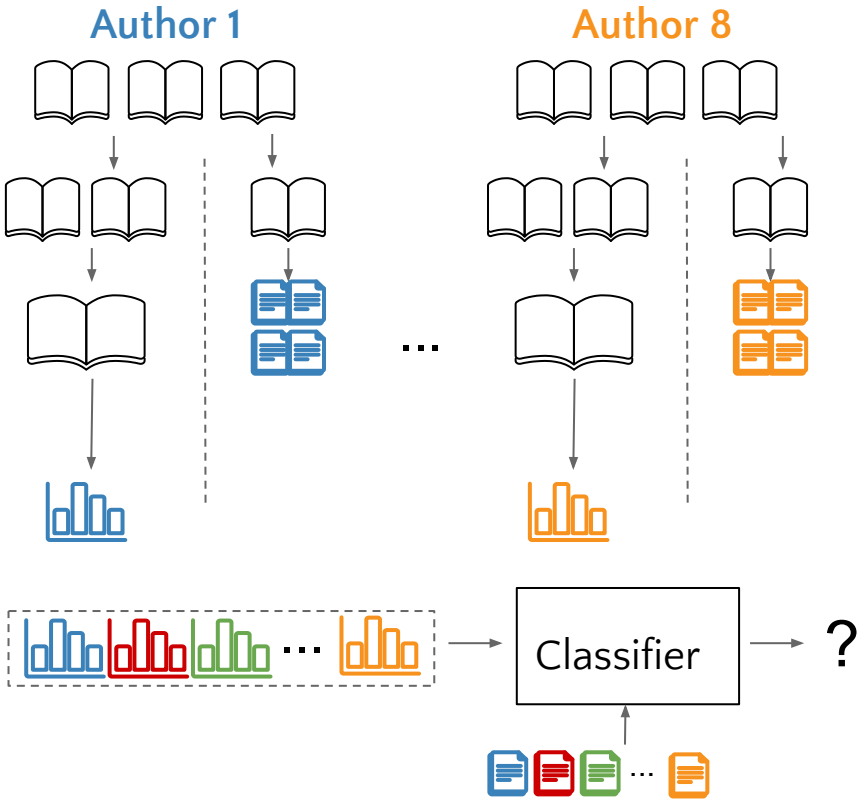
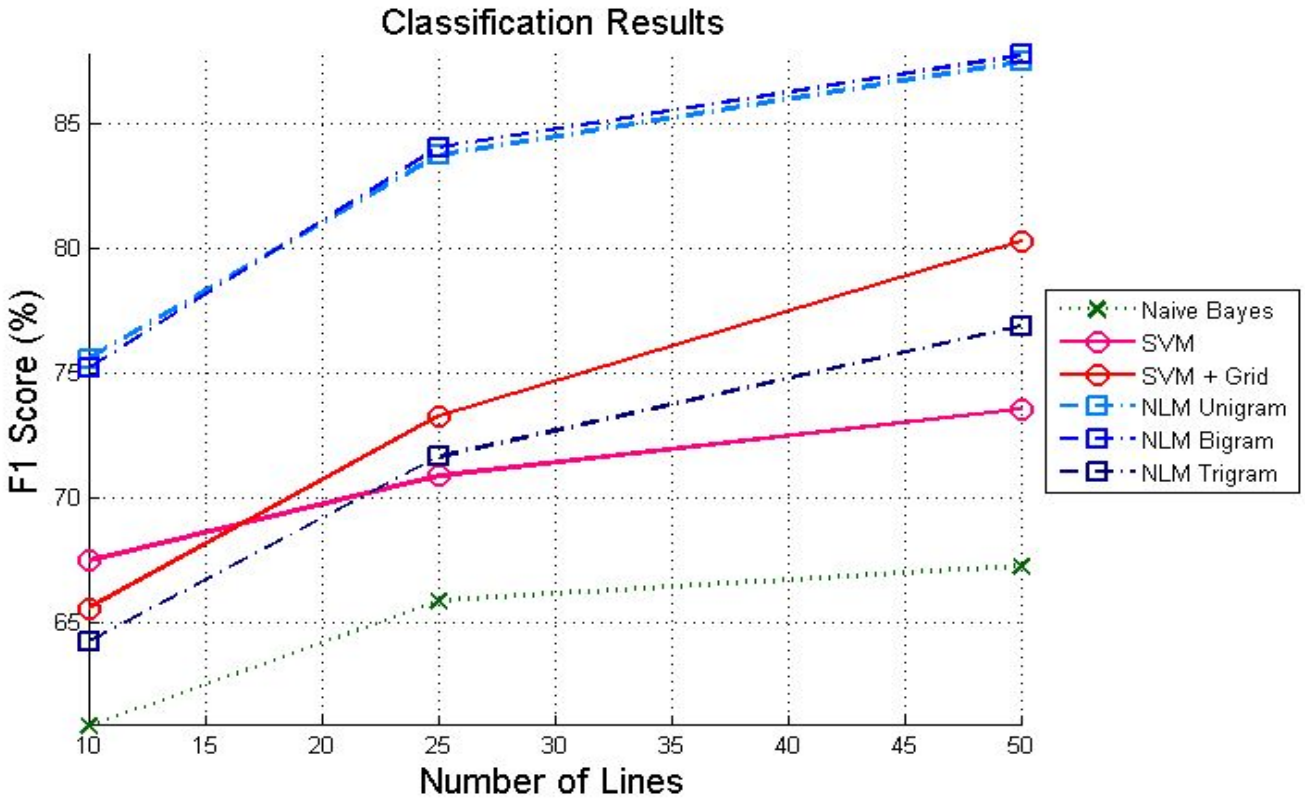
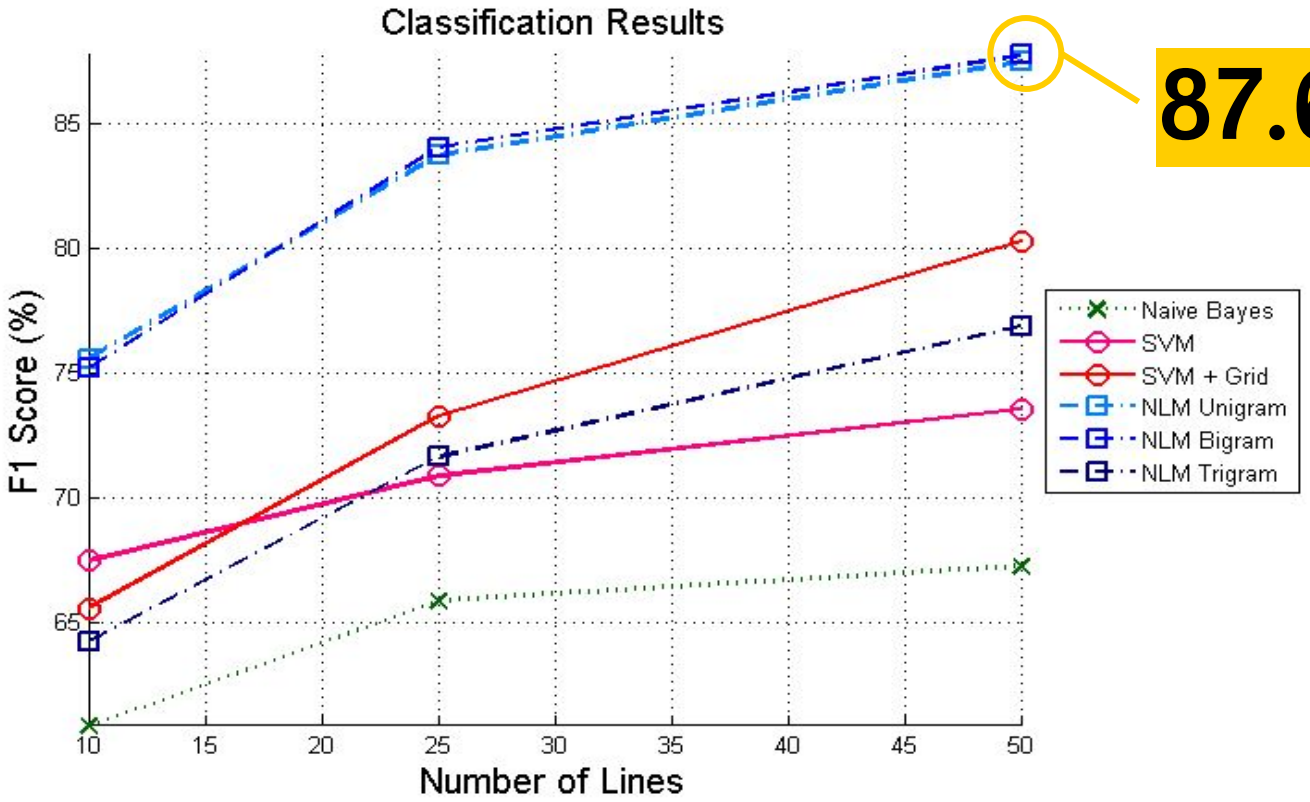


4 Results


Classification Results
F1 Score (%)
85
80
75
70
65
10
15
20
25
30
35
40
45
50
Number of Lines
Naive Bayes
SVM
SVM + Grid
NLM Unigram
NLM Bigram
NLM Trigram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SVM
SVM + Grid
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NLM Trigram

87.6%

5 Conclusions. Future Work

5 Conclusions

- **NLM** is, by far, the **best option**
- **Larger chunks** (more lines) lead to **better results**
- **Correlation** represents a **problem** in simple approaches

5 Future Work

- **Increase** database (training and test)
- Further analyze **relation** between **chunk size** and **accuracy**
- **Equilibrate** number of samples per author
- **Explore** other **smoothing** methods of NLM
- Use of **Neural Networks**

Thanks!

Credits

Special thanks to all the people who made and released these awesome resources for free:

- Presentation template by SlidesCarnival
- Photographs by Unsplash

To evaluate the system

$$\text{Precision} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Positives}}$$

$$\text{Recall} = \frac{\text{True Positives}}{\text{True Positives} + \text{False Negatives}}$$

More Compact way:

$$\text{F}_1 \text{ Score} = 2 \cdot \frac{\text{Precision} \cdot \text{Recall}}{\text{Precision} + \text{Recall}}$$