Next-word Prediction with Approach Federated Learning

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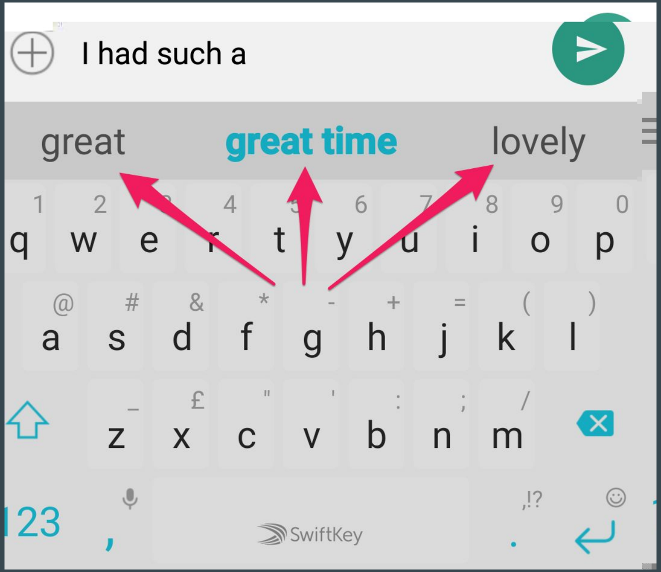
Business Understanding

Predict the next word ensuring data privacy



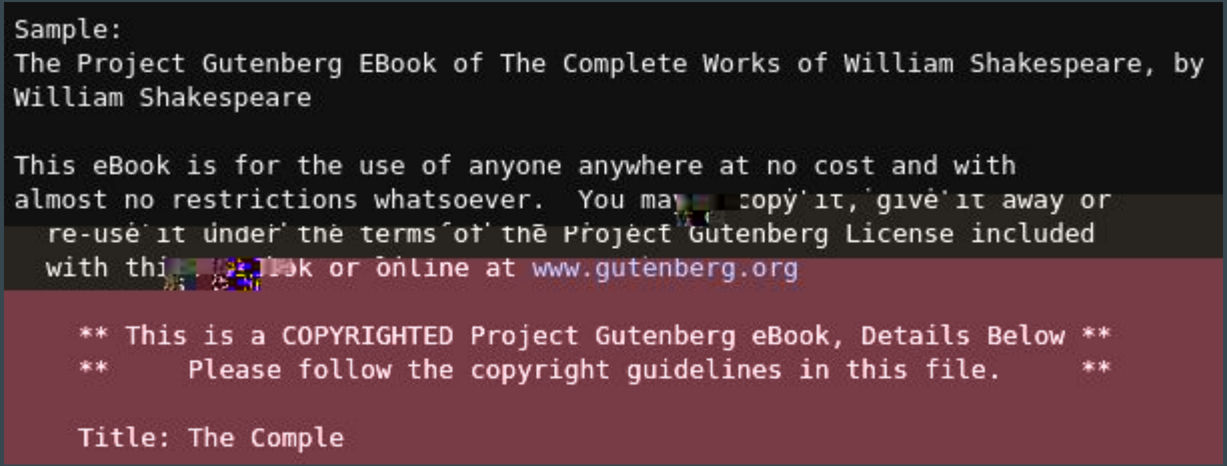
I had such a

Collect Initial Data

- The data consists in Shakespeare’s plays
- Hosted in Project Gutenberg
- Unique file with all plays
- txt format
- Script to download

Describe Data

- Total rows: 124.788
- Total tokens: 1.134.708
- Total characters: 5.465.129
- Total unique character: 91
- Sample, first 500 characters:



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Sample:
The Project Gutenberg EBook of The Complete Works of William Shakespeare, by
William Shakespeare

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almost no restrictions whatsoever.  You may copy it, give it away or
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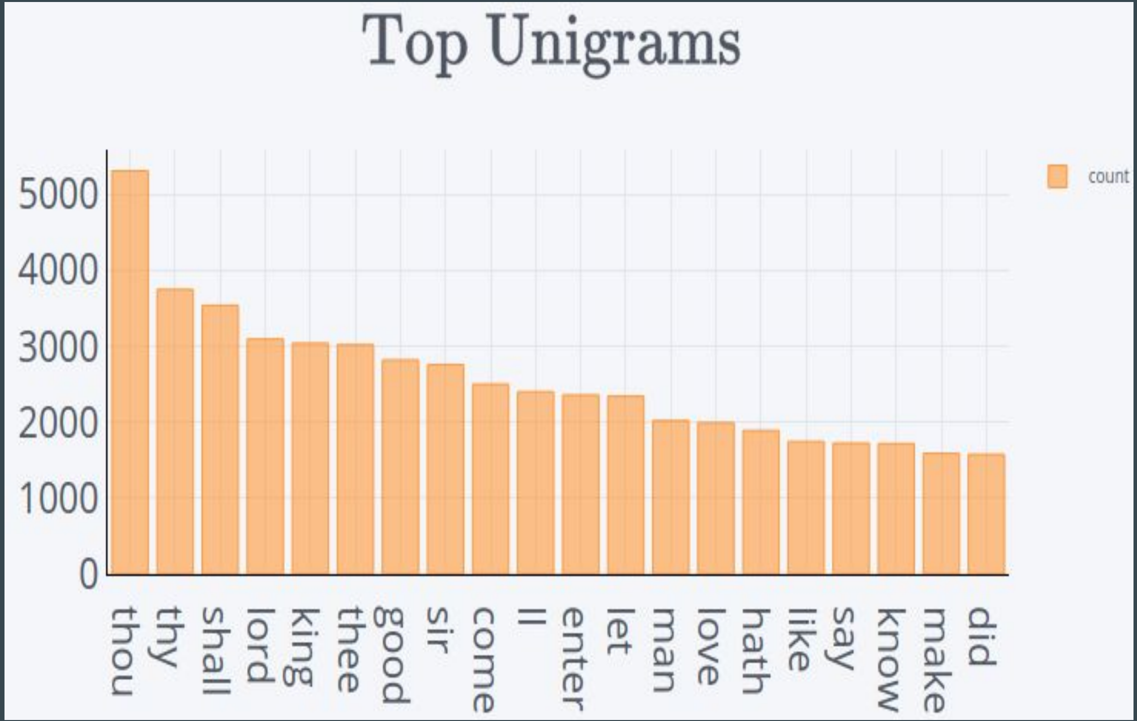
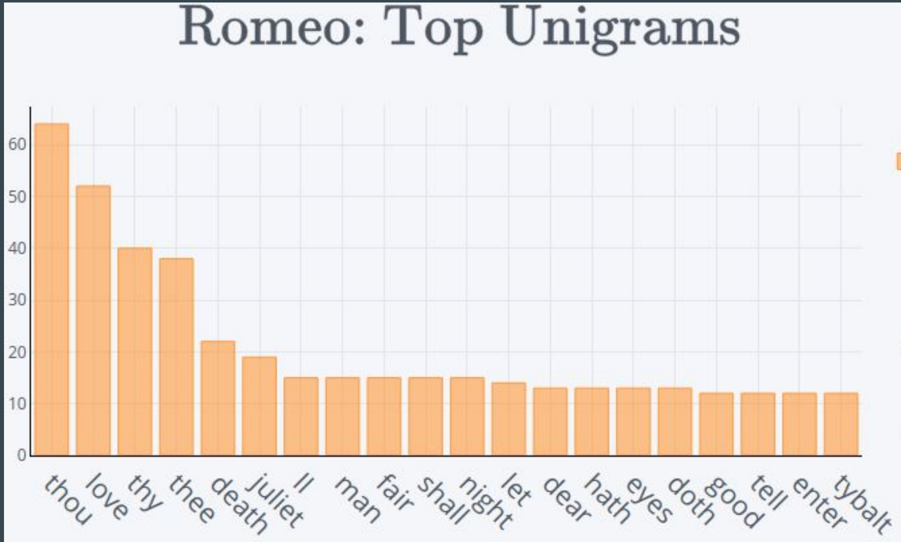
Preprocessing

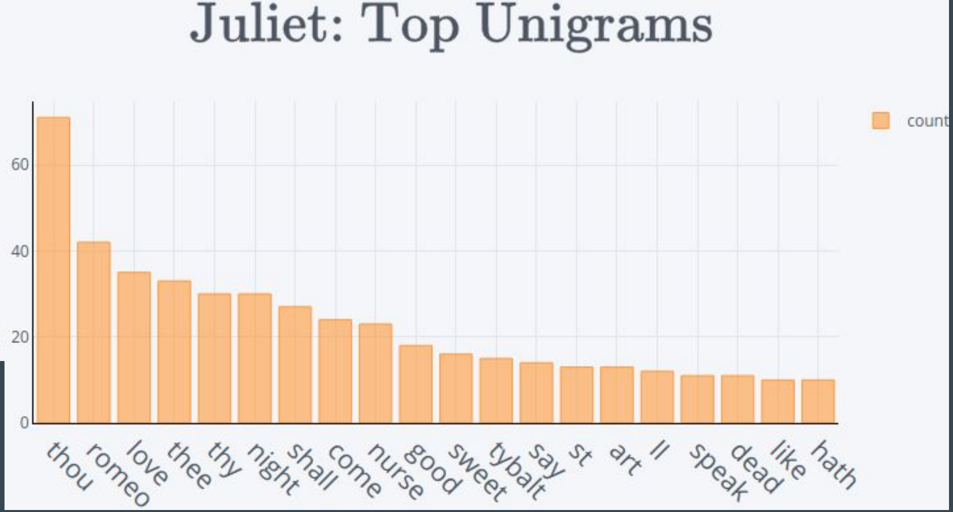
- Function to remove unnecessary text
- Bag-of-Words
- Term Frequency and Inverse Document Frequency (TF-IDF)
- Latent Dirichlet Allocation (LDA)

Explore Data (n-grams)

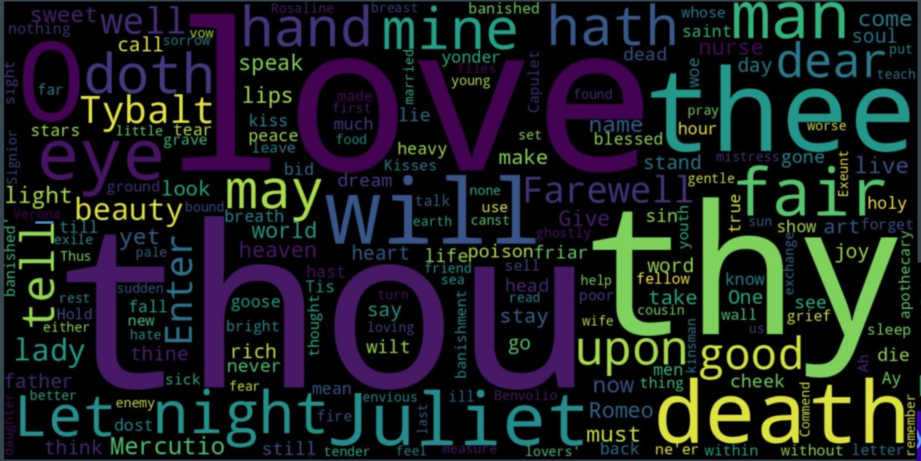


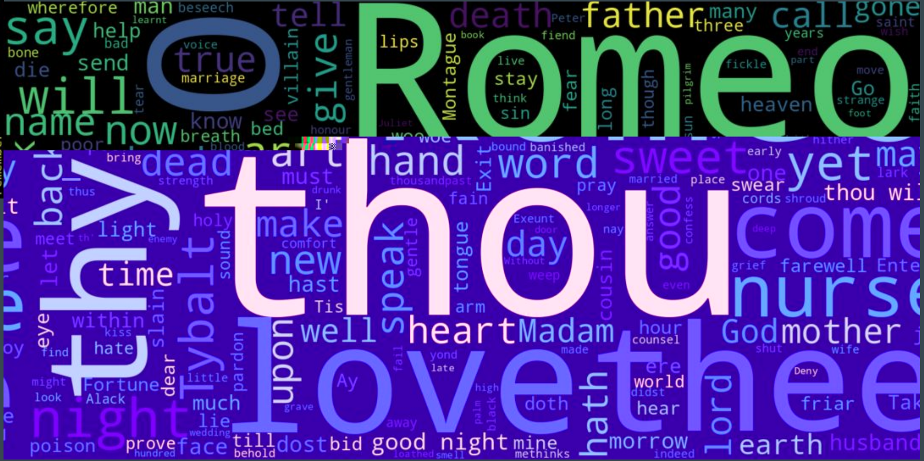
Explore Data (n-grams): Romeo and Juliet





Explore Data (WordCloud): Romeo and Juliet

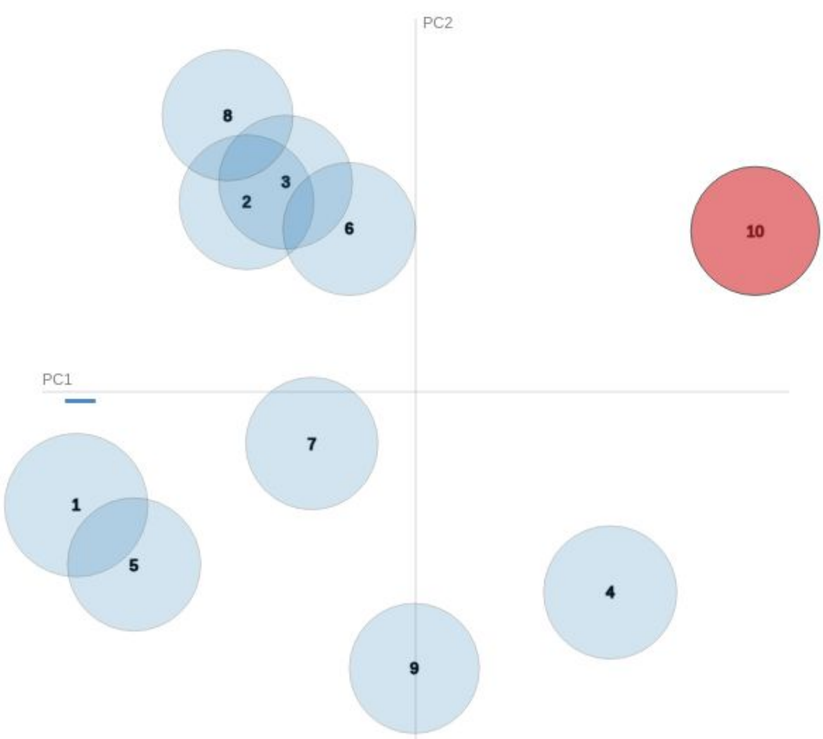




Word Topic Clusters

By analyzing the words, topics can be classified:

- Topic 1: Family Duel
- Topic 2: Actions of a king
- Topic 3: Romantic dispute
- Topic 4: Farewell (Despedida)
- Topic 5: Relationship between queen, mother, prince and gentleman



NOTE: Each bubble represents a topic

Federation Design

- To simulate the federation of clients, the module will be used tff.simulation
- 715 users where each example corresponds to a data set of spoken by the character in a given play.

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