Classifying Refugee News Reports

Data Warehousing and Computing Lab

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Outline

1. **Aim and Motivation**
   Working with IOM and Refugee News Flood
2. **Database Management**
   UI, Data Types and MongoDB
3. **Text Processing**
   String Cleaning, Vectorization and TF-IDF Representations
4. **Modelling the Data**
   Clustering and Cross-Validated Classifiers

Motivation

- Ever since the start of the refugee crisis there has been a steady increase in news reports and rumors regarding missing migrants.
    - Not even factoring in Donald Trump's Twitter activity
- In order to efficiently allocate resources and to help people in nedd, it is crucial to determine hot spots based on reliable data.
- Cooperation with the International Organisation for Migration (IOM)

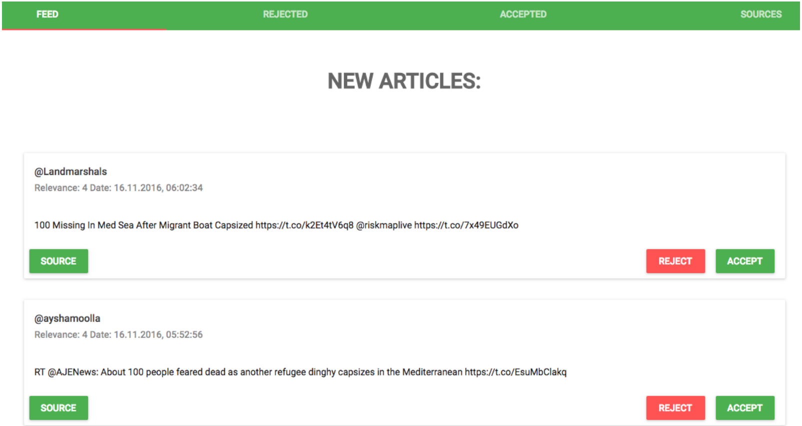
Data Types, Challenges and a Solution

- Data Sources:
  - → Google Alert News Feeds
  - → Twitter Feeds
  - → Missing Migrant Project (MMP) data
- Datamanagement Challenges:
  - → One schema is not enough (different data types)
- Datamanagement Solution: MongoDB

MongoDB

- MongoDB has several advantages:

UI and Automated Labelling Process



NEW ARTICLES:

@Landmarshals
Relevance: 4 Date: 16.11.2016, 06:02:34

100 Missing In Med Sea After Migrant Boat Capsized https://t.co/k2Et4tV6q8 @riskmaplive https://t.co/7x49EUGdXo

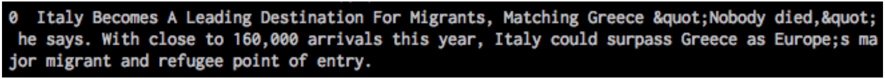
@ayshamoolla
Relevance: 4 Date: 16.11.2016, 05:52:56

RT @AJENews: About 100 people feared dead as another refugee dinghy capsizes in the Mediterranean https://t.co/EsuMbClakq

▸ Link

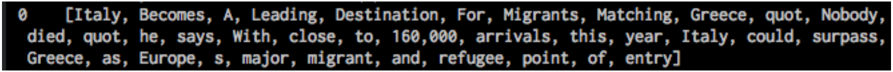
Cleaning the strings

- Original text string - Label: Rejected



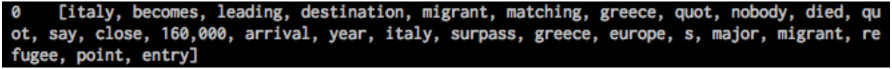
```
0  Italy Becomes A Leading Destination For Migrants, Matching Greece &quot;Nobody died,&quot;
 he says. With close to 160,000 arrivals this year, Italy could surpass Greece as Europe;s ma
jor migrant and refugee point of entry.
```

- Splitting text into tokens



```
0    [Italy, Becomes, A, Leading, Destination, For, Migrants, Matching, Greece, quot, Nobody,
  died, quot, he, says, With, close, to, 160,000, arrivals, this, year, Italy, could, surpass,
  Greece, as, Europe, s, major, migrant, and, refugee, point, of, entry]
```

- Removing stopwords



```
0    [italy, becomes, leading, destination, migrant, matching, greece, quot, nobody, died, qu
ot, say, close, 160,000, arrival, year, italy, surpass, greece, europe, s, major, migrant, re
fugee, point, entry]
```

Constructing a Vectorized Representation

- tf-idf: value increases proportionally to the number of times a word appears in the document, but is offset by the frequency of the word in the corpus, which helps to adjust for the fact that some words appear more frequently in general.
- Deciding on dimensionality: bi-grams, tri-grams, etc.

  → Which representations do really matter?

The Problem

- Easy/accelerated classification of relevant and irrelevant news
- Problems:
  1. Redundancy: Many observations cover the same events
  2. Sensitivity: Hard classification problem
- Solutions:
  1. Hierarchical clustering using DBSCAN
  2. Ensemble Methods: Random Forest

Clustering using DBSCAN - Density-based spatial clustering of applications with noise

- Density-based clustering algorithm: core points, (density-)reachable points and outliers
- Core point forms cluster together with all reachable points (core or non-core).
- Clusters contain at least one core point; non-core points can be part of a cluster, but they form its "edge", since they cannot be used to reach more points.
- Applied to TF-IDF matrix and parametrized with difference tolerance

Building a First Classification Model

- Many potential classifiers available: Logistic Regression, Naive Bayes, SVM, Decision Tree, Random Forest and Neural Networks
- Idea: Start with MVP (minimal viable product) to grasp the problem → Generative Model: Naive Bayes

Problems in Classification

- Hyperparameter choices: 5-fold cross-validation and parameter grid search
- Adding non-parametric complexity: Random Forest

Improving Classification

- Hyperparameter choices: 5-fold cross-validation and parameter grid search
- Adding non-parametric complexity: Random Forest

Conclusion

- Open research/work:
  1. Better understanding of the decision boundary problem
- *Any Questions?*
- *Thank you for your attention!*