**Problem Formulation Paper**

Topic:

**Classification of the Dataset: One Million Post Corpus**

Course:

Natural Language Processing

Department of Mathematics and Computer Science

At Phillips Marburg University

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1. Introduction

For the following Group Project in the Course Natural Language Processing we decided to train a classification Model on the Dataset One Million Post Corpus.

This Dataset contains annotated user posts from the Austrian Newspaper Website “Der Standard”.

The Main objective for our project is to train a model that is able to predict the annotated categories mentioned in Chapter 1.2 .

As subtask we would like to train another model that is able to predict the label status which helps to identify content that should be deleted and therefore probably has a relation to the negative associated categories.

Eventually, given the time constraints and project scope enables us, we would like to take a closer look at the distance between categories to find out how they correlate and how the categories correlate to the topic path of news articles.

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# Dataset Description

The “One Million Posts” corpus is an annotated data set consisting of user comments posted to the Austrian newspaper website “Der Standard” (in German language).

Der Standard is an Austrian daily broadsheet newspaper. On the newspaper’s website, there is a discussion section below each news article where readers engage in online discussions. The data set contains a selection of user posts from the 12 month time span from 2015-06-01 to 2016-05-31. There are 11,773 labeled and 1,000,000 unlabeled posts in the data set. The labeled posts were annotated by professional forum moderators employed by the newspaper.

## Dataset Labels

### Post Labels

The data set contains the following data for each post:

* Post ID

→ 206

* Article ID

→ 4

* Headline (max. 250 characters)

→ “Ja aber: Was hat der Stance….”

* Main Body (max. 750 characters)

→ “Ich bin Rechtshänder, fahre Goofy und kicke mit Rechts. Sie sind Linkshänder, ..”

* User ID (the user names used by the website have been re-mapped to new numeric IDs)

→ 10467

* Time stamp

→ “2014-08-13 08:00:52.207”

* Parent post (replies give rise to tree-like discussion thread structures)

→ 203

* Status (online or deleted by a moderator)

→ “online”

* Number of positive votes by other community members

→ 0

* Number of negative votes by other community members

→ 0

### Article Labels

For each article, the data set contains the following data:

* Article ID

→ 4

* Publishing date

→ “2014-08-13 05:30:00.00”

* Topic Path (e.g.: Newsroom / Sports / Motorsports / Formula 1)

→ “Newsroom/User/mitmachen/Mitreden”

* Title

→ “Welche Erfahrungen haben Sie als Linkshänder gemacht?”

* Body

→ “<div class="section" … Wie sieht Ihr Alltag als Linkshänder aus? Erledigen Sie manche Arbeiten mit rechts statt mit links? ...”

## Dataset Annotations for user generated content

### Potentially undesirable content

* Sentiment (negative/neutral/positive)

An important goal is to detect changes in the prevalent sentiment in a discussion, e.g., the location within the fora and the point in time where a turn from positive/neutral sentiment to negative sentiment takes place.

* Off-Topic (yes/no)

Posts which digress too far from the topic of the corresponding article.

* Inappropriate (yes/no)

Swearwords, suggestive and obscene language, insults, threats etc.

* Discriminating (yes/no)

Racist, sexist, misogynistic, homophobic, antisemitic and other misanthropic content.

### Neutral content that requires a reaction

* Feedback (yes/no)

Sometimes users ask questions or give feedback to the author of the article or the newspaper in general, which may require a reply/reaction.

### Potentially desirable content

* Personal Stories (yes/no)

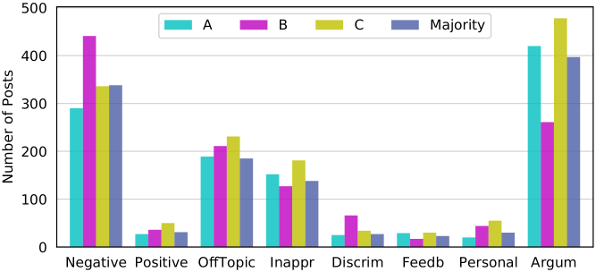
In certain fora, users are encouraged to share their personal stories, experiences, anecdotes etc. regarding the respective topic.

* Arguments Used (yes/no)

It is desirable for users to back their statements with rational argumentation, reasoning and sources.

## Dataset Issues

Imbalanced data between catgeories.



Confusion Matrix does not show any relation between the labels which seems off between negative and positive sentiment.

,Graphical user interface, text, application

Description automatically generated

# Initial Idea

## Prediction of post categories

Training a model that can predict the categories of posts mentioned in Chapter 1.2.

For this task we will load the Dataset into different classifiers and split into training and test data.

We will not use accuracy for performance measurement because of data imbalance. Instead, we will be using F1 Score to compare the performance.

Trained Models are further described in Chapter 3.

# Trained Classifiers

We have used different classifiers to get a performance overview and choose the best classifier.

Therefore, each Classifier gets its Sub-Chapter, and the best overall result will be collected in Chapter XXX

## Support Vector Column – RBF Kernel

## Support Vector Column – Primal

## Support Vector Column – Dual

## Logistic Regression – Balanced

## Gradient Boosting Trees

## Feed Forward Neural Network

## K-Nearest Neighbour

## Naive Gaussian Bayes

## Best performing Classifier per Label

# Conclusion

Due to the large imbalance in the Dataset and the inconsistent post-labelling which does not seem to follow any consistent order, the parameter tweaks in the classifiers could not improve the results by a large margin. Although our performance tweaks did not boost the results by large, we were able to achieve a F1-Score above 0.6 for 5 of 9 labels, where the other 3 labels were too imbalanced for any learning to take place.

In conclusion there is not one single best performing classifier as most F1-Scores per label were similar between the different classifiers but if we were to choose one, MLP-Classifier would be the winner, outperforming by a small margin.