

# Paper Structure

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# 1 Introduction

## 2 Methods

### 2.1 Preprocessing

#### 2.1.1 Feature Engineering

##### Images

- Discuss if figure of cnn examples can be moved to appendix

##### Reviews

- Description of Sentiment Analysis, stating procedure and results and including **Figure** with Wordcloud, either only English Words or Side-by-Side Wordclouds of English and Norwegian Words
- In addition: Language Detection to include the *number of different languages* and the *fraction of norwegian languages* and Analyzing the reviews lengths to include the *median review length*
- Since there are multiple reviews per apartment the results for each review were averaged for each apartment separately.

##### Others

- Optionally mention all other features that we added to the dataset
- All self-engineered features from images, from reviews and from existing metric variables were combined into a single dataframe as the foundation of all further analysis

#### 2.1.2 Feature Selection

#### 2.1.3 Price Distribution

- Discuss if figure of price distribution can be moved to appendix

## 2.2 Models

### 2.2.1 Classical Models

- serve as benchmark models to better evaluate performance of custom neural network
- selected with increasing degrees of complexity and corresponding decreasing degree of interpretability
- Focus on 4 models: `LinearRegression`, `Ridge`, `RandomForest` and `HistGradientBoosting`
- Describe Model Fitting process and hyperparameter tuning with Randomized Search Cross Validation

### 2.2.2 Neural Network

- Discuss if figure of dropout impact can be moved to appendix

## 3 Results

### 3.1 Predictive Performance

- **Figure** of performance comparison between selected classical models and neural network for given feature selector (e.g. `RFE`) and different number of selected features
- Interpret Differences in Training and Validation Performance between different models
- Interpret Differences in Performance for different number of selected features
- Compare Performance on Validation Set with Performance on Test Set for the best model of each class by means of a table  
⇒ Models whose hyperparameters were tuned on validation set generalize worse to test set, e.g. `HistGradientBoosting`, `RandomForest` and `Ridge`
- Include average predictions of top 2/3/4/5 models, where models are selected based on validation set performance and Test Set predictions

are averaged

- Potentially mention which models contributed to predictions on new, unseen dataset from challenge (only in presentation)

### **3.2 Explanations and Interpretation**

- Discuss if coefficient plot can be moved to appendix

## **4 Conclusion**

## **5 Appendix**

- include link to repository with codebase to reproduce all findings
- include images of:

## **6 References**