# Online News Popularity Prediction

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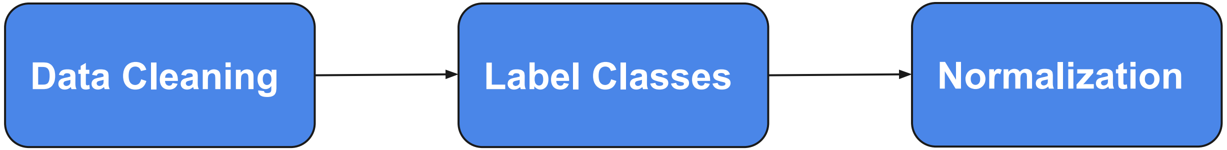
# Data Description

- **39,644** articles published by Mashable from 2013 to 2015
- **58** predictive features:
  - number of words, links, images, videos, day of the week, article category, etc.
- **Target variable:** number of article shares
- **Goal**: build a prediction model to help publishers to maximize popularity of their articles and sell advertisement

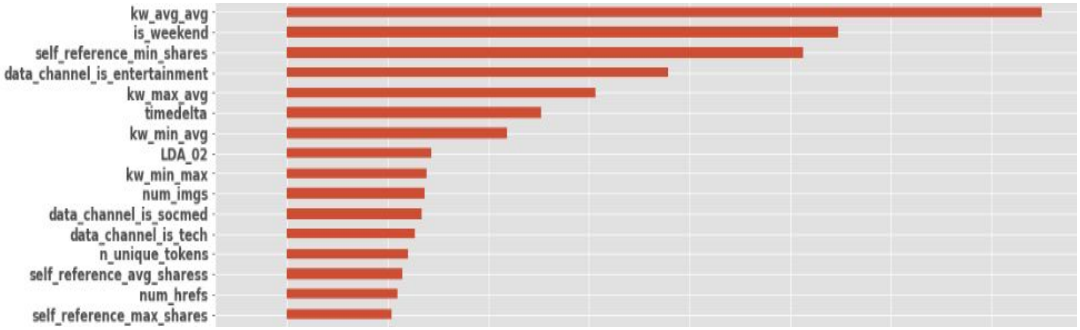


# Feature Importance

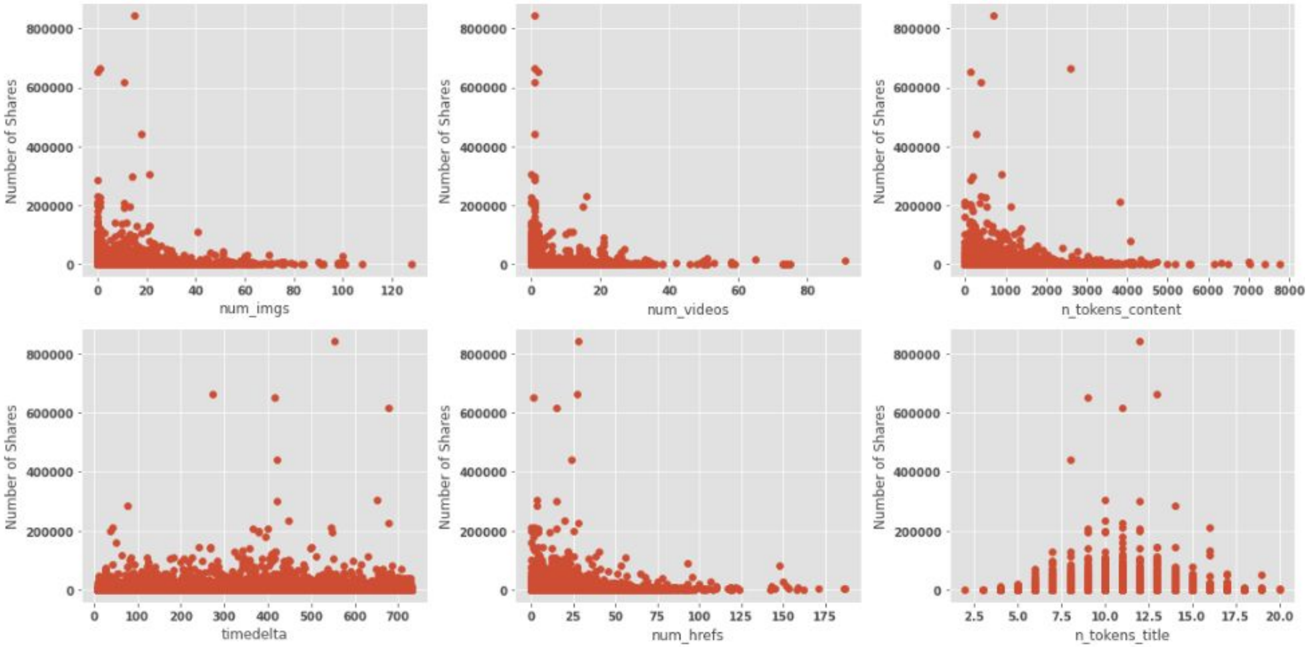
Some important features

- average number of keywords
- published on a weekend?
- minimum number of shares of Mashable links
- article category
- etc.

Mean Decrease Accuracy



# Exploratory Data Analysis



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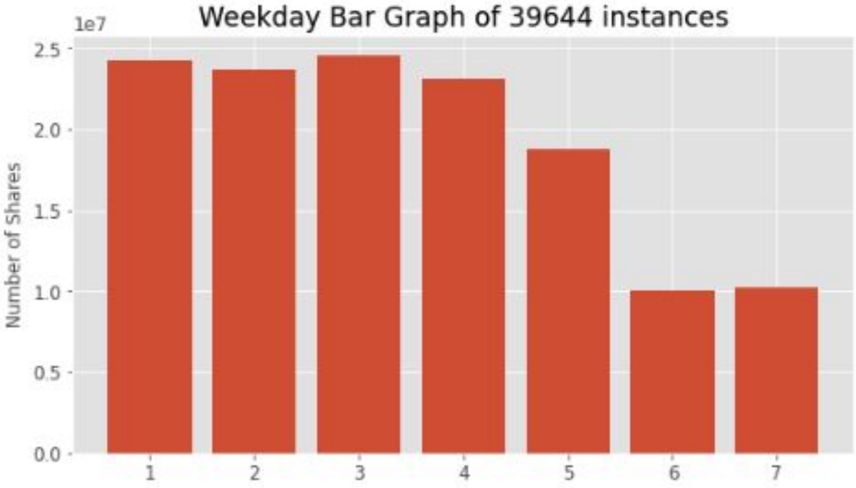
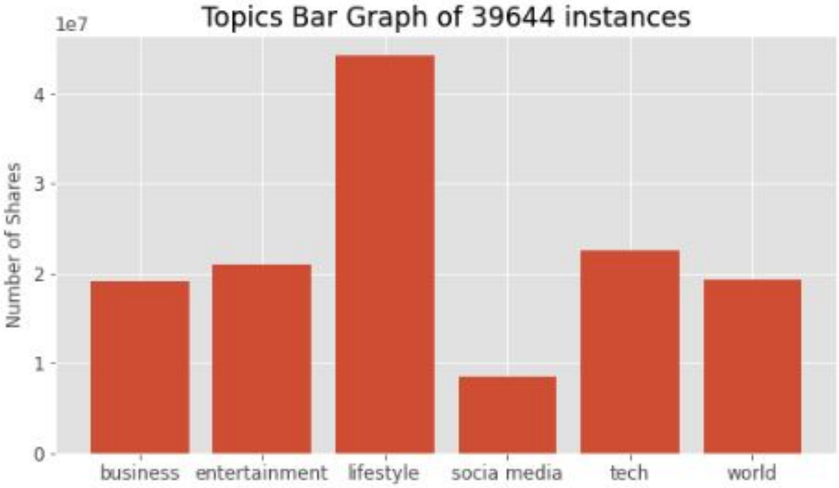


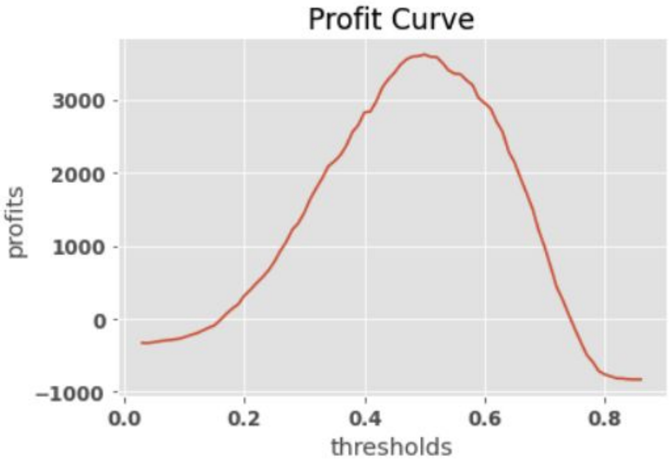


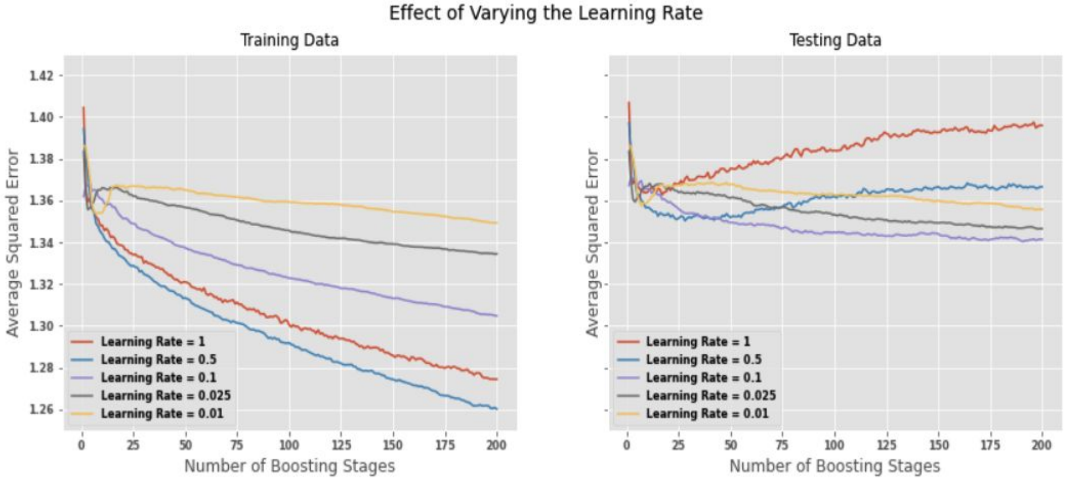
# Multi-Classes Classification

Classes: “not popular”, “mediocre”, “popular” and “super popular”

Models trained: **Logistic Regression, Random Forest Classifier and Gradient Boosting Classifier**

Baseline model F1 score: 0.49



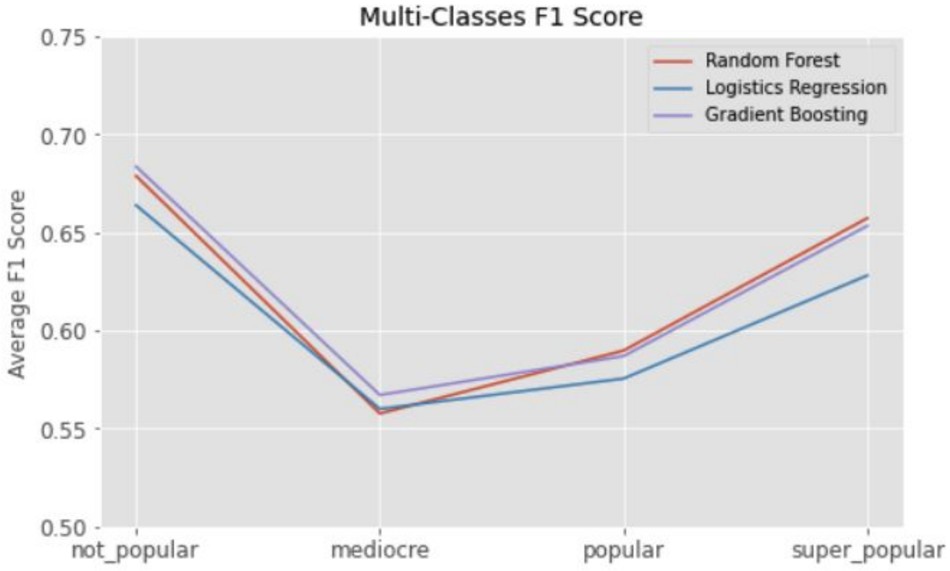


# Model Performance

- Performance measure: **F1 score**

$$F_1 = 2\frac{\text{precision} \cdot \text{recall}}{\text{precision} + \text{recall}} = \frac{1}{\frac{\frac{1}{\text{precision}} + \frac{1}{\text{recall}}}{2}}$$

- The models were better at predicting “not popular” and “super popular” categories with F1 score greater than 0.65



# Business Insights

Recommendations to improve popularity:

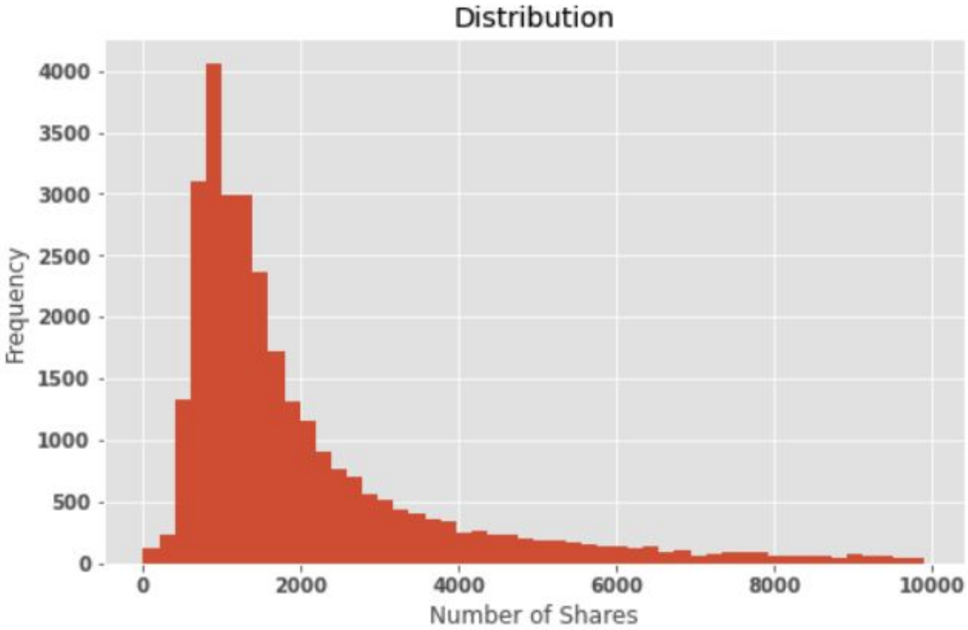
- increase the embedded links to articles with high popularity
- increase amount of subjectivity in title
- increase number of positive/trending words in the content
- decrease number of longer words in the content

# Next Steps

- web scraping 39,644 articles based on their URLs
- NLP analysis on article content
- identify trending words in popular articles

## Any questions?

# Appendix. Distribution of target variable

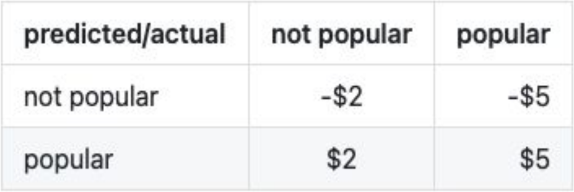


# Appendix. Cost matrix and profit curve

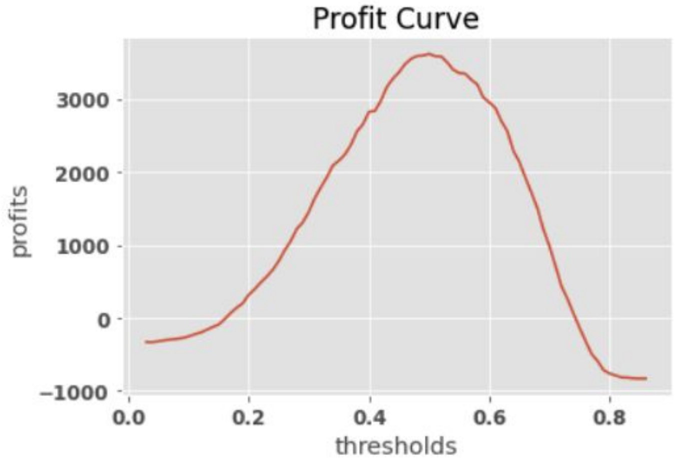
Assumptions:

- a popular article will bring $5 in ads revenue in average
- a not popular article will bring $-2 in ads revenue
- it costs $3 to do improvement on not popular articles
- the opportunity cost of a popular article which predicted as not popular is $3

Optimal threshold: 0.5



| predicted/actual | not popular | popular |
|---|---|---|
| not popular | -$2 | -$5 |
| popular | $2 | $5 |


Profit Curve
profits
thresholds