# Trip Advisor Hotel Reviews

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# Data

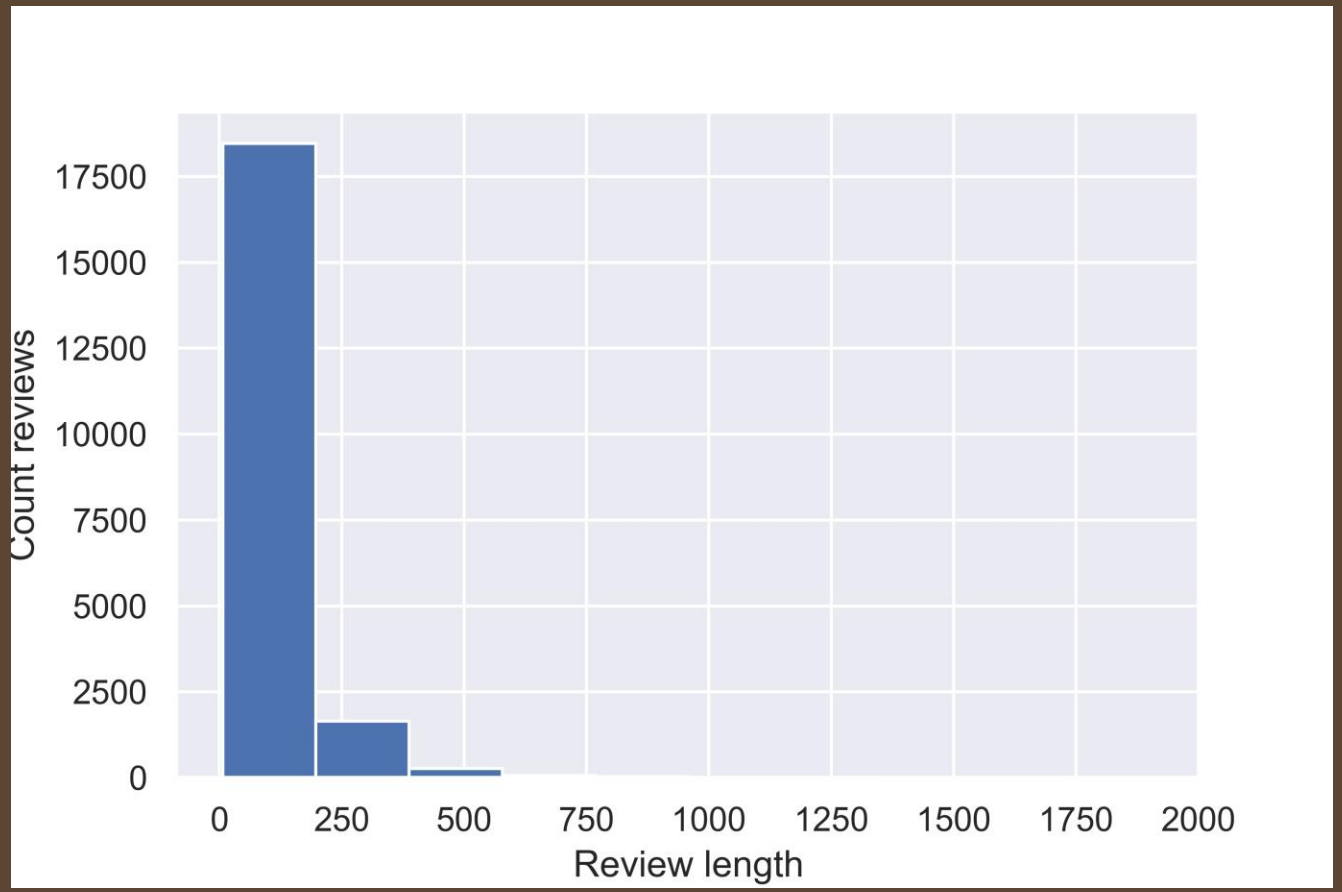
- https://www.kaggle.com/andrewmvd/trip-advisor-hotel-reviews
- Hotels play a crucial role in traveling and with the increased access to information new pathways of selecting the best ones emerged.
- This dataset, consists of 20k reviews crawled from Tripadvisor.

| | Review | Rating |
|---|---|---|
| not recommend hotel did reviewers actually sta... | | 1 |
| barcelona rocks, stayed hotel jazz girlfriend ... | | 4 |
| ok hotel good location stayed night way beijin... | | 3 |
| great service nice pool ok beach lovely ground... | | 4 |
| surprising treat spent weekend july 15/16 2006... | | 5 |

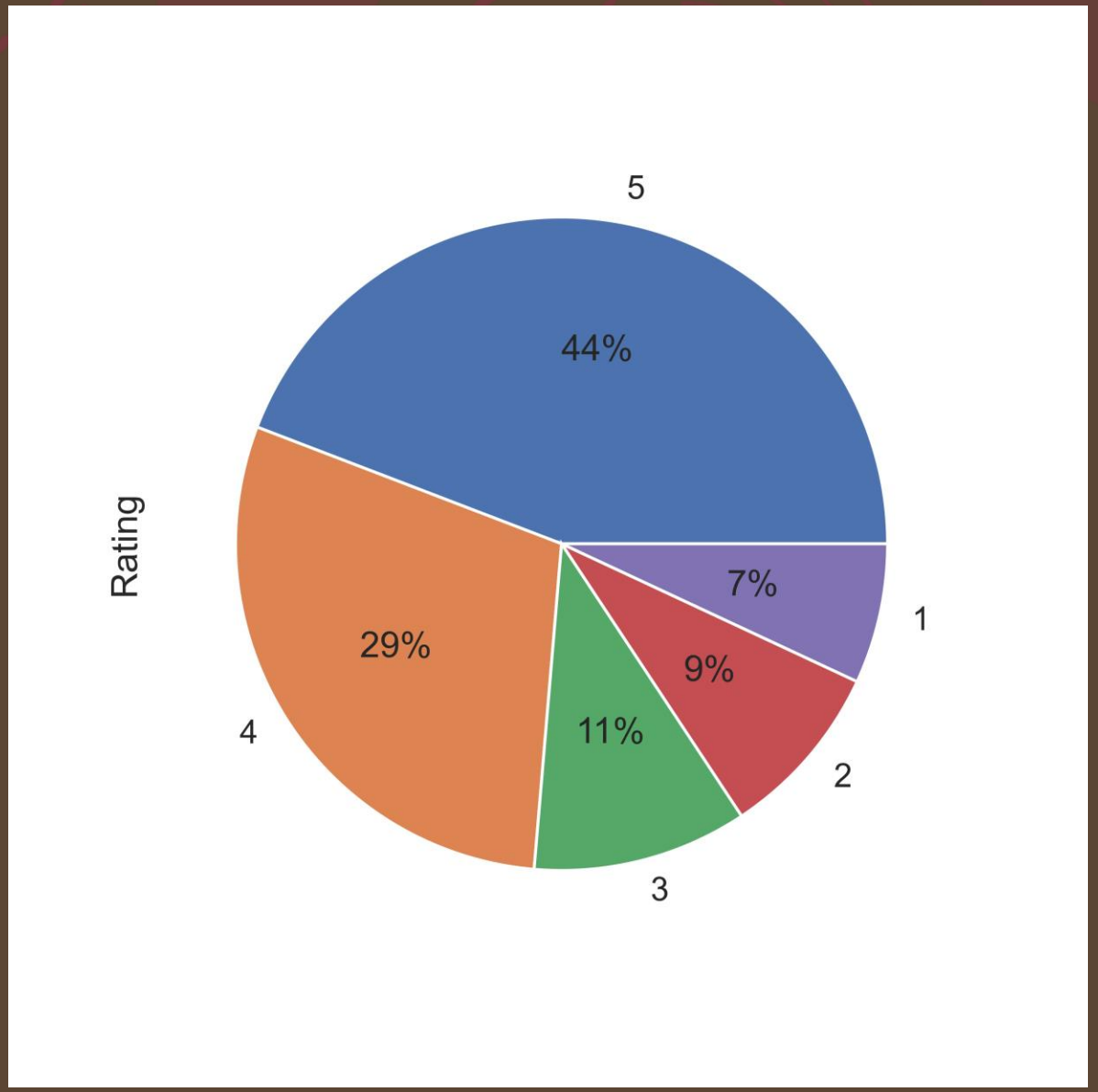
# Task

- Predict the rating of each review.

# Exploration




| | |
|---|---|
| count | 20491.000000 |
| mean | 104.375824 |
| std | 100.656586 |
| min | 7.000000 |
| 25% | 48.000000 |
| 50% | 77.000000 |
| 75% | 124.000000 |
| max | 1931.000000 |


Rating
5
44%
1
7%
2
9%
3
11%
4
29%

# Validation

Split data:

- Train – 80%
- Validation – 10%
- Test – 10%

# Tokenization

- StaticTokenizerEncoder from torchnlp package is used.
- Vocabulary size - 67354.
- Padded to 2000.

# Regression or Classification?

# Metrics

- Loss function – MSE.
- Score metric – Quadratic Weighted Kappa.

# Quadratic Weighted Kappa (QWK)

- Quadratic weighted kappa measures the agreement between two ratings.
- This metric typically varies from 0 (random agreement between raters) to 1 (complete agreement between raters). If there is less agreement between the raters than expected by chance, the metric may go below 0. The quadratic weighted kappa is calculated between the scores which are expected/known and the predicted scores.

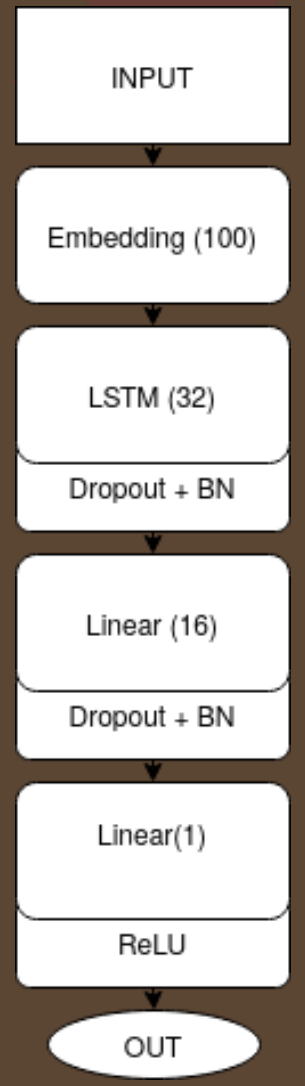
**P. S.** Quadratic Kappa Metric is same to cohen kappa score in sci-kit learn (sklearn.metrics.cohen_kappa_score) when weights are set to 'quadratic'.

# Interpretation of QWK

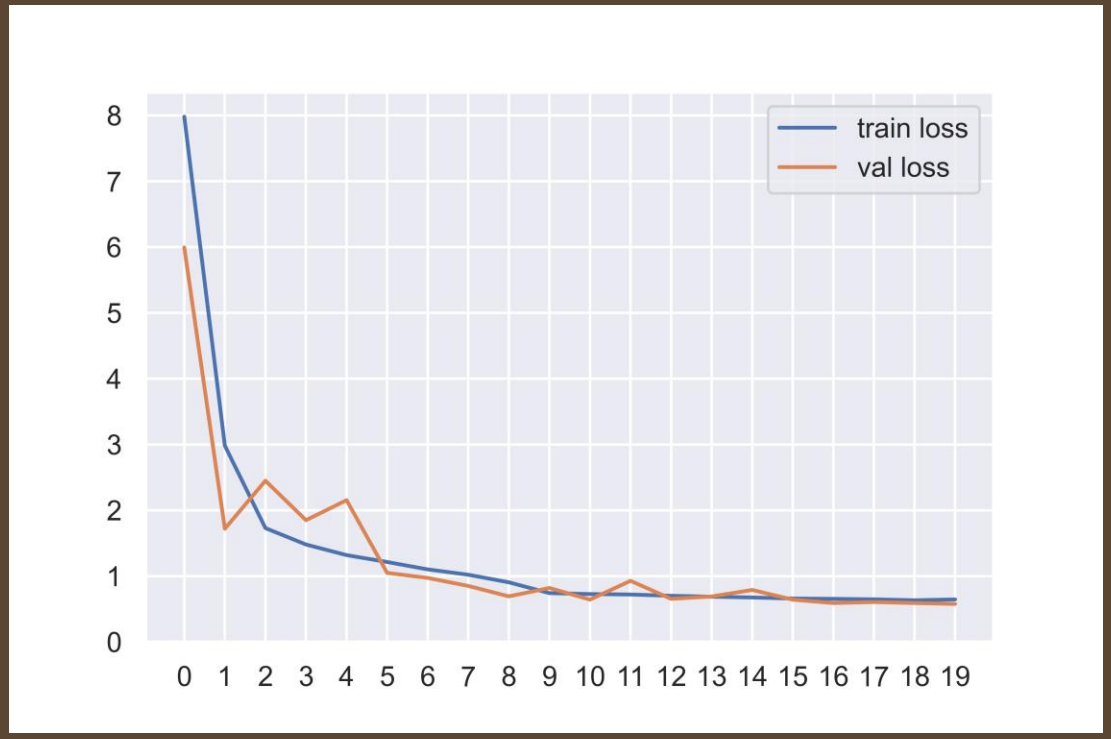
| Range of Quadratic Weighted Kappa | Concordance |
|---|---|
| Negative | poor |
| 0.01–0.20 | slight |
| 0.21–0.40 | fair |
| 0.41–0.60 | moderate |
| 0.61–0.80 | substantial |
| 0.81–1 | almost perfect |

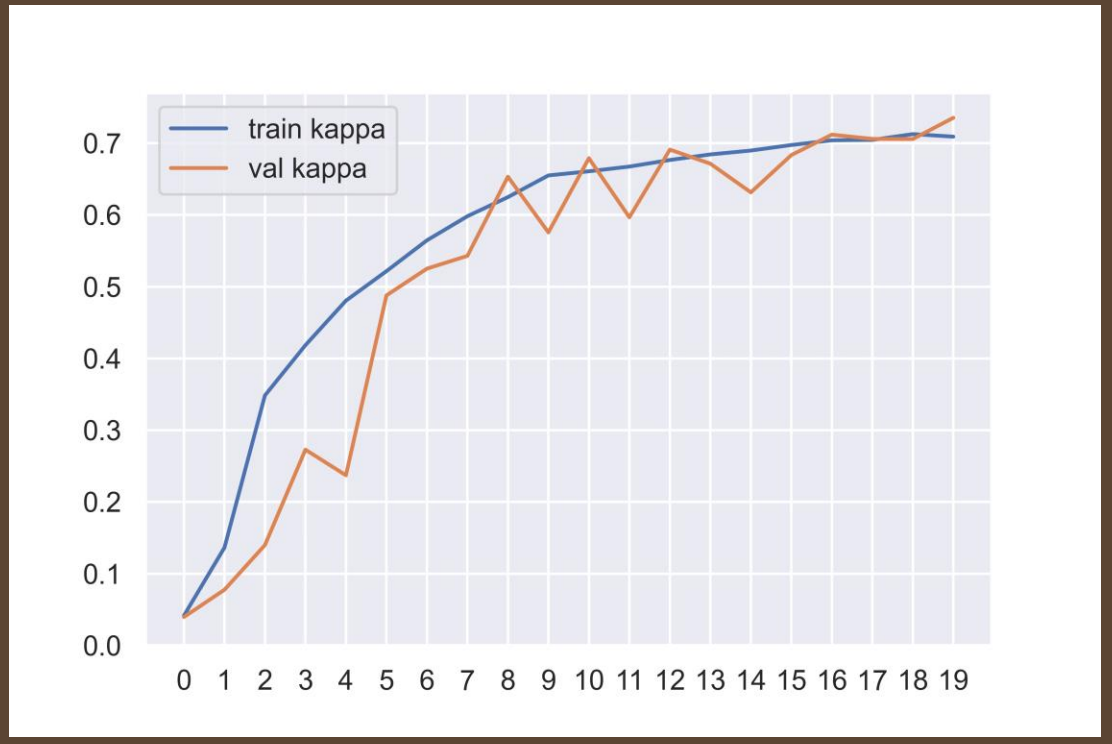
Source: https://www.researchgate.net/figure/Interpretation-of-quadratic-weighted-kappa_tbl1_336574571

# Rating Regression Model



# Performance



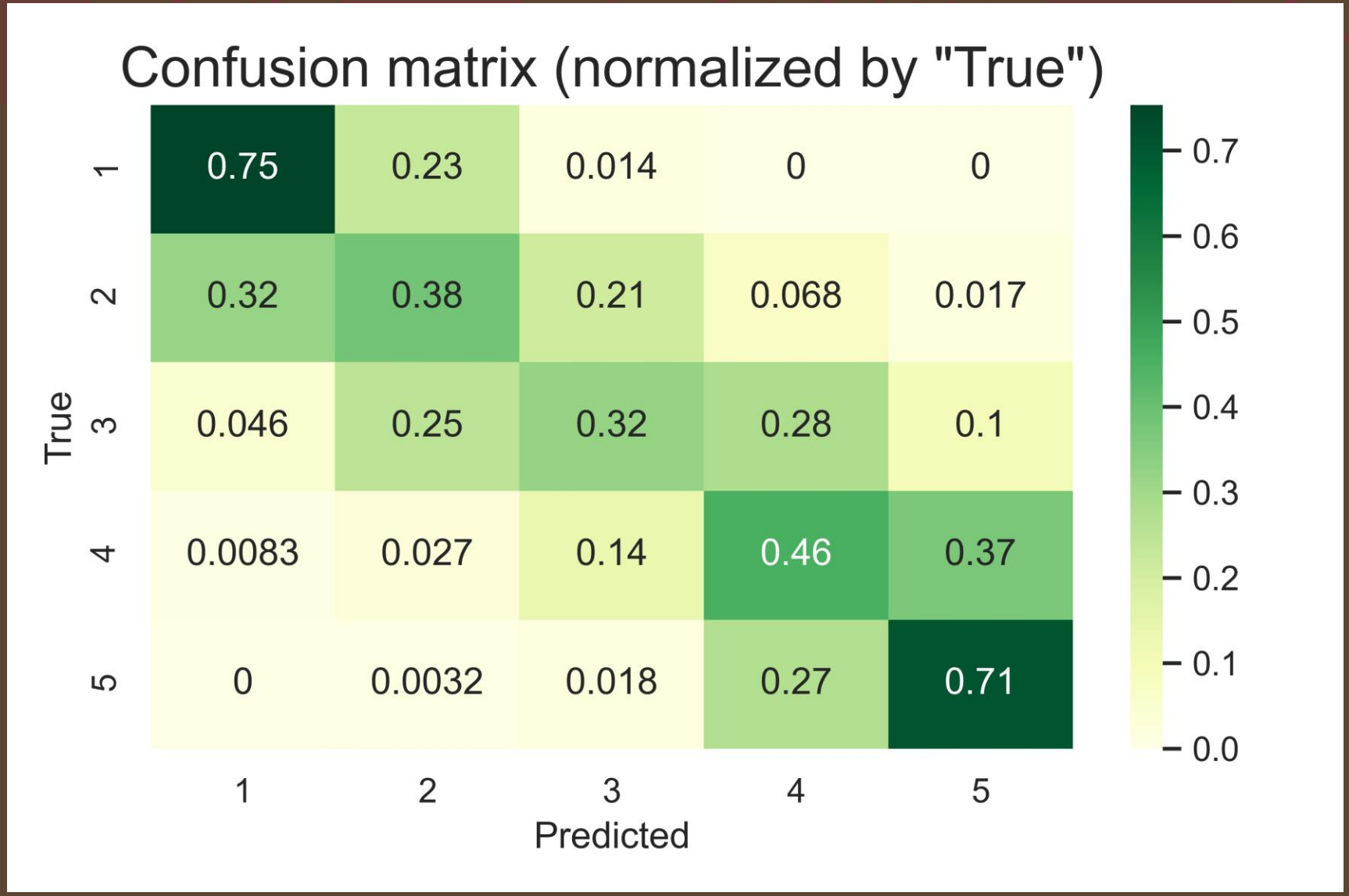
# Round predictions

- Default thresholds (simple round): [1.5, 2.5, 3.5, 4.5]
- Using scipy.optimize.minimize to find best thresholds (based on quadratic weighted kappa)
- Thresholds after optimization: [1.615, 2.850, 3.417, 4.172]

# Model Evaluation

# Quadratic Weighted Kappa Score

| | QWK Score | |
|---|---|---|
| | **Simple Rounder** | **Optimized Rounder** |
| Train | 0.794 | 0.834 |
| Validation | 0.736 | 0.785 |
| Test | 0.748 | 0.786 |


Confusion matrix (normalized by "True")
True
1
2
3
4
5
0.75
0.23
0.014
0
0
0.32
0.38
0.21
0.068
0.017
0.046
0.25
0.32
0.28
0.1
0.0083
0.027
0.14
0.46
0.37
0
0.0032
0.018
0.27
0.71
1
2
3
4
5
Predicted
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0

# Thanks!