CS297

When Can I Trust an Average Rating on Amazon?

By

Pushkar Umaranikar

Supervised by : Dr. Pollett
Outline...

- Online Review System
- Aggregation of reviews and challenges
- Bayesian ranking
- Amazon review system
- Amazon review summary
- Averaging estimators
Online Review System

- We generally pay attention to number of stars for each product.
- We should also consider number of reviews behind averaged number of stars.
- Each review consists of
  - Rating
  - Review
  - Review of review
Online Review System (2)

• People don’t read through all reviews.
• Summary of review needed to aggregate individual review.
• Factors considered
  – Some level of accuracy
  – Review population size
  – Usefulness

• Then, what is proper aggregation?
Galton’s experiment

• Game of guessing the weight of an ox.
• 787 people, guessing independently.
• Average was 1197 pounds, ox weighted 1198 pounds.

• Why it worked well?
  – An objective answer with clear numerical meaning
  – Unbiased and independent estimates.
  – Enough people participation.
Challenges in aggregation

• Tradeoff between review population and average rating score.
• How to view aggregated ratings?
• Defining trustworthy average rating.
• Review consideration for finding out average rating.
• Actual challenge is turning vectors into scalars.
Bayesian ranking

- Weighting the raw rating scores with the population sizes.
- \( R \): rating of all the products.
- \( N \): total number of reviews for all the brands.

\[
\tilde{r}_i = \frac{NR + n_i r_i}{N + n_i}.
\]
What does Amazon do?

• Rating based on formula in addition to Bayesian ranking.

• Includes:
  – Bayesian adjustment
  – Recency of reviews
  – Reputation score of reviewer

• Exact formula is not known outside Amazon.
Guidelines on Amazon ranking

• N is chosen between max and avg value of N.
• Products having low recency of helpful reviews are at lower locations.
• Products having high quality, positive reviews are up in ranking.
• Products having major issue are demoted in ranking.
Averaging sequentially-trained estimators

- To make average estimator more accurate.
- Focuses on points that we do not know very well.
- With N estimators and M datasets, each estimator $y_i$ gets trained by the datasets.
- Some datasets are well handled while others are less.
- We should adapt accordingly, and give challenging datasets, heavier weight $w$ in the next estimator's parameter training.
Thank you