

# NEURAL NETWORKS RECOMMENDATION SYSTEM

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on Amazon Reviews Dataset



# TensorFlow

OBJECTIVE: Explore Neural Networks by using TensorFlow Recommenders to address Cold Start problem.

PROJECTED OUTCOME: Test Retrieval, Ranking, Sequential models.



# Outline

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BUSINESS  
PROBLEM



DATA AND  
METHODS



RESULTS



CONCLUSIONS

# Business Problem

Stakeholder: Marketing team

Low user  
penetration in US  
(20% at 2022)

Cold Start  
Problem



Deliver to Elena  
Newcastle 98059

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Hiland 27.5 inch Mountain Bike 27 Speeds, Lock-Out Suspension Fork, Aluminum 18/19.5 inch Frame  
Hydraulic Disc-Brake for Men Women Mens MTB Bicycle Adult Bike

◀ Back to results



Share

**Hiland Aluminum Mountain Bike 27 Speeds, Hydraulic Disc-Brakes, Lock-Out Suspension Fork, 27.5 inch Wheel, 3 Sizes for Men Mens Mountain Bike Adult Womens Bicycle**

[Visit the HH HILAND Store](#)

555 ratings  
| 80 answered questions

-8% \$369<sup>99</sup>

List Price: \$399.99 i

prime

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**Max discount \$40.** Activation required. Prime exclusive offer. Limited-time offer, see terms.

Color: Grey&Orange



# DATA & METHODS

## DATA:

2.3M Outdoor product reviews (2000 – 2015)

## FEATURES:

Product title, review title, review, review date, votes

## DATA SOURCE:

[Amazon Reviews dataset](#)

## RECOMMENDATION SYSTEMS:

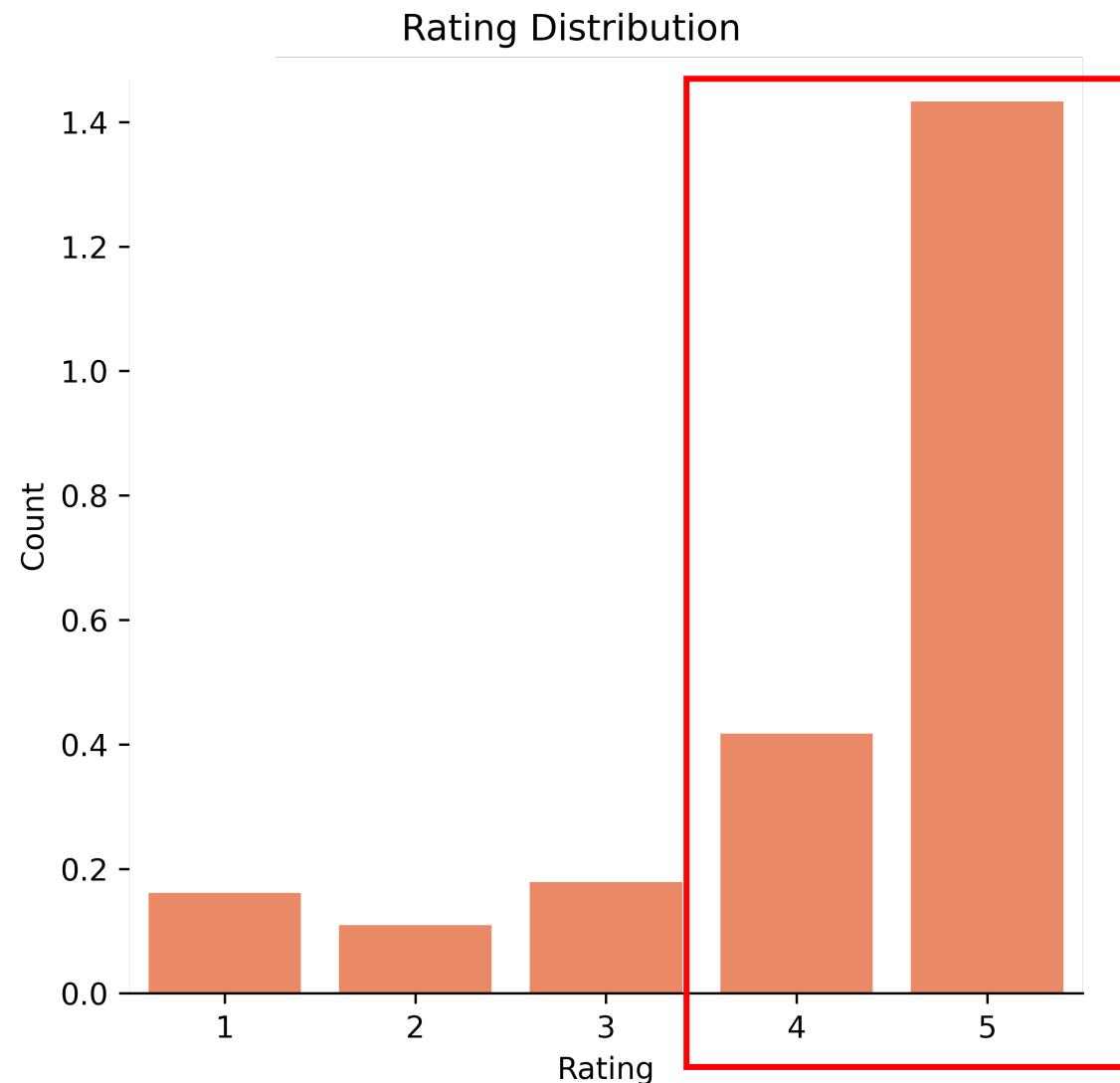
Retrieval

Ranking

Sequential

Combined Features





Star Rating Distribution:

62.4% - 5 star

18.1% - 4 star

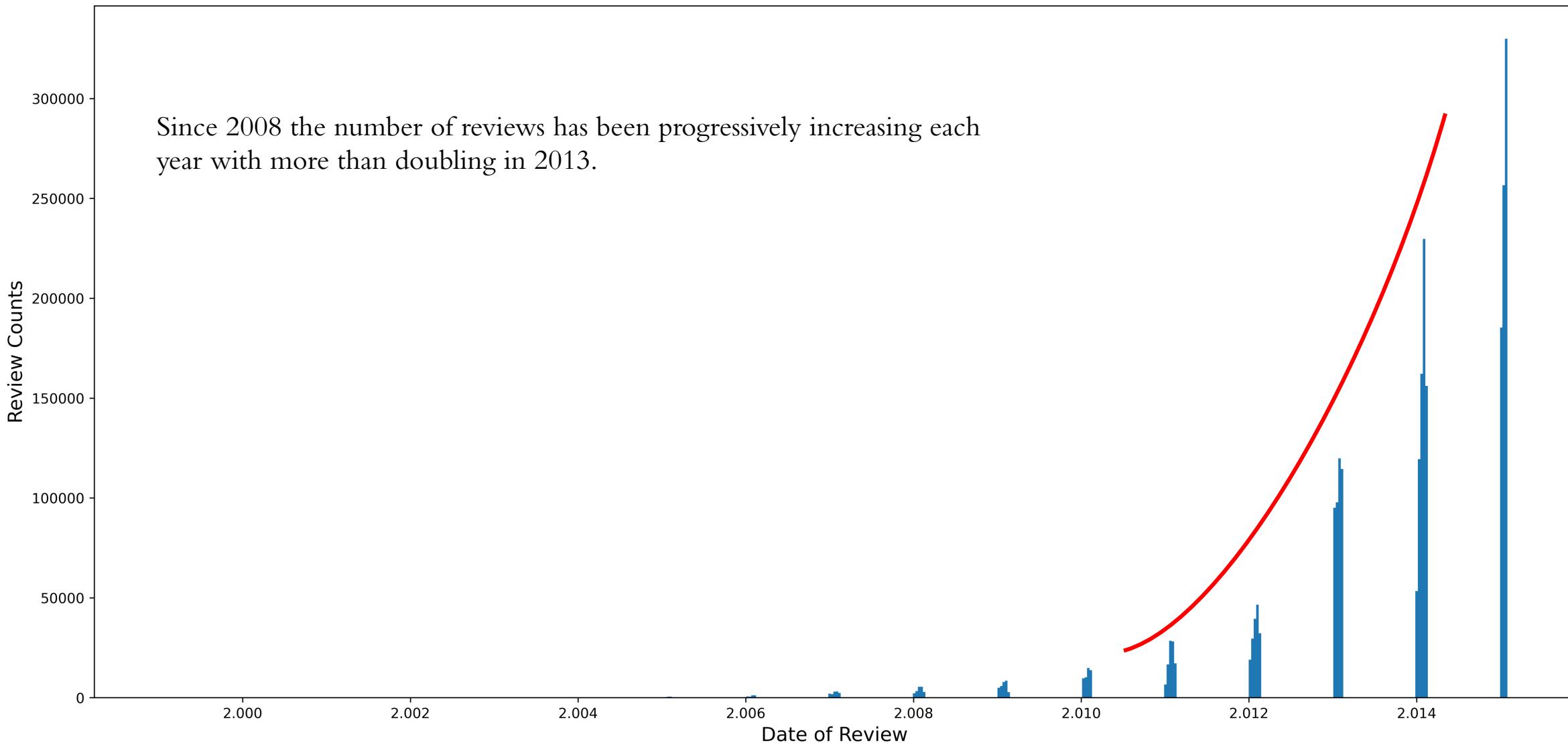
7.6% - 3 star

4.7% - 2 star

7.1% - 1 star

Rating distribution is skewed left indicating that customers tend to leave positive ratings.

## Review Distribution



Top 5 Rated Products between 2000 - 2015

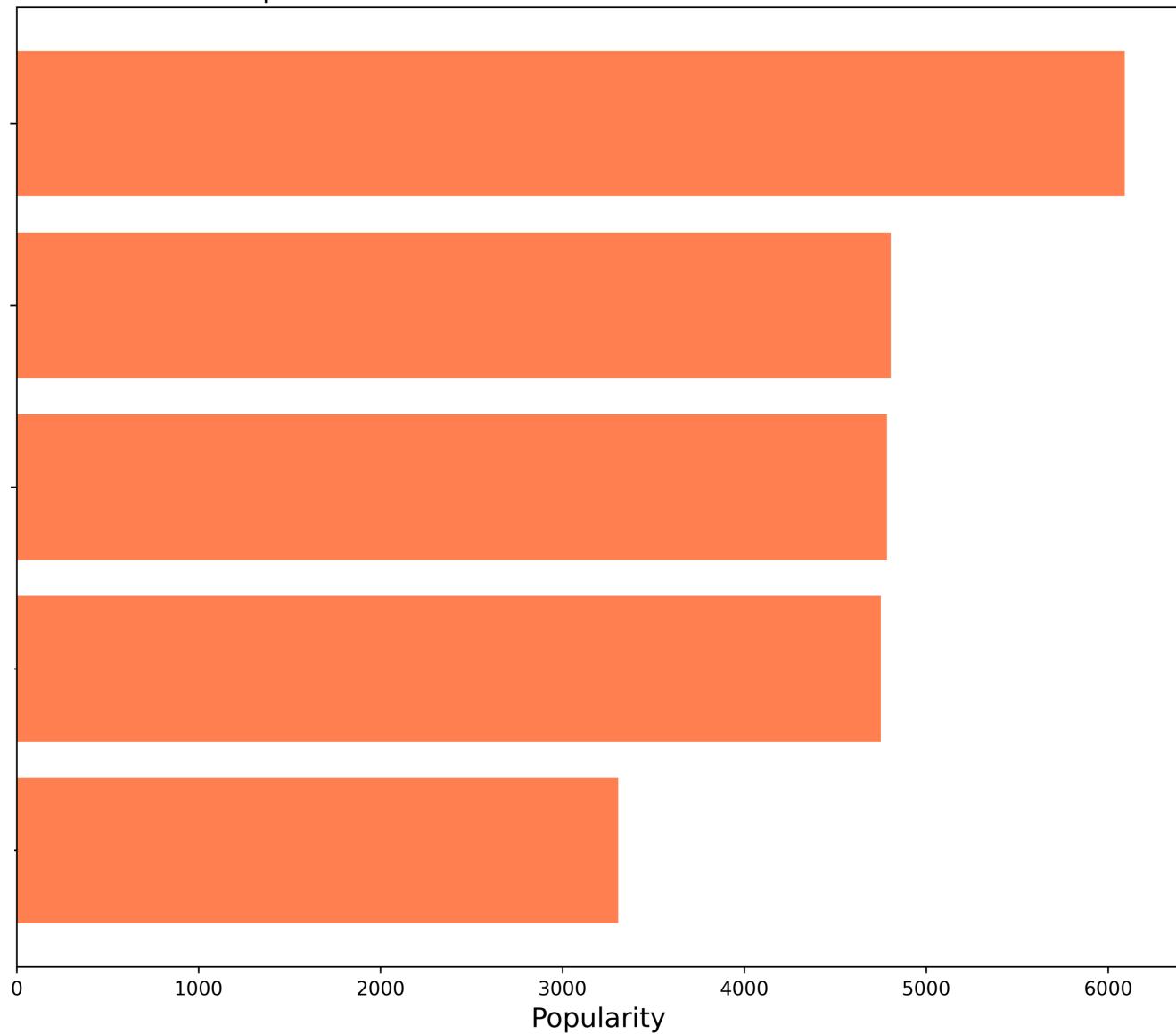
SoundAsleep Dream Series Air Mattress

Intex Pillow Rest Raised Airbed

Hydro Flask Insulated Water Bottle

Intex Raised Downy Airbed

LifeStraw Personal Water Filter for Camping



# Test User



Mountain biking

Camping

Does have a kid



# ITEM-TO-ITEM Retrieval Model (tuned)

Top-K Categorical Accuracy Rate on Test Data

115K subset dataset

Top-1 36%

Top-5 49%

Top-10 58%

Top-50 68%

Top-100 70%

2.3M full dataset

95.9%

96.12%

96.12%

96.13%

96.18%

# Top-10 Recommendations on Subset Data



# Top-10 Recommendations on Full Data



# BruteForce vs ScaNN

## Serving Performance

FOR ITEM-TO-ITEM RETRIEVAL MODEL  
ON FULL DATASET

BruteForce and ScaNN  
retrieved the same Top-10  
recommendations

BruteForce 5.29 ms

ScaNN 4.55 ms

ScaNN is 15% faster at the  
same accuracy rate of 96%.

## BUSINESS RECOMMENDATIONS

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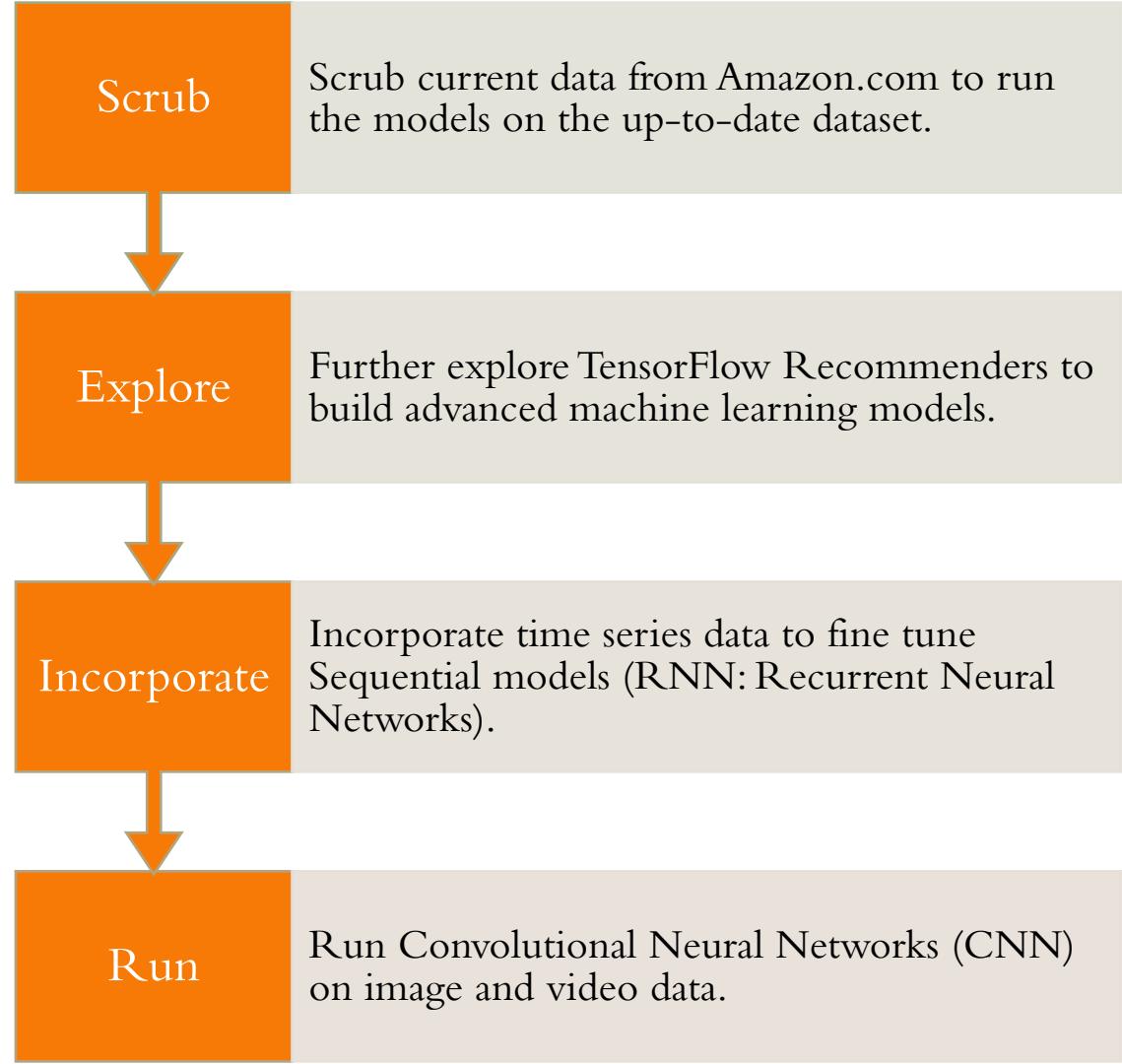


A/B test item-to-item Retrieval  
TensorFlow model on the website.



Implement ScaNN for efficient  
and fast serving.

## NEXT STEPS



The background of the entire image is a high-angle aerial photograph of a long bridge spanning a body of water with a vibrant turquoise hue. The bridge has two distinct levels: a lower level with four lanes of traffic and an upper level with two lanes. Several vehicles, including cars and trucks, are visible on both levels. The water below shows subtle ripples.

THANK YOU

[Link to Notebook](#)

