# Intro to Data Science HW 1

Ben Green

## Contents



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# Question 1

## 1a.

| Feature Name | Feature Type |
|---|---|
| `producer` | nominal |
| `release_to_review_time` | interval |
| `used_real_name` | binary |
| `verified_purchase` | binary |
| `rating` | ordinal |
| `helpfulness` | ratio |
| `number_of_votes` | ratio |
| `length_of_review_text` | ratio |

## 1b.

The mode of `producer` is Apple, with 4480 entries.

## 1c.

5077/9585, or 53% of reviewers used their real name and had a verified purchase.

## 1d.

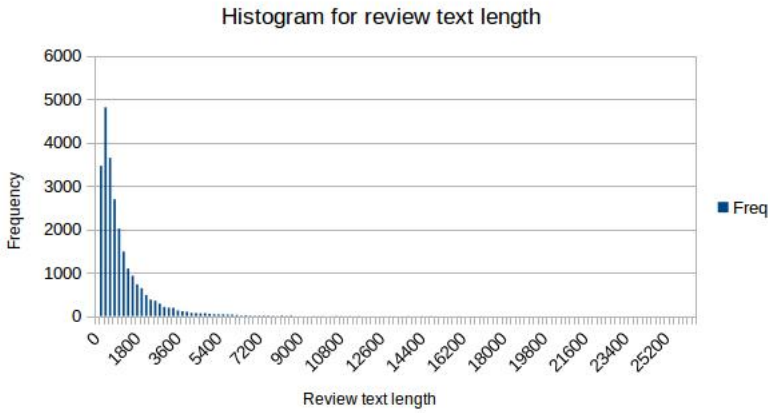
5077/13989, or 36% of reviews with a verified purchase had a reviewer who used their real name.

## 1e.

| **Measure** | **Value** |
|---|---|
| min | -537 |
| q1 | 74 |
| median | 144 |
| q3 | 290 |
| max | 11686 |
| interquartile | 215 |

These numbers can be displayed conveniently in a boxplot.

## 1f.



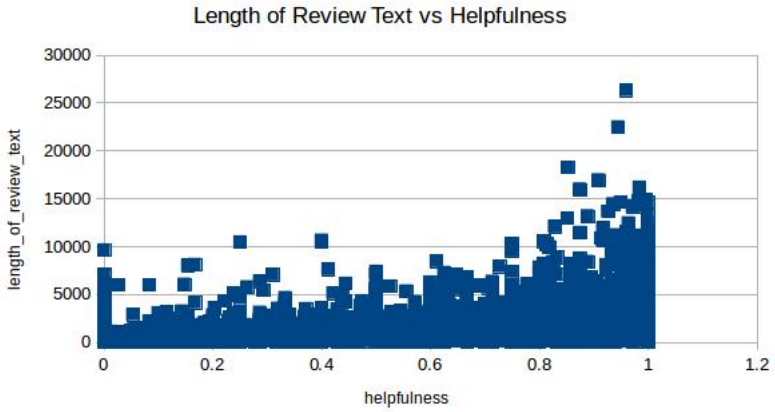

## 1g.

Yes, the distribution of `length_of_review_text` is heavily skewed towards the shorter end. There are outliers of 18275, 22492, and 26332.

## 1h.

The Pearson correlation value between `length_of_review_text` and `helpfulness` is approximately .25. This indicates that there is a slight positive correlation between these two variables.

## 1i.



# Question 2

w=.216 x=.064
w=.216 x=.064

# Question 3

## 3a.

Sketch of vector $u$ = [1.25, -1.75, 1.75]
Sketch of vector $v$ = [0.95, -0.95, 1.35]
Sketch of vector $w$ = [-0.35, 1.65, 1.85]

The sketches were constructed by taking the dot products of each vector with each randomly generated vector.

## 3b.

$$\arccos \frac{u \cdot v}{\|u\| \cdot \|v\|} = 0.318 \tag{1}$$

$$\arccos \frac{u \cdot w}{\|u\| \cdot \|w\|} = ? \tag{2}$$

# Question 4

## 4a.

The Mahalanobis distance reduces to the Euclidian distance when the covariance matrix is the identity matrix.

## 4b.

The Mahalanobis distance reduces to the Euclidian distance when the covariance matrix is a diagonal matrix.

# Question 5

## 5a.

## 5b.

## 5c.