

Project 1 Implementation Report

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For my implementation, I used two different strategy to address the author prediction task.

Log-likelihood Calculation:

Zhu Shuzhen's Markov Matrix:

$$\begin{bmatrix} \frac{3}{10} & \frac{47}{190} & \frac{29}{190} & \frac{3}{10} \\ \frac{53}{156} & \frac{1}{4} & \frac{11}{78} & \frac{7}{26} \\ \frac{35}{103} & \frac{27}{103} & \frac{15}{103} & \frac{26}{103} \\ \frac{55}{199} & \frac{56}{199} & \frac{27}{199} & \frac{61}{199} \end{bmatrix}$$

Du Fu's Markov Matrix:

$$\begin{bmatrix} \frac{1}{88} & \frac{29}{103} & \frac{46}{309} & \frac{73}{309} \\ \frac{279}{27} & \frac{279}{41} & \frac{279}{1} & \frac{93}{49} \\ \frac{80}{69} & \frac{160}{37} & \frac{10}{21} & \frac{160}{51} \\ \frac{236}{236} & \frac{118}{118} & \frac{118}{118} & \frac{236}{236} \end{bmatrix}$$

Total log-likelihood for Zhu Shuzhen:

$$\begin{aligned} & 3 \log \left(\frac{35}{103} \right) + 5 \log \left(\frac{53}{156} \right) + 4 \log \left(\frac{61}{199} \right) + 3 \log \left(\frac{3}{10} \right) + 6 \log \left(\frac{56}{199} \right) \\ & + 3 \log \left(\frac{55}{199} \right) + 2 \log \left(\frac{7}{26} \right) + 5 \log \left(\frac{26}{103} \right) + 5 \log \left(\frac{1}{4} \right) \\ & + 3 \log \left(\frac{47}{190} \right) + 4 \log \left(\frac{29}{190} \right) + 2 \log \left(\frac{15}{103} \right) + 2 \log \left(\frac{11}{78} \right) \\ & + \log \left(\frac{27}{199} \right) \end{aligned}$$

Total log-likelihood for Du Fu:

$$\begin{aligned} & 3 \log \left(\frac{27}{80} \right) + \log \left(\frac{1}{3} \right) + 5 \log \left(\frac{88}{279} \right) + 6 \log \left(\frac{37}{118} \right) + 5 \log \left(\frac{49}{160} \right) \\ & + 3 \log \left(\frac{69}{236} \right) + 3 \log \left(\frac{29}{103} \right) + 5 \log \left(\frac{73}{279} \right) + 2 \log \left(\frac{23}{93} \right) \\ & + 2 \log \left(\frac{73}{309} \right) + 4 \log \left(\frac{51}{236} \right) + \log \left(\frac{21}{118} \right) + 2 \log \left(\frac{49}{279} \right) \\ & + 4 \log \left(\frac{46}{309} \right) + 2 \log \left(\frac{1}{10} \right) \end{aligned}$$

Zhu Shuzhen's Test Case Output:

Zhu Shuzhen

Zhu Shuzhen's & Du Fu Test Case Output:

Euclidean Distance and Consine Similarity Calculation:

Zhu Shuzhen's Markov Matrix:

$$\begin{bmatrix} \frac{57}{200} & \frac{47}{53} & \frac{29}{200} & \frac{19}{7} \\ \frac{47}{169} & \frac{93}{3} & \frac{62}{22} & \frac{7}{31} \\ \frac{29}{93} & \frac{13}{27} & \frac{93}{5} & \frac{13}{13} \\ \frac{19}{40} & \frac{169}{11} & \frac{31}{9} & \frac{93}{61} \\ \frac{62}{40} & \frac{7}{169} & \frac{31}{31} & \frac{13}{186} \end{bmatrix}$$

Column sums: [1, 1, 1, 1, 0]

Du Fu's Markov Matrix:

$$\begin{bmatrix} \frac{103}{314} & \frac{87}{275} & \frac{46}{153} & \frac{73}{242} \\ \frac{87}{44} & \frac{275}{73} & \frac{153}{49} & \frac{242}{69} \\ \frac{46}{157} & \frac{275}{41} & \frac{153}{16} & \frac{242}{49} \\ \frac{73}{27} & \frac{275}{74} & \frac{153}{14} & \frac{242}{51} \\ \frac{157}{314} & \frac{275}{275} & \frac{153}{51} & \frac{242}{242} \end{bmatrix}$$

Column sums: [1, 1, 1, 1, 0]

Predicted author for Zhu Shuzhen's test tones:

Cosine Similarity with Zhu Shuzhen: 0.5728528390325099

Cosine Similarity with Du Fu: 0.612084042064026

Euclidean Distance to Zhu Shuzhen: 0.8218014556290012

Euclidean Distance to Du Fu: 0.7969871938136044

Cosine Similarity Prediction: Du Fu

Euclidean Distance Prediction: Du Fu

Baseline Method - Infinity Vector Norm Calculation:

Baseline Infinity Norm Prediction for Zhu Shuzhen's test tones:

- Infinity Norm Difference with Zhu Shuzhen: 0.2093
- Infinity Norm Difference with Du Fu: 0.1896
- Baseline Infinity Norm Prediction: Du Fu

Baseline Infinity Norm Prediction for Du Fu's test tones:

- Infinity Norm Difference with Zhu Shuzhen: 0.1967
- Infinity Norm Difference with Du Fu: 0.1770
- Baseline Infinity Norm Prediction: Du Fu