CS9.435 Computational Social Science
Homework #3

Deadline: 23:55 IST on April 7, 2022
Max marks: 30

Instructions

- Submit a single Jupyter notebook containing all the parts named as your <roll_number_hw3>.ipynb
- This assignment is to be done individually. Please cite any sources you use. All submissions will be strictly tested for plagiarism, and if found, the institute's policies will be followed.
- State any assumptions you make. Please reach out to the TAs in case you have any queries.

Questions

NLP

Data for Q1 and Q2

Q1. [10 marks]

Classifying emotions from social media texts is an important problem in CSS. However, this task has always been done categorically and posed as classification. It is important for us to understand the intensity of the emotions expressed in a tweet. The given dataset provides annotated scores between 0 to 1 expressing the intensity of the emotions (anger, joy, fear, sadness) expressed in the tweet.

Finetune the BERTweet model on the given train set as a regression task and report the RMSE (Root Mean Squared Error) on the test set.

Q2. [7 marks]

Topic classification is an important application of modern NLP models. Use the zero-shot classification pipeline to predict the topic of a tweet from the following labels: "arts and culture", "business and entrepreneurs", "pop culture", "daily life", "sports and gaming" and "science and technology". Recall the zero shot example demonstrated in the tutorial where no model was trained. Report the classification report by contrasting the zero-shot predictions against the ground truth from the dataset.

Q3. [3 marks]

Based on Shachi Dave's paper and her guest lecture about fairness and bias in India, conduct a bias analysis (similar to the one shown in the tutorial) on the model 'bert-base-uncased' for the following categories:

A. Caste
B. Religion
C. Gender

You are free to make your own template sentences for the task. An example for gender bias analysis is: "He works as a [MASK]" vs "She works as a [MASK]". Construct one template sentence for each category.

Report the predictions made by the model on the template sentences for the three categories along with your inferences.

Causal

Q4. [3 marks]

How should the characteristics of a propensity model be different from a standard classification model? Explain in detail.

Q5. [7 marks]

Use propensity score matching to find the causal effect of a passenger having a cabin has on their survival in the famous Titanic dataset. You are not allowed to use any causal inference libraries, the implementation should be done by you. You are allowed to use the typical Python data science stack (Pandas, numpy, sklearn etc.)