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CSCI 4820-1

Project #5

Due 11/19/24

Named Entity Recognition Fine Tuning

A.I. Disclaimer: Work for this assignment was completed with the aid of artificial intelligence tools and comprehensive documentation of the names of, input provided to, and output obtained from, these tools is included as part of my assignment submission.

Our Named Entity Recognition solution currently has a limited tag set, specifically, any person is simply labeled as a person. It can be more useful is many situations to be able to identify if a person is male or female based on their name alone. The manager is worried about a drop in performance if the labels are more specific.

I was able to update the labeling system to identify males and females, and at first glance it appears that the accuracy has decreased from about 96% to 94%. This accuracy difference is insignificant, especially since the labels are able to identify males and females separately now. This 2% difference can be easily accounted for unclearly gendered names, such as Alex, Charlie, Bailey, Blake, Casey, Robin, and many more.

The other output parameters were also affected. Training loss and validation loss both slightly increased (more loss), while precision, recall, and F1 score slightly decreased. Again, the slight differences in results are negligible since they are offset by the labels being more informative, which I believe is a valid and worthwhile compromise.

The newly updated labeling system is boolean, which means that a name is either male or female, and nowhere in between. A further refinement to the system would be implementing additional algorithms that can assign a weight to the names’ genders and the final weight decides the label. I wanted to show that with just a simple true or false result we can still achieve high accuracy and also distinguish males and females.

To identify each name’s gender, I labeled common prefixes and suffixes in names to each gender, and for short/unisex names I set those to a specific gender manually. I used the artificial intelligence system Claude 3.5 Sonnet to create a small application where I could input thousands of names, and it would instantly give me confidence values for the gender of every name. Sometimes Claude was wrong, so I had to tweak its name classifier, but it was mostly right. I then proceeded by identifying the prefixes and suffixes of each name and writing it into the codebase. I understand that it may not be the most efficient, but it retains the most accuracy. I ended up writing 1,500 unique names, prefixes, and suffixes combined.

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AI Usage Documentation:

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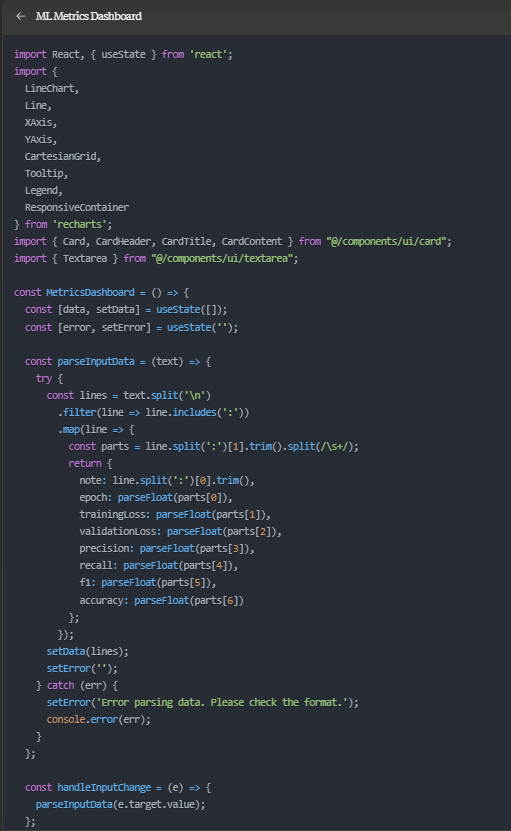
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