Natural Language Processing – Assignment #4

Assignment description

This assignment involves two tasks – fine-tuning an encoder LLM for classification and your reflections on the strengths and the weaknesses of the fast-pace developing contemporary AI tools.

Task #1: fine-tuning the distilbert language model for Amazon reviews classification

We will make use of the extensive documentation available on HuggingFace for fine-tuning encoder-based language model (distilbert) for the classification task you implemented in assignment #2. HuggingFace is the provider of the transformers library that exposes multiple services related to LLMs and datasets hosted on the platform. Following a prepared tutorial and adapting it to your usecase is one of the fundamental skills of an NLP engineer and researcher.

1. Go over this huggingface tutorial carefully, reading through the relevant documentation where required. Make sure you get the general idea of the flow, input and output.

2. Copy the notebook to your Google drive ("Copy to Drive") and make the appropriate adjustments: Use the attached Automotive train & test files for tuning the model for classification, where you make use of the test part for evaluation similarly to what they do with the IMDB dataset.

3. Compute the final classification accuracy on the test part – it should be higher than we could achieve with the TF-IDF approach and the language-unaware logistic regression classifier. You last notebook cell should compute and print the accuracy, the fine-tuned model yields on the test set.

4. A couple of things that appear in the Huggingface notebook and you do not need in this assignment: (1) do not create a user in huggigface and do not upload your tuned model back to huggingface (push_to_hub()) – keep it in a local folder within your Google Colab; (2) do not push your models' results to WandB (as done in the tutorial).

   To summarize, your TrainingArguments initialization should look like:

```
training_args = TrainingArguments(
    output_dir="<your model output location>",
    learning_rate=2e-5,
    per_device_train_batch_size=16,
    per_device_eval_batch_size=16,
    num_train_epochs=2,  # you can decide how many epochs
    weight_decay=0.01,
    …
    push_to_hub=False,  # note the change (not pushig to huggingface)
    report_to="none"  # note the addition (not reporting to WandB)
)
```

Run the entire notebook on Google Colab so that the last cell prints your final accuracy.

Download the notebook (file → download → download .ipynb) where all your outputs along the way are printed – do not clear cells' output!

Your notebook will be submitted along with another document (task #2).

מטלה 2# (בעברית):

עם ההתקדמות המהירה מאוד של כלי AI בשנים האחרונות, נפתחות בפנינו הזדמנויות חדשות אבל גם אתגרים רבים. כתבו מספר פסקאות (כחצי עמוד לפחות, בעברית) על היתרונות והאתגרים שמציבות התפתחויות אלה בפנינו כחֶבְרָה, כסטודנטים באקדמיה וכאדם פרטי. כתבו במילים שלכם לאחר מחשבה והרהורים בנושא.

אין כאן תשובות נכונות או לא נכונות – הן צריכות להיות שלכם.

Submission

Submit a single zip file – assignment4_ xxxxxxxxx_xxxxxxxxx.zip , where "xxxxxxxxx" stands for a student id. Please specify two student ids (your and your partner's). It should include two flies:

- your notebook with fine-tuning LLM for Amazon reviews classification (+ outputs)
- a word or pdf document with your answer for task #2

Good Luck!