Paper Title : Personalized LoRA for human centered Text Understanding
Paper Link:
1. Summary :
To summarize, the proposed PLoRA prioritized three areas: 1) task-specific and human-centered adaptation through a dynamic combination of PEFT-based LoRA and knowledge-injected PKI; 2) introducing the few-shot learning strategy to adapt well-trained PLMs to unseen users during the training phase; and 3) a PnP framework that couples and decouples task-specific and human-centered knowledge for cold-start issues.

Terms: PEFT(parameter efficient fine tuning), PLM(pretrained language model),PnP(Plug and Play)
1.1 Motivation:
Human centered text understanding using pre trained Language models is a difficult task as it has millions of tokens. In order to make this process efficient and effective authors provided personalized LoRA with plug and play(PNP) framework

1.2 The contribution:
In this paper the authors proposed pLoRA with the pnp framework for HCTU tasks. To furthermore improve the authors added dropout and mutual information maximizing techniques. The performance enhancement enables it to have zero shot and few shot learning capabilities as well.

1.3 Methodology:
HCTU task maps every user to a text data to tailor made the user experience. This task can be represented with equation(1) where,
X = user input text , u = user , y = sentiment score for the particular task.
arg max q(y|x, u) → (1)

Depending on the user a distinct profile is created to provide personalized experience. LoRA basically converts a (m*n) matrix into (m*r) and (r*n) matrix to optimize the calculation where r<<(m,n). Which makes updating weights much faster.

pLoRA takes h and p as additional input along with W. the plug and play framework is nothing but W consisting of random gaussian distribution and p is zero matrix. Whenever new user enters basically p * W = 0 . The models start gradually to understand user and p updates accordingly. To gain generalizability pdropout and mutual information maximization is applied.

For the experiment the authors used pLoRA technique for self attention mechanism only but it can be used in any linear projection neural network model for personalized task.

1.4 Conclusion:
Using pLoRA personalized HCTU tasks can be easily achieved without computational overhead. As pretrained language models are currently available, pLoRA has great

potential. The authors only used sentiment analysis using pLoRA and they claim that its usage could be broadened to complex paradigms as well. But the performance on complex paradigms is yet to be evaluated.

Limitations:

Performance of pLoRA has only been tested on sentiment analysis and other NLP based tasks haven't been evaluated yet. Compared to text generation and semantic analysis this task is easier.

Language models have a problem of hallucinations. How do these models perform in real life scenarios? Do they carry the hallucinations from LMs as well? There are many gray areas yet to be discovered.

Information reliability is also a great issue.

Synthesis:

Regardless of the pros and cons. pLoRA is definitely a step towards the right direction. So that we can create a personalized AI experience without data leaving user vicinity.