RS Final Project

2024

Background

The final project this year is based on the RecSys challenge from 2022. You will use and innovate upon the paper made by the team who had reached the 11'th place, and impressively utilized only free resources.

Project outline

Part 1: Anchor paper (25% of final grade)

- Get familiar with the challenge.
- Understand the paper.
- Perform data exploration.
- Reconstruct some of their results

Part 2: Innovation (30% of final grade)

You may select from the list of suggested innovations or suggest your own idea, tackling one of the following:

- Improve - Improve the existing method
- Compete - Suggest an alternative approach
- Inspire - Apply in a different domain / for a different task

Timeline

- Innovation proposal - 15.2.2024
- Anchor paper submission - 22.2.2024
- Innovative part & final project submission - 7.3.2024
- 10 min presenting your final submission PDF - 14.3.2024

Deliverables

Innovation proposal

1. PDF (up to one page) including:
    a. ID's and names of the team.
    b. State the problem/issue/challenge that you will address in your innovation part.

c. Shortly describe your idea for innovation, or the selected innovation from the list and how you plan to implement it.
d. How you will evaluate performance.
e. What experiments/configurations you are planning to do.

Anchor paper

1. The edited and executed relevant notebooks from 'Models_for_ensemble' and 'Final_submission', containing the output results (make sure they run without errors)
2. Notebook containing your data exploration and observations.
3. PDF (up to 3 pages) including:
    a. ID's and names of the team.
    b. Note the version of the rating matrix and the neural model you selected to focus on.
    c. Describe the setup you used to run your code (free colab / cloud / local etc.)
    d. Summarize your coding effort so far - what was done, whether you faced technical challenges and why, gaps you still have.
    e. Provide instructions for executing your notebooks, if needed.
    f. Shortly report the main insights regarding the dataset, following your data exploration.
    g. Report the results in a table including the MRR@100 and normalized score results for the four combinations of models, emphasizing the best combination. Show a comparison to the reported results in the anchor paper.
    h. Feel free to add relevant comments to your submission so we better understand the status of your research effort.

Innovation

1. PDF extending your previous submission, with a new chapter dedicated to the innovative part (up to 3 additional pages):
    a. Describe any challenges you had and how you solved them.
    b. Summarize your coding efforts implementing the innovations part, as well as instructions for reproducing your results.
    c. Describe the experiments you did
    d. Extend the results table to include your experiments, emphasizing the model with the best results.
    e. (scientific) Insights gained.
    f. Open questions and future direction for further research.
2. The edited and executed notebooks, which are relevant to run your innovation model and reproduce the results.

Instructions for anchor paper reconstruction

1. Get familiar with RecSys challenge and download the dataset: https://www.recsyschallenge.com/2022/
2. Read and understand the paper https://dl.acm.org/doi/pdf/10.1145/3556702.3556845
3. Select one out of three versions of URM (user rating matrix) used for the traditional models and one out of the three neural models.
4. Get familiar with the paper code (README etc.)
5. Suggested setup (you may use any other setup):
    a. Download the zipped code from: https://github.com/pm390/recsys2022/tree/main.
    b. Unzip it and upload to your google drive.
    c. Upload the downloaded dataset into the specified location (see readme).
    d. Execute all notebooks from the 'Data_preparation' folder, using colab CPU.
    e. In the 'Models_for_ensemble' folder, execute the relevant notebooks that contain the traditional model with your selected version of URM, using CPU resources.
    f. In the 'Models_for_ensemble' folder, execute the relevant notebooks that contain your selected neural model using GPU resources.
    g. In the 'Final_submission' folder, adapt the code to take only your selected models into account. Note that due to RAM limitation in the free resources, you might need to reduce the amount of models combined to one sub-model from your computed traditional (i.e. "UCF", "ICBF", "Graph", "ICF") and the neural model you selected. Check which of the four combinations produce the best results for the rankers model and add them to your report.

- Note that this project is designed to be completed using the freely available resources on colab. As the resources for GPUs are limited, use it wisely.
- Tips for GPU usage:
    - Before connecting to GPU, make sure your code executes without errors on CPU (at least until the training part begins)
    - Connect to the GPU runtime only when you are ready to run your code.
    - Disconnect from your runtime if you are going on a break.
- Hints:
    - In order to use the downloaded folder in google drive, mount the colab notebook and use 'cd' function to get to the location of the relevant notebook.
    - In order to use the same environment as indicated in the paper code, add the following lines at the beginning of the notebook:
        - *!sudo apt-get install python3.7*
        - *!pip3 install -r ../requirements.txt*
    - In order to be able to run on GPU within colab, you might need to install cuda library. Add the following commands to the beginning of your notebook:
        - *!sudo apt-get update*
        - *!sudo apt install nvidia-cuda-toolkit*
    - If the colab GPU crashes during training, it might be helpful to reduce the batch size.

Innovation suggestions

1. Treat the problem as basket completion and compare to sessions / augment data by permuting sessions, evaluate and compare . Example reference, Prod2Bert example code
2. The marketing department would like to promote items with a specific value for a feature category (e.g. items by a specific vendor). In the current dataset, we don't know the meaning of each feature category. 1) Select a feature category and value and design a metric and evaluation to give higher weight for errors where the users selected items with the value the marketing wants to promote. 2) Adapt the algorithm to optimize the new metric 3) Evaluate your solution and the impact on the original and adapted metric
3. Select a different algorithm for session-based recommendation or sequential recommendation of your choice (possible sources: papers with code, relevant conferences, literature). 1) Explain your choice 2) Add the selected model to the ensemble or implement it as a stand-alone model 2) evaluate it and explain your results
4. Your idea!