Instructions

You are a group of data scientists entrusted with a critical project at a large corporation, armed with mountains of untapped user and product data. The company currently relies on a randomized product display strategy, thereby missing valuable opportunities to leverage the insights that its extensive data could provide. Your task is to collaboratively design, implement, and evaluate a recommendation system aimed at enhancing customer engagement and satisfaction. This project simulates a real-world scenario where your recommendations will directly impact the company's business objectives.

The CEO is highly interested in the potential business impact of your work. In your upcoming meeting in April, you will present a proof of concept and provide an estimation of the algorithm's added value to the organization. Keep in mind that she is not very technical, so your presentation must be accessible and compelling.

Fortunately, you still have access to the materials from your previous study of recommendation systems. Below is a list of the key topics you recall:

- Data exploration and preprocessing
- Non-personalized recommenders: random, popular, demographic filtering
- Collaborative filtering recommenders: memory-based, model-based
- Content-based recommenders: BoW, TF-IDF, lemmatization, BERT, NER
- Hybrid recommenders: weighted, switching, mixed
- Context-aware recommenders
- Evaluation of recommenders using various metrics: regression, classification, ranking, not just accuracy
- Best practices in evaluation: CV, CVTT, early stopping
- Hyperparameter tuning
- Balancing the exploration-exploitation trade-off using bandit algorithms

Note: You must select a dataset upon which to base your work, as it was sourced directly from the company itself. You have the freedom to select any dataset, but it's essential it allows you to explore and implement a wide range of techniques effectively.

Grading criteria

Below is a list of evaluation aspects for your final project. Unlike previous assignments, the overall quality of this work will be evaluated holistically rather than by individual components. Your primary goal is to implement a working recommender system – you have various approaches at your disposal, and the assessment will reflect the effectiveness and integration of your solution as a whole.

- Delve into various aspects of recommendation systems. The depth and diversity of your exploration and development will contribute to your grade.
- Demonstrate the proper use of tools and methods to build and evaluate your recommender system that functions end-to-end for all clients.
- Deliver strong evidence of the added value that your proposed recommender system would bring to the organization.
- Offer an extensive, well-supported interpretation of your results, clearly explaining the reasoning behind your choices.

- Present your findings in a clear, organized, and coherent manner. Your final presentation should be accessible to both technical and non-technical audiences.
- You are encouraged to consider additional aspects beyond the core techniques covered in class, such as ethical implications, deployment architectures, monitoring strategies, and scalability.
- Note that achieving the highest score will not be based on obtaining the best performance metrics, as these depend on both the algorithms and the data. Extensive hyperparameter tuning is not expected; rather, the focus is on demonstrating effective use of the methods across all phases of the recommender system.
- Individual participation and contribution within the team will be taken into account and can impact the final grade.

Deliverables

- A functional prototype showcasing the system's capabilities. For example, a Jupyter Notebook with all Python code.
- A compelling presentation articulating the major conclusions to be presented to the CEO of your company. The appointment has a given maximum duration and will be shared with you via announcement in the campus.