Project Proposal: Personalized Fashion Recommendation
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Team No : 11

Background :

The Recommendation system is one of the most important information services on today's Internet. Recently, graph neural networks have become the new state-of-the-art approach of recommended systems. Context driven recommendations systems have shown to improve the existing performance of recommendations as for fashion people don't have a idea what to choose compare to regular e-commerce where search space is infinite but people have a clarity of the product category for fashion products with similar outfit often confuses the end-customer hence contextual driven recommendation help to rescue based on past transactional details.

Paper Summary:

The approach mentioned in our referred work is similar to the metric learning idea of Vasileba et al.[5], but rather than using text to improve product embeddings, a graph to exploit structural information and obtain better product embeddings. The model in "Context-Aware Visual Compatibility" is based on the graph auto-encoder (GAE) framework defined by Kipf et al. [6].
Some models from meta-analysis of past literature- GCN- This is a typical spectral model that combines graph convolution and neural networks to achieve the graph task of semi-supervised classification. GraphSAGE- This is a pioneered spatial GNN model that samples neighbors of the target node, aggregates their embeddings, and merges with the target embedding to update.

Project Description:
Main goal :
We will be using the data from H&M Personalized Fashion Recommendations Kaggle competition and work with Graph Neural Network based approaches to develop product recommendations. The available meta data spans from simple data, such as garment type and customer age, to text data from product descriptions, to image data from garment images.
We would model this problem as an edge prediction problem of GNN and try to get a high MAP@12 score, and also analyze how they compare with other approaches like LSTMs and metric learning ones.

Objectives:

- The primary task in the public contest is to predict what articles each customer will purchase in the 7-day period immediately after his/her transactions.
- Multimodal Recommendation with user-product interactions and historical and article data which is textual in nature.

Dataset :

- The Dataset is 34GB in size that we initially plan to use : H&M dataset [1] which is publicly available on kaggle.We would like to generate embeddings and then train the model and evaluate on the metrics described below.

Baseline and Evaluation:

We can use regular metric learning for recommendations as a baseline for this project. We will be using Mean Average Precision @ 12 (MAP@12) for evaluation of the results.

$$MAP@12 = \frac{1}{U} \sum_{u=1}^{U} \sum_{k=1}^{min(n,12)} P(k) \times rel(k)$$

where U is the number of customers, $P(k)$ is the precision at cutoff k, n is the number predictions per customer, and $rel(k)$ is an indicator function equaling 1 if the item at rank k is a relevant (correct) label, zero otherwise.

Methods:

The methods that we will be mostly will be referring to are :
1) "https://github.com/tsinghua-fib-lab/GNN-Recommender-Systems"
2) https://github.com/gcucurull/visual-compatibility

For evaluation **Mean Average Precision@K** as a metric mentioned in the previous question.

Other Metrics

For this task apart from the metric described above we will include **Mean Average Recall@K** and we would like to explore metrics to quantify bias in the predictions of the model.

Timeframe + Work Distribution (For two months)

23rd February	Project Proposal submission
25th February - 28th February	Paper Discussions and Task formulation
1th March - 30th March	Implementation of core compatibility prediction model and literature review to improve the task based model.
1st April - 24th April	Working on the task introduced and comparison with relevant datasets in the domain.
25th April	Final Report and Project Presentation

References :

[1] H&M Dataset - https://www.kaggle.com/c/h-and-m-personalized-fashion-recommendations
[2] Context-Aware Visual Compatibility Prediction :
https://arxiv.org/pdf/1902.03646.pdf
[3] A Deep Learning System for Predicting Size and Fit in Fashion E-Commerce
-https://arxiv.org/pdf/1907.09844.pdf
[4] Variational Graph Auto-Encoders
https://arxiv.org/abs/1611.07308