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4 **Exploratory Data Analysis**

5 **Course counts per genre**

- [ ] **Course enrollment distribution**
- [ ] **20 most popular courses**
- [ ] **Word cloud of course titles**
- [ ] **Content-based Recommender System using Unsupervised Learning**
- [ ] **Flowchart of content-based recommender system using user profile and course genres**

16 **Collaborative-filtering Recommender System using Supervised Learning**

17 **Flowchart of KNN based recommender system**

18 **Flowchart of NMF based recommender system**

19 **Flowchart of Neural Network Embedding based recommender system**

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21 **Compare the performance of collaborative-filtering models**

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- Content-based recommendation methods
  - All 3 methods seem to return varying courses as their top recommendations. Suggesting that they capture different area of interest for the recommendation.
  - The results seem to heavily depend on the type of methods as well as the hyperparameters.

- ▶Choosing hyperparameters requires good insight into the dataset as well as the objective of the recommendation system.
- ▶Perhaps combining various content based recommendation methods may yield a better result as it may capture a larger scope of the user's interest. It may also be possible to capture the hit rate of each method and build a supervised learning model such as neural network to further improve the results.

▶Collaborative filtering

- ▶Given the strong performance of the baseline method, the dataset doesn't seem

to suffer from the overfit. It may be the reason why knn and nmf based methods performed worse than the baseline method as well. Perhaps the hyperparameters for knn and nmf require more tuning.

- Embedding based method seems to have decreasing RMSE value at 10 epochs. The results may be further improved with fine tuning the hyperparameters.
- While all methods seem to yield relatively low RMSE value, the embedding method seems to be the best method for the recommendation system.
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- ▶Content-based clustering
  - ▶Kmeans inertia vs. clusters
  - ▶ PCA acc. variance vs. n components
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