Real estate app development and recommendation (II)

Student: Jonathan Jiang Jia Long (U1921237K)   Supervisor: Prof Zhang Jie

Abstract:

The rapid growth of the e-commerce market has revolutionised the way real estate is bought and sold, resulting in an increased need for effective social recommendation algorithms that can assist buyers in selecting the best properties based on their needs and preferences. This study reviewed existing commercial solutions in real estate recommendation and identified gaps in current models such as the cold-start problem, data sparsity and scalability issues.

To circumvent these challenges and enhance the user experience in property acquisition, we developed a social recommendation app that utilises a multi-modal algorithm. The performance evaluation of the proposed algorithm performs well as an unsupervised machine learning algorithm, comparable to existing algorithms in speed and explainability of results.

Project Objectives:

To create a comprehensive solution for property seekers by implementing and developing an internal social recommendation system in the PropNex Investment Suite.

	Address/Project Name	Date of Sale	Sale Price	Private/Pu	Type	Floor_min	Floor_ma	Area (Sqm	Remainir	Flat_mod	cosine_similarity
input	THE GALE	2022-08	1020000	Private	Condominium	6	10	87	Freehold	Unknown	1
	CHANGI COURT	2021-10	1030000	Private	Condominium	6	10	87	Freehold	Unknown	0.999999
	SHERWOOD CONDOMINIUM	2019-10	1010000	Private	Condominium	6	10	87	Freehold	Unknown	0.999999
cosine-sim	CHANTILLY RISE	2018-08	1000000	Private	Condominium	6	10	87	Freehold	Unknown	0.999998
	ROSALIA PARK	2019-12	1370000	Private	Condominium	1	5	137	Freehold	Unknown	
	NOUVELLE PARK	2020-12	1380000	Private	Condominium	1	5	135	Freehold	Unknown	
knn-clustering	HUME PARK I	2020-06	1378000	Private	Condominium	1	5	135	Freehold	Unknown	

Hybrid SVD-Cosine-Similarity Collaborative Filtering

- After pre-processing the data, we scaled and normalised the data to ensure that the similarity values are only affected by the angle between the vectors and not by their magnitudes.
- We then utilised Truncated Singular Value Decomposition (TruncatedSVD) to reduce the feature matrix's dimensionality.
- The pairwise cosine similarity between the given project and all other projects is calculated. The projects with the highest cosine similarity values to the given project are identified as the most similar ones.

Hybrid SVD-k-NN-clustering Collaborative Filtering

- Most pre-processing, scaling, normalising, concatenation and dimensionality reduction steps are the same from the hybrid_SVD_cosinesim_normalised model.
- We started by fitting the k-NN model to the reduced features matrix.
- The similarity is measured using Euclidean distance, and the algorithm was implemented with BallTree, KDTree, and brute force.
- We then found the properties that are nearest neighbours to the input property based on the k-NN model.