DNN based movie recommendation system with explainable reasoning

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DECLARATION

I declare that this thesis is the result of my independent effort and has not been previously presented in any form for the purpose of obtaining another degree or diploma from any university or tertiary institution. Acknowledgment has been provided within the text for any information or findings derived from the published or unpublished works of others, and a comprehensive list of references is included.

Signature: Date: 04 July 2024

The above candidate has carried out research for the Master's thesis/dissertation under my supervision. I confirm that the declaration made above by the student is true and correct.

Name of Supervisor: Dr. Thushari Silva

Signature of the Supervisor: Date: 04 July 2024

ABSTRACT

A recommender system gives confidential private preferences to its users by evaluating users' historical data and behaviors. Since the early 1980s, the recommender system has been used as a popular symbolic AI technology. It comes under the broad umbrella of the Expert system. However, with the latest developments, The use of machine learning techniques and algorithms in recommender system development has been a natural way to increase prediction accuracy and address issues with data sparsity and cold start. Users and service providers can both benefit from recommender systems.

Frequently, visitors are directed to recommended articles that they were not expecting, which can lead to confusion. As a result, explainability becomes to be evaluated in direct relation to how well the recommendation system operates. Enhancing efficiency, transparency, and customer happiness leads to increased user loyalty. The recommendations are supported by justifications for the approaches. Hence, with the rapid growth of the demand for recommender systems, its landscape is evolving into explainable recommender systems for better quality. Since then explainable recommender systems become a research challenge. Some techniques for generating explanations of recommendations are provided by the academia. The Recommender system is depending more and more on these machine learning algorithms due to the recent success of machine learning models and algorithms. Explainable Artificial Intelligence is a new field that aims to produce high-quality suggestions and clear explanations of the outcomes while offering transparent learning techniques. This has opened a new era of recommender systems, revealing more complex relationships between users and products, offering highly sophisticated data visualizations, and discovering vast amounts of information in contextual, virtual, demographic, and textural data. Therefore, this thesis reports on the development of a machine learning-based recommender system solution with explainable reasoning.

DEDICATION

To my parents, my family, and all my teachers for their genuine motivation and collaboration towards the success of my educational life … !!!

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LIST OF ABBREVIATIONS

Abbreviation	Description
AI	Artificial Intelligence
GUI	Graphical user interface
NLP	Natural language processing
DNN	Deep Neural Network
ML	Machine Learning
IoT	Internet of Things
RS	Recommender system
WSGI	Web Server Gateway Interface
CLI	Command Line Interface
CPU	Central processing unit
GPU	Graphics processing unit
IDE	Integrated development enviorment
VS	Visual Studio
SQL	Structured Query Language
NLTK	Natural Language Toolkit
UI	User Interface
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheet
REST	Representational State Transfer
API	Apllication Programing Interface
DB	Data Base
FE	Front End
BE	Back End
FFN	Feed Forward Network

ORM	Object Relational Mapping
SVD	Singular Value Decomposition
PCA	Principal Component Analysis
SGD	Stochastic gradient Decent
RNG	Random Number generator
BST	Behavioral Sequence Transformer
RMSE	Root Mean Squared Error
MAE	Mean Absolute Error
KNN	K Nearest Neighbors
Std	Standard deviation
DDPG	deep deterministic policy gradient