DAT301m Project Proposal
Champion Recommender System for League of Legends

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Abstract

League of Legends is a popular MOBA game, yet choosing a suitable champion can be difficult for beginners. This project introduces a personalized champion recommender system based on player inputs such as preferred lane, attack type, and MOBA experience. Using TensorFlow, we train a deep learning model to predict compatibility between users and champions, generating ranked suggestions. This work demonstrates a practical AI application in personalized recommendation for gaming.

1 Problem Statement

For new or inexperienced players in *League of Legends* (LoL), choosing a champion can be intimidating. They often do not know which champion suits their preferred lane, gameplay style, or skill level. Unlike experienced players, they have no champion history to guide recommendations.

This project aims to build a **Champion Recommender System** that suggests champions based on a player's:

- Preferred lane (Top, Jungle, Mid, ADC, Support)
- Preferred attack range (Melee, Ranged, or Both)
- Experience with MOBA games (e.g., never played, casual, or experienced)

This system is especially useful for cold-start users who need personalized suggestions instead of relying on meta or general statistics.

2 Dataset Description

Primary dataset: *League of Legends - Champions Dataset* from Kaggle, which includes:

- Champion stats (attack, defense, magic, difficulty)
- Champion roles and tags (e.g., assassin, tank), and range type
- Playstyle and base attribute information

Dataset link: `https://www.kaggle.com/datasets/gabkgonzales/league-of-legends-dataset`

User input data:

- Collected through a short profile form (lane preference, range preference, MOBA experience)
- Encoded into feature vectors to be used as model input

3 Related Work

Previous work on game recommendation and champion suggestion has included:

- Collaborative filtering (e.g., SVD) based on user history
- Content-based filtering using champion stats and metadata
- Graph-based recommendation models to capture champion synergy and counters
- DraftRec (WWW 2022): context-aware champion recommendations during ranked draft

Our system is novel in that it focuses on cold-start players without prior game history by using only personal preferences.

4 Methodology and Implementation Plan

4.1 Data Preprocessing

- Load and clean the Kaggle dataset
- Extract champion features (e.g., difficulty, role, range type)
- Encode player inputs into numerical feature vectors

4.2 Model Architecture (Using TensorFlow)

- Build a deep learning model to predict compatibility between player profile and champions
- Model input: lane (one-hot), attack type, MOBA experience
- Model output: ranked list of suitable champions

4.3 Training

- Train from scratch using TensorFlow and Keras
- Simulate user profiles and match with suitable champions
- Use appropriate loss functions (e.g., ranking loss or cross-entropy)

4.4 Evaluation

- Top-K Accuracy (Hit@K)
- NDCG@K – normalized ranking quality
- Perform ablation study with/without specific input features

5 Model Design and Techniques

We will use the following AI techniques, implemented with TensorFlow:

- **Champion embeddings** learned from champion attributes
- **User profile encoder** to represent user preferences
- **Scoring layer** to compute compatibility
- **Fully connected layers** to learn nonlinear relationships

This is a custom-trained model, not a wrapper around any pre-trained pipeline.

6 Evaluation Strategy

We will evaluate model performance using:

- Hit@K – is a good suggestion among the top K?
- NDCG@K – how well is the suggestion list ranked?
- MAP@K – mean average precision

Additionally, we will conduct qualitative case studies with example users and review the output recommendations.

7 Expected Outcomes

By the end of the project, we expect to deliver:

- A functional champion recommender system built using TensorFlow
- 3–5 personalized champion suggestions per user
- Validated performance with $>60\%$ Hit@5 accuracy on synthetic test data

8 Conclusion

This project applies Deep Learning using TensorFlow to address a real-world gaming problem. It offers a beginner-friendly, AI-driven champion recommendation system tailored to new players in League of Legends. Unlike existing tools, it solves the cold-start problem by learning from user preferences instead of gameplay history.