Module Interface Specification for Movie Recommender

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1 Revision History

Date	Version	Notes
2024-03-19	1.0	Initial Release

2 Symbols, Abbreviations and Acronyms

See SRS Documentation at
https://github.com/alimousavi1997/RecommSys/blob/main/docs/SRS/SRS.pdf

Contents

3 Introduction

The following document details the Module Interface Specifications for Movie Recommender

Complementary documents include the System Requirement Specifications and Module Guide. The full documentation and implementation can be found at https://github.com/alimousavi1997/RecommSys.

4 Notation

The structure of the MIS for modules comes from Hoffman and Strooper (1995), with the addition that template modules have been adapted from Ghezzi et al. (2003). The mathematical notation comes from Chapter 3 of Hoffman and Strooper (1995). For instance, the symbol := is used for a multiple assignment statement and conditional rules follow the form $(c_1 \Rightarrow r_1|c_2 \Rightarrow r_2|...|c_n \Rightarrow r_n)$.

The following table summarizes the primitive data types used by Movie Recommender.

Data Type	Notation	Description
character	char	a single symbol or digit
string	char*	a sequence of characters
integer	$\mathbb{Z}$	a number without a fractional component in (-∞, ∞)
natural number	$\mathbb{N}$	a number without a fractional component in [1, ∞)
real	$\mathbb{R}$	any number in (-∞, ∞)

The specification of Movie Recommender uses some derived data types: sequences, strings, and tuples. Sequences are lists filled with elements of the same data type. Strings are sequences of characters. Tuples contain a list of values, potentially of different types. In addition, Movie Recommender uses functions, which are defined by the data types of their inputs and outputs. Local functions are described by giving their type signature followed by their specification.

5 Module Decomposition

The following table is taken directly from the Module Guide document for this project.

Level 1	**Level 2**
Hardware-Hiding Module	
Behaviour-Hiding Module	Input Format Module Item Selector Module
Software Decision Module	KNN Module

Table 1: Module Hierarchy

6 MIS of Input Format Module

6.1 Module

Input Format

6.2 Uses

None

6.3 Syntax

6.3.1 Exported Access Programs

Name	In	Out	Exceptions
load_dataset	file_path: char*	array	FileNotFound-InvalidFileFormat

6.4 Semantics

6.4.1 State Variables

None

6.4.2 Environment Variables

file: A npz file.

6.4.3 Assumptions

None

6.4.4 Access Routine Semantics

load_dataset(file_path)():

- transition: -
- output: Read user-item interaction matrix from the file and returns the appropriate dataset for the KNN module.
- exception: $exc :=$ (
  if file_path does not exist then FileNotFoundException
  |
  if file_path is not in the correct format then InvalidFileFormatException
)

7 MIS of Item Selector

7.1 Module

Itemselector

7.2 Uses

None

7.3 Syntax

7.3.1 Exported Access Programs

Name	In	Out	Exceptions
item_selector	user_indices: $\mathbb{Z}$	popular_item_indices: $\mathbb{Z}$	-

7.4 Semantics

7.4.1 State Variables

None

7.4.2 Environment Variables

None

7.4.3 Assumptions

None

7.4.4 Access Routine Semantics

item_selector(user_indices):

- transition: -
- output: popular_item_indices: The popular items among specified users as inputs
- exception: -

8 MIS of KNN

8.1 Module

KNN

8.2 Uses

None

8.3 Syntax

8.3.1 Exported Access Programs

Name	In	Out	Exceptions
knn	user_item_interaction_matrix: $\mathbb{R}^m$, target_user_index: $\mathbb{Z}$	closed_users_indices: $\mathbb{Z}^y$	-

8.4 Semantics

8.4.1 State Variables

None

8.4.2 Environment Variables

None

8.4.3 Assumptions

None

8.4.4 Access Routine Semantics

knn(user_item_interaction_matrix):

- transition: -
- output: closed users to the target user.
- exception: -

References

Carlo Ghezzi, Mehdi Jazayeri, and Dino Mandrioli. *Fundamentals of Software Engineering*. Prentice Hall, Upper Saddle River, NJ, USA, 2nd edition, 2003.

Daniel M. Hoffman and Paul A. Strooper. *Software Design, Automated Testing, and Maintenance: A Practical Approach*. International Thomson Computer Press, New York, NY, USA, 1995. URL http://citeseer.ist.psu.edu/428727.html.