IFN647 ASSIGNMENT 2

Final Report

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# Statement of completeness

|  |  |  |
| --- | --- | --- |
| **Statement of completeness:**  **Group Number:** | | |
| The following undersigned members of the group agree to abide by this statement to ensure successful completion of the project (Assignment 2) to meet project requirements and timelines. We declare that each team member has a same or similar contribution to the project. | | |
| **Name, student number & email** | **Signature** | **Date** |
|  |  |  |
|  |  |  |
|  |  |  |
| 1. Only if permitted |  |  |
| ***Task Allocation for each student***  *1.*  *2.*  *3.* | ***Allocation Percentage* (%)** | |
| ***Other issues or comments*** | | |

# User Manual

## Information on used packages

## Data folder setup

## How to execute Python files

## Expected outputs for each Python file

## Additional information (if any)

# Design

**Task 1:** Design an Okapi BM25-Based IR Model (***BM25IR***) that ranks documents in each dataset using the corresponding query (topic) for all 50 datasets.

### Description of your model for Task 1

### Assumption (if any)

### Algorithm 1 (including inputs, outputs, and the procedure or method in plain English or pseudocode)

### What the query feature function and document feature function are?

**Task 2:** Design a Language Model-Based Ranking Model (***LMRM***) that ranks documents in each dataset using the corresponding query (topic) for all 50 datasets.

### Description of your model for Task 2

### Assumption (if any)

### Algorithm 2 (including inputs, outputs, and the procedure or method in plain English or pseudocode)

**Task 3.** Based on the knowledge you gained from this unit about *learning to rank*, design a Pseudo-Relevance Ranking Model (***PRRM***) to rank documents in each dataset using the corresponding query (topic) for all 50 datasets.

### Description of your model for Task 3

### Assumption (if any)

### Algorithm 3 (including inputs, outputs, and the procedure or method in plain English or pseudocode)

### The differences between *PRRM* and the other two models

# Implementation

**Task 4.** Use Python to implement three models: ***BM25IR***, ***LMRM*** and ***PRRM***, and test them on the given 50 datasets for the corresponding 50 queries (topics).

## Model1:

## Python package or module (or any open-source software) you used:

## Data structures (used to represent a single document and a set of documents):

## Model2:

## Python package or module (or any open-source software) you used:

## Data structures (used to represent a single document and a set of documents):

## Model3:

## Python package or module (or any open-source software) you used:

## Data structures (used to represent a single document and a set of documents):

# Results & Evaluation

**Task 5.** Use three effectiveness measures to evaluate the three models.

Table 1: The performance of 3 models on average precison (MAP)

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Model1** | **Model2** | **Model3** |
| R101 |  |  |  |
| R102 |  |  |  |
| R103 |  |  |  |
| … |  |  |  |
| R150 |  |  |  |
| MAP |  |  |  |

Table 2: The performance of 3 models on precision@12

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Model1** | **Model2** | **Model3** |
| R101 |  |  |  |
| R102 |  |  |  |
| R103 |  |  |  |
| … |  |  |  |
| R150 |  |  |  |
| Average |  |  |  |

Table 3: The performance of 3 models on DCG12

|  |  |  |  |
| --- | --- | --- | --- |
| **Topic** | **Model1** | **Model2** | **Model3** |
| R101 |  |  |  |
| R102 |  |  |  |
| R103 |  |  |  |
| … |  |  |  |
| R150 |  |  |  |
| Average |  |  |  |

# Discussion

**Task 6.** Recommend a model based on significance test and your analysis and describe a possible application scenario.

## Analysis about the difference between three models (Significance test)

## If the t-test is unsatisfactory, how can you use the evaluation results to refine PRRM mode?

## Analysis about your findings and/or Recommendation (A justification must be included on your findings or recommendation)

## The application scenario and potential ethical issues

# References

Appendix 1 (listing the top-12 ranked documents for each dataset for Model1)

Appendix 2 (listing the top-12 ranked documents for each dataset for Model2)

Appendix 3 (listing the top-12 ranked documents for each dataset for Model3)