

Greek Mythology Explorer – Final Report

Natural Language Processing and Information Retrieval 01

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Final Group Project

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# Introduction

## Motivation

## Project goals and use case

# Data Acquisition and Graph Modelling

## Data source: Wikidata and SPARQL

## Graph construction: Nodes, edges and relationships

# System Architecture

## Technology stack overview

## Web integration and interface

## Migration from early prototypes

# Core Features

## Interactive graph exploration

## Shortest path queries

## Character similarity matching via vector comparison

# Evaluation

**Note on Sources**  
The theoretical foundations and evaluation methodology in this section are based on materials from the course lecture (*Lecture 04, 2025, Chung-Ang University*) as well as the following standard IR textbooks: *Introduction to Information Retrieval* by Manning, Raghavan, and Schütze (2008), and *Modern Information Retrieval* by Baeza-Yates and Ribeiro-Neto (1999, 2011).

## Evaluation setup and methodology

To evaluate the effectiveness of our character matching system, we follow standard IR evaluation methodology. Since direct user satisfaction is hard to measure, we use **relevance** as a proxy.[[1]](#footnote-1) A result is considered relevant if the suggested character meaningfully matches the user-defined profile.

Our setup includes:

* A set of **test queries** based on user-defined slider inputs.
* **Manual relevance judgements** for the top-k results per query, using binary and graded scales.[[2]](#footnote-2)
* Evaluation using standard IR metrics.

This approach aligns with the classic IR evaluation framework: a document collection, a set of information needs, and relevance assessments.[[3]](#footnote-3)

## Relevance metrics: Precision@K, MAP, NDCG

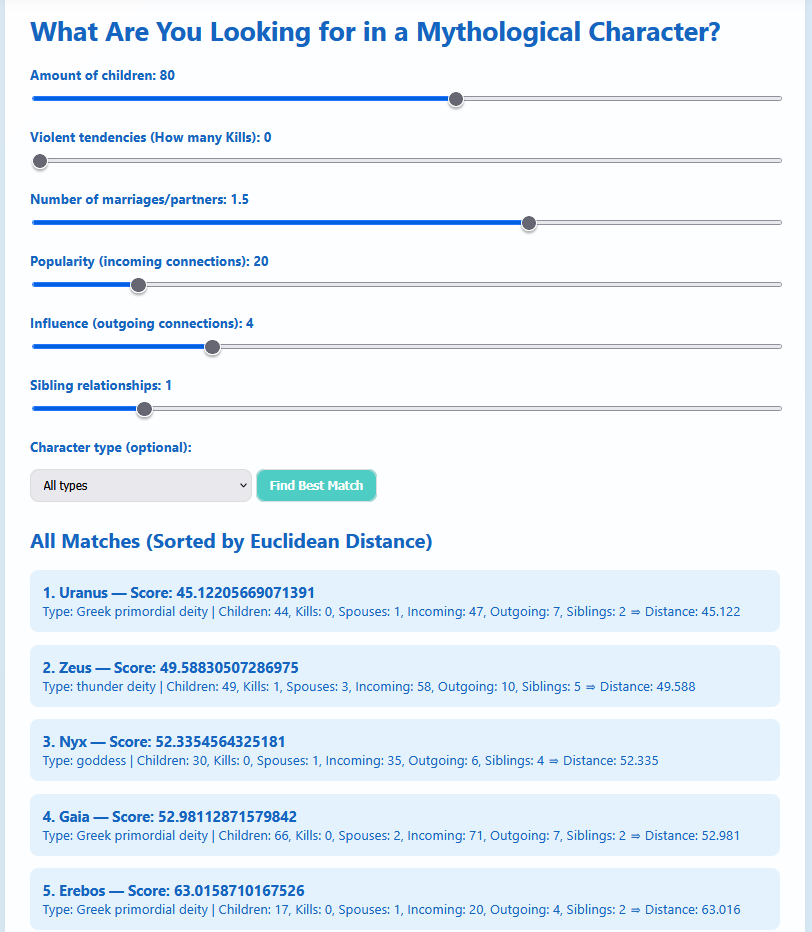
We apply three widely used IR metrics:

* **Precision@K**: Measures the proportion of relevant results in the top K[[4]](#footnote-4). It reflects how well the system ranks relevant characters at the top.
* **Mean Average Precision (MAP)**: Averages the precision at each relevant result position, then across all queries.[[5]](#footnote-5) It rewards systems that rank relevant results higher.
* **Normalized Discounted Cumulative Gain (NDCG)**: Accounts for graded relevance and discounts lower-ranked results logarithmically.[[6]](#footnote-6) It is especially useful when not all relevant results are equally important.

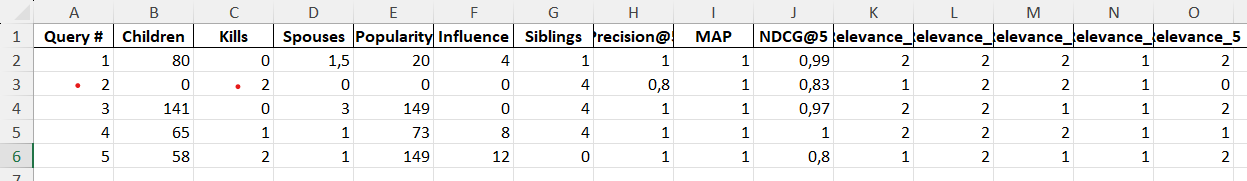
These metrics allow us to compare different configurations of our matching algorithm and assess ranking quality in a structured way.

## Results and Interpretation

To evaluate the effectiveness of our character matching system, we conducted five test queries using different slider configurations. Each query returned a ranked list of mythological characters based on Euclidean distance to the input profile. As an example, the screenshot below shows one such query and its top results:



To assess the quality of these results, we manually assigned graded relevance scores (0 = not relevant, 1 = somewhat relevant, 2 = highly relevant) to the top 5 matches for each query. Based on these judgments, we computed three standard IR metrics: **Precision@5**, **Mean Average Precision (MAP)**, and **Normalized Discounted Cumulative Gain (NDCG@5)**. The following table summarizes the results:



* **Key Observations:**
* **Precision@5** was **1.0** for 4 out of 5 queries, indicating that most top-ranked results were relevant.
* **MAP** reached the maximum value of **1.0**, showing that relevant characters were consistently ranked at the top across all queries.
* **NDCG@5** values ranged from **0.80 to 1.00**, reflecting that highly relevant characters were generally placed in higher positions, with minor variations in ranking quality.

These results suggest that our system is effective at identifying and ranking mythologically similar characters based on user-defined traits. The combination of graph-based data modeling and vector similarity appears to yield meaningful and interpretable results.

# Conclusion and Outlook

1. Chung-Ang University. (2025). *Lecture 04: IR Evaluation Measures*. Natural Language Processing and Information Retrieval, p.3. [↑](#footnote-ref-1)
2. Chung-Ang University. (2025). *Lecture 04: IR Evaluation Measures*. Natural Language Processing and Information Retrieval, p.4, 17; Manning, C. D., Raghavan, P., & Schütze, H. (2008). *Introduction to Information Retrieval*. Cambridge University Press. [↑](#footnote-ref-2)
3. Chung-Ang University. (2025). *Lecture 04: IR Evaluation Measures*. Natural Language Processing and Information Retrieval, p.4. [↑](#footnote-ref-3)
4. Chung-Ang University. (2025). *Lecture 04: IR Evaluation Measures*. Natural Language Processing and Information Retrieval, p.10; Baeza-Yates, R., & Ribeiro-Neto, B. (2011). *Modern Information Retrieval: The Concepts and Technology behind Search* (2nd ed.). Addison-Wesley. (Original work published 1999) [↑](#footnote-ref-4)
5. Chung-Ang University. (2025). *Lecture 04: IR Evaluation Measures*. Natural Language Processing and Information Retrieval, p.13, 16. [↑](#footnote-ref-5)
6. Chung-Ang University. (2025). *Lecture 04: IR Evaluation Measures*. Natural Language Processing and Information Retrieval, p.21. [↑](#footnote-ref-6)