

Independent Study Project Proposal

I. Project Goal

- A. The goal of the project is to create an application that catalogues books the user has read in a fast, persistent manner. The user will be able to search for books based on several built-in characteristics (like author and genre), but also by user-defined tags. The application will include a GUI in some capacity for entering and retrieving books. The application will also contain an AI that recognizes the genre of a book based on its summary (hopefully -- might not get to this).

II. Project Motivation

- A. I am interested in databases, so I thought a project similar to a database would be interesting. In addition, practicing my GUI skills is always good. Finally, I wanted to incorporate artificial intelligence into my project in some capacity, and this seemed like a good project for that.

III. Project Assumptions

- A. I am assuming that I will be able to install and use all necessary libraries and software.

IV. Project Components

A. Main Database

- 1. This includes the “back-end” side of the project: the data structure, persistent storage, entering books, editing records, and searching for books based on tags or author/genre/etc.

B. GUI

- 1. I’m not certain if this is going to be JavaFX or a local website server + HTML, JavaScript, and CSS yet, but the GUI will allow for entering books, searching for books in the database, and also a few useful actions, like searching Amazon for the book.

C. AI Genre Detection

- 1. This would be the last thing I do, and might not happen if I don’t get to it. I envision that the application would pull the summary/blurb of the book from the internet, and then feed it into an AI that would spit out the probable genre of the book.

V. Project Scope

- A. The product is intended to be used as a personal tool on a local machine. It is not intended to be used as a server for multiple machines, or to be accessed remotely.

VI. Project Tools

- A. While I remain at home for online learning, I will use Java and NetBeans. I’ll also be using the native Java libraries, as well as NSIS for packaging the final product.
- B. The GUI tools are subject to change, but it could be the JavaFX libraries, or HTML/JavaScript/CSS (for a web app style interface).

- C. I don't currently know what I would use for the machine learning/artificial intelligence portion of the project. Some possibilities include, but are not limited to, deeplearning4j, Apache OpenNLP, and Java-ML.

VII. Project Testing

A. Main Database

1. I expect that the data will remain persistent across system shutdowns.
2. I expect that data will be inserted and retrieved in a reasonable amount of time for a large dataset.
3. I expect that the data structure will have a theoretical complexity of, at maximum, $O(n \log n)$ for both insertion and search. I would prefer that the complexity would approach $O(n)$ or $O(\log n)$, however.

B. GUI

1. I expect that the GUI will interface correctly with the backend database.
2. The tests will include (but are not limited to) whether the GUI correctly:
 - a) Inserts a book with specified additional data
 - b) Searches for and displays a book based on given criteria
 - c) Correctly performs the additional useful actions (e.g. searching Amazon for the book)

C. AI Genre Detection

1. I'm not certain what form the AI will be in, so I'm not certain of the exact form of the test either. However, for a large testing dataset of blurb/summary & genre pairs, I hope the AI will have an accuracy of at least 90%.

VIII. Project Team

- A. I, Carson Foster, will be responsible for the entirety of the project's creation.