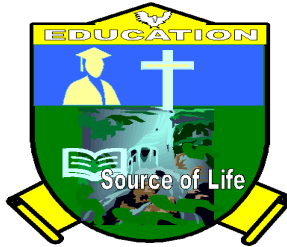


# **RUAHA CATHOLIC UNIVERSITY**



**(RUCU)**

**FACULTY OF INFORMATION AND COMMUNICATION**

**TECHNOLOGY (ICT)**

**DEPARTMENT OF COMPUTER SCIENCE**

**PROJECT TITLE: ARTIFICIAL INTELLIGENCE (AI) POWERED, HYBRID BOOK RECOMMENDATION SYSTEM.**

**NAMES**

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# Project Title: Artificial Intelligence (AI) powered Book Recommendation System

## 1. Introduction

The rapid growth of digital reading platforms has led to an overwhelming number of books available online, making it difficult for users to easily discover content that matches their reading interests. Traditional recommendation methods struggle with personalization, diversity, and contextual relevance. This project introduces an AI-powered Book Recommendation System built using Django, Machine Learning, and Natural Language Processing techniques to personalize book suggestions based on user behavior, book content, and contextual factors.

## 2. Problem Statement

Despite the abundance of digital books, readers face the following challenges: difficulty in discovering relevant books due to information overload, cold start problems for new users or newly added books, filter bubbles, where users only get recommendations similar to their past choices, shallow recommendation approaches relying mainly on metadata, ignoring deeper content features, lack of interactive analytics tools to understand reading patterns and trends. These limitations highlight the need for a more intelligent, hybrid, and content-aware recommendation system.

## 3. Objective of the Project

### General Objective

To develop an AI-powered, hybrid book recommendation system that provides personalized, diverse, and contextually relevant recommendations.

### Specific Objectives

- To explore and assess relevant data sources in order to gain insights into user behavior, book attributes, and contextual factors influencing book selection
- To Develop a hybrid recommendation algorithm combining collaborative filtering and content-based methods.
- To design a machine learning model using word embeddings to predict user preferences.
- To evaluate the system's performance in terms of accuracy, scalability, and user satisfaction using A/B testing and other metrics.

## 4.Scope of the Project

The system focuses on fiction books across multiple genres. It uses Book metadata from sources such as Amazon, Goodreads, and Bookcrossing. User-uploaded PDF files for metadata extraction, user-generated data (ratings, reviews, reading lists), Django-based web platform supporting CRUD operations, Plotly visualizations for analytics (reading trends, book popularity). The scope includes personalized recommendations but excludes e-book reading or audio playback functionality.

## 5.Significance of the Project

The system will be helpful to users by reducing time spent searching for relevant books, offering personalized and context-aware recommendations, encouraging exploration of diverse genres and authors, providing dashboards to visualize reading patterns and trends. The system will help to match books to the right audience and support digital library modernization.

## 6. Methodology

The project will use Django, machine learning and natural language processing techniques.

Technologies to be used include;

**Backend:** Python/PHP, Django

**Frontend:** HTML, Bootstrap, CSS

**Database:** SQLite

**Tools:** VS Code, Notepad

## 7.System Requirements

### Hardware Requirements;

- Minimum RAM: 4GB
- Processor: Dual-core or higher
- Storage: 10GB+ free space

### Software Requirements;

- Windows/Linux Operating System
- Web Browser (Chrome/Firefox)
- Django Framework,

- SQLite database

## **8. Literature Review**

Existing studies show that: collaborative filtering is widely used but suffers from cold start and data sparsity, content-based systems improve personalization but lack deep thematic understanding Hybrid systems achieve better accuracy by combining strengths of both methods, NLP models such as Word2Vec, Glove, and BERT improve recommendation relevance by capturing semantic meaning in text and few systems combine advanced AI, Django web frameworks, and interactive analytics in one platform. These gaps motivated the development of a modern, hybrid, AI-driven recommendation system.

## **9. Expected Output**

- A fully functional AI-powered recommendation web application.
- Interactive analytics dashboard (reading patterns, popular genres).
- A hybrid recommendation engine with improved accuracy and relevance.
- A complete project report detailing methodology, results, and findings.

## **10. Conclusions**

This project provides an advanced solution to book discovery challenges by leveraging artificial intelligence and web technologies. The hybrid recommendation system overcomes traditional limitations, improves personalization, and enhances user engagement with interactive analytics. The platform demonstrates strong potential for expansion into larger digital library systems and commercial recommendation engines.