Project Documentation

1. Introduction

Project Title: SmartSDLC – AI-Enhanced Software Development Lifecycle

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2. Project Overview

Purpose

The purpose of SmartSDLC is to streamline the Software Development Life Cycle (SDLC) by automating two critical tasks:

1. Requirements Analysis – Extract and classify requirements from PDF documents or user inputs.

2. Code Generation – Translate natural language requirements into functional code snippets in multiple programming languages.

This tool empowers developers, project managers, and analysts by reducing manual effort, improving accuracy, and accelerating the software design process.

Features

Requirements Analysis

Extracts text from PDF files.

Organizes requirements into Functional, Non-Functional, and technical categories.

Code Generation

Generates AI-powered code snippets.

Supports languages such as Python, Java, JavaScript, C++, C#, PHP, Go, and Rust.

Interactive Gradio Interface

Tabbed design: “Code Analysis” and “Code Generation.”

Supports both file uploads and manual text input.

3. Architecture

Frontend (Gradio):

Provides an intuitive and responsive user interface with tabs for analysis and code generation.

Backend (PyTorch & Transformers):

Handles text processing, model inference, and output generation.

LLM Integration (IBM Granite 3.2 Instruct Model):

Utilizes ibm-granite/granite-3.2-2b-instruct for natural language understanding and generation.

PDF Processing (PyPDF2):

Extracts content from uploaded documents for requirement analysis.

4. Setup Instructions

Prerequisites

Python 3.9+

pip (package manager)

Internet connection (to download models)

Run the application:

python smartsdlc.py

5. Folder Structure

smartsdlc.py

README.md

SmartSDLC- Project Documentation

Demo video

6. Running the Application

1. Launch the App:

python smartsdlc.py

2. Access the Gradio Interface:

- Code Analysis Tab → Upload a PDF or enter text, click Analyze, and view categorized requirements.
- Code Generation Tab → Enter a requirement, choose a programming language, and click Generate Code.

3. If share=True, a public link will be generated for remote access.

7. User Interface

Code Analysis Tab:

- Upload PDF or enter text.
- Displays structured requirement analysis.

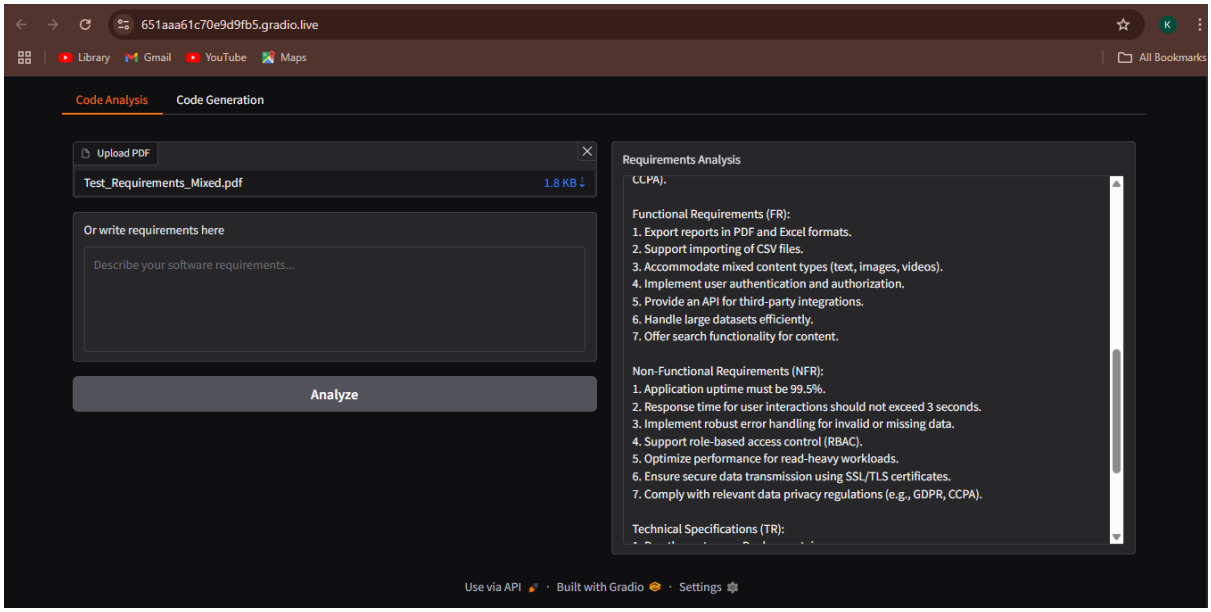
Code Generation Tab:

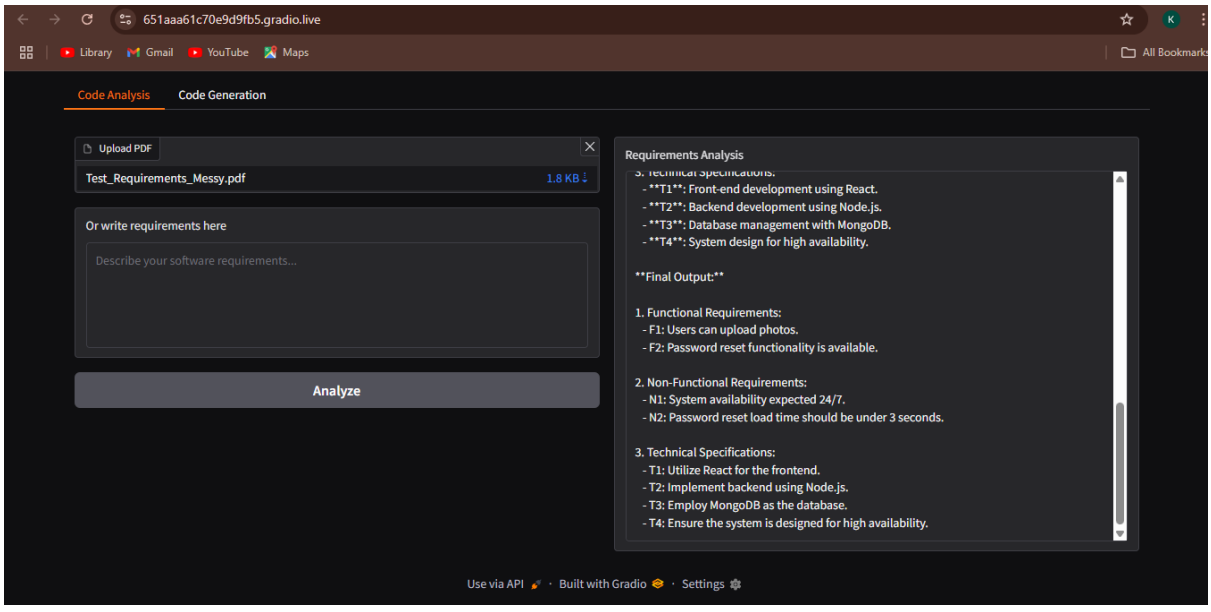
- Enter requirement text.
- Choose programming language.
- Displays generated code snippet.

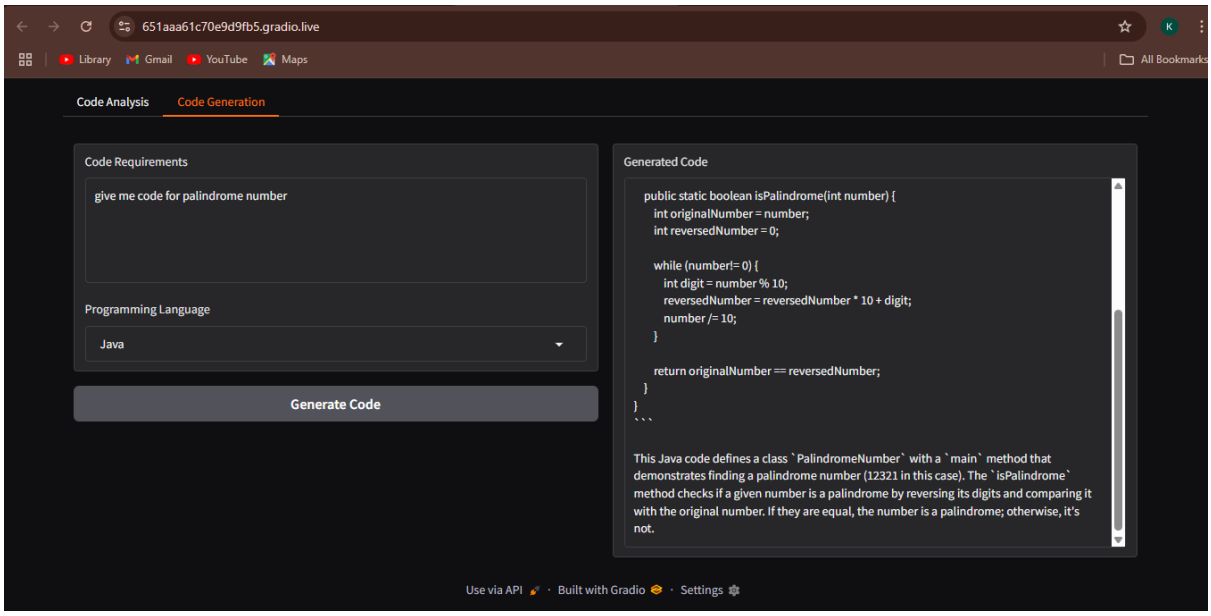
8. Testing

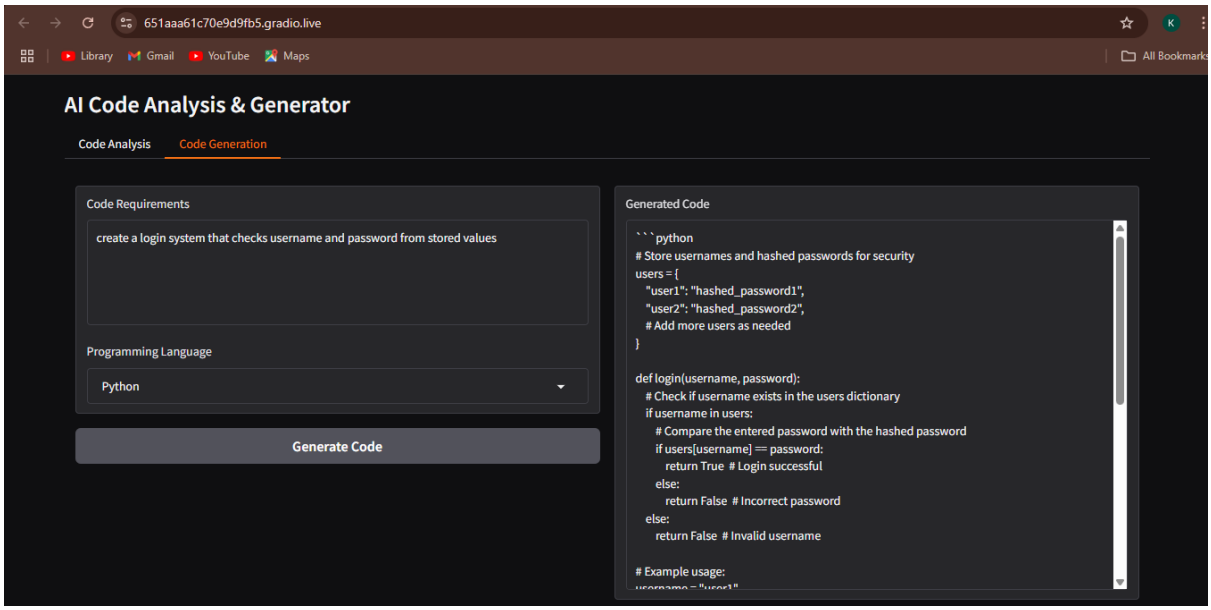
- **Unit Testing:**
  Verified core functions such as PDF extraction, requirement classification, and code generation.
- **Functional Testing:**
  Tested end-to-end flows using sample PDFs and requirement prompts.
- **Manual Testing:**
  Validated Gradio interface usability and accuracy of generated outputs.

9.Screenshots






651aaa61c70e9d9fb5.gradio.live
Library
Gmail
YouTube
Maps
All Bookmarks
Code Analysis
Code Generation
Code Requirements
give me code for palindrome number
Programming Language
Java
Generate Code
Generated Code
public static boolean isPalindrome(int number) {
int originalNumber = number;
int reversedNumber = 0;
while (number!= 0) {
int digit = number % 10;
reversedNumber = reversedNumber * 10 + digit;
number /= 10;
}
return originalNumber == reversedNumber;
}
}
```
This Java code defines a class `PalindromeNumber` with a `main` method that demonstrates finding a palindrome number (12321 in this case). The `isPalindrome` method checks if a given number is a palindrome by reversing its digits and comparing it with the original number. If they are equal, the number is a palindrome; otherwise, it's not.
Use via API
Built with Gradio
Settings


651aaa61c70e9d9fb5.gradio.live
Library
Gmail
YouTube
Maps
All Bookmarks
AI Code Analysis & Generator
Code Analysis
Code Generation
Code Requirements
create a login system that checks username and password from stored values
Programming Language
Python
Generate Code
Generated Code
```python
# Store usernames and hashed passwords for security
users = {
"user1": "hashed_password1",
"user2": "hashed_password2",
# Add more users as needed
}
def login(username, password):
# Check if username exists in the users dictionary
if username in users:
# Compare the entered password with the hashed password
if users[username] == password:
return True # Login successful
else:
return False # Incorrect password
else:
return False # Invalid username
# Example usage:

## 10. Known Issues

- Generated code may require manual refinement.
- Large PDFs may slow down processing.
- Model accuracy depends on prompt clarity.

## 11. Future Enhancements

- Add export functionality (Word, PDF, JSON).
- Integrate versioning for generated requirements.
- Expand supported programming languages.
- Introduce authentication for secure deployments.