AlgoPath: AI-Powered Personalized Learning Recommender for Coding Students

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AI Hiring Show – Rabbitt AI

Problem Statement

Objective: Build an intelligent AI-powered learning coach for students using LeetCode, HackerRank, etc.

Key Goals:

- Analyze code and detect coding patterns
- Identify individual knowledge gaps
- Generate personalized learning plans
- Recommend relevant DSA resources
- Adapt over time to user learning patterns

Target Audience

- College students, beginners to intermediate programmers
- Preparing for FAANG interviews, DSA mastery, or competitive programming
- Platforms: LeetCode, HackerRank, CodeChef

System Architecture

Core Modules

- **Frontend:** Streamlit UI with code input, language selector
- **Analyzer:** Regex logic-based detection of DSA concepts
- **Recommender:** Builds learning plan based on gaps
- **Progress Tracker:** Stores user concept history
- **AI Mentor (GPT):** Gives strengths/weaknesses, next problems

Code Pattern Analysis

Detects patterns like:

- Looping: `for`, `while`
- Recursion: self-calling functions
- Hashmaps, Arrays, Lists, DP, Greedy, Graphs, etc.

Formula Example (DP):

$$dp[i] = \min(dp[i-1], dp[i-2]) + cost[i]$$

Personalized Learning Roadmap

For code using hashmaps and loops:

- **Mastered:** Hashmaps, Arrays
- **Missing:** DP, Recursion, Graphs
- **Recommendations:**
  - YouTube: Recursion crash course
  - GFG: Graph Traversal (DFS/BFS)
  - LeetCode: DP practice problems

App Interface

AI Mentor Feedback Example

User Code: Two Sum (Python)
GPT Feedback:

- Strengths: Hashmap logic, clean structure
- Improvements: Missing recursion, backtracking
- Next Problems: Three Sum, Group Anagrams

Key Achievements

- Built fully working AI-powered code analyzer
- Supports Python, C++, Java, JS
- Adapts to each student's skill level
- Fully aligned with challenge goals
- Ready for real-world deployment

Thank You!

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