**National University of Computer & Emerging Sciences**

**Karachi Campus**

**Spider Solitaire with AI Hint System**

**Project Proposal**

**Artificial Intelligence**

**Section: 6B**

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**1. Introduction**

The proposed project is an AI-powered **Spider Solitaire game** developed in Python. The game will follow standard **Spider Solitaire rules** while integrating an **AI Hint System**. This AI will analyze the current board state and suggest the best possible moves based on predefined heuristics. The goal is to enhance the player's experience by providing **strategic guidance** without completely automating gameplay.

### **2. Existing System**

Several Spider Solitaire applications exist across various platforms, both online and offline. These implementations allow users to manually move cards according to the game's rules. However, most existing versions lack an **intelligent hint system** that suggests optimal moves based on logical strategies.

### **3. Problem Statement**

Traditional Spider Solitaire games do not offer a **smart hint system** that helps users learn strategic gameplay. The existing hint mechanisms simply highlight **random possible moves** rather than guiding the player towards the best decision. Our system aims to improve **user experience and strategic decision-making** by implementing an **AI-powered hint system** that prioritizes:  
 ✅ Moves that **uncover hidden cards**.  
 ✅ Moves that **extend existing sequences**.  
 ✅ Moves that **free up empty columns** for better card mobility.  
 ✅ Moves that **move completed suits to the foundation**.

### **4. Proposed Solution**

The AI-powered Spider Solitaire game will integrate the following features:

* **Rule-Based AI Hint System**: The AI will analyze the board and suggest the best moves based on **predefined heuristics**.
* **Strategic Move Selection**: Instead of random hints, the system will score moves based on their effectiveness and prioritize the most beneficial ones.
* **Graphical User Interface (GUI)**: The game will be developed using **Pygame**, featuring an intuitive UI where hints will be visually highlighted.

### **5. Salient Features**

✅ **AI Hint System**: Suggests optimal moves instead of random legal moves.  
✅ **Smart Move Evaluation**: Prioritizes moves based on game strategy.  
✅ **Interactive GUI**: Developed using Pygame with real-time hint display.  
✅ **Valid Move Detection**: Ensures that all AI-suggested moves follow the rules of Spider Solitaire.  
✅ **Dynamic Game State Analysis**: AI continuously evaluates the board for better decision-making.

### **6. Tools & Technologies**

* **Programming Language**: Python
* **Frameworks/Libraries**: Pygame, NumPy
* **Algorithm Used**: Rule-Based AI, Heuristic Move Scoring
* **Operating System**: Windows/Linux