

# DSA Adventure Quest

## Project Overview

DSA Adventure Quest is an interactive desktop game designed to teach fundamental concepts of Data Structures and Algorithms (DSA) in a fun and engaging manner. Built using Python's tkinter library, the game provides players with a series of levels, each focusing on a different DSA concept, with increasing levels of difficulty.

## Features

### Level 1: Array Puzzle

**Objective:** Rearrange the given set of numbers to form the largest possible number.

**Mechanics:**

Players are presented with five random numbers.

Input the rearranged numbers in descending order to solve the puzzle.

Correct answers allow players to proceed to the next level, while incorrect attempts show the correct solution.

### Level 2: Sorting Visualization

**Objective:** Predict the output of a Bubble Sort algorithm applied to a randomly generated array.

**Mechanics:**

Players are shown an unsorted array and asked to provide the sorted version.

Correct answers advance players to the next level, while incorrect answers display the correct sorted array.

## Level 3: Graph Connectivity Puzzle

Objective: Determine whether a given graph is fully connected.

Mechanics:

The graph is displayed as an adjacency list.

Players answer with "yes" or "no" based on whether all nodes are connected.

Feedback is provided based on the player's input.

## End Game

Players' scores are displayed upon completing all levels, with options to replay or exit the game.

## Technical Implementation

### User Interface

The game features a sleek, modern UI with the following design highlights:

Dark theme: Background (#1e1e2e) with vibrant contrasting colors for text and buttons.

Interactive buttons: Hover effects for better feedback.

Clear navigation: Buttons and labels guide players seamlessly through levels.

### Code Structure

#### Class-based Design

DSAAventureQuest: The main class encapsulating all game logic and GUI components.

#### Modular Levels

Separate methods for each level to ensure modularity and maintainability.

#### Score Tracking

A cumulative score is maintained to reward player progress.

## Tools and Libraries

Python: Core programming language.

tkinter: Used for creating the graphical user interface (GUI).

random: Generates random numbers and arrays for gameplay.

## How to Run

### Prerequisites:

Install Python (version 3.6 or higher).

### Steps:

Save the script as `dsa_adventure_quest.py`.

Run the script using the command:

```
python dsa_adventure_quest.py
```

### Gameplay:

Follow the on-screen instructions to play through each level.

## Future Enhancements

Add more levels focusing on advanced DSA concepts (e.g., Trees, Graph Traversals).

Include hints and explanations for incorrect answers to enhance learning.

Add a leaderboard system to encourage competition.

## Conclusion

DSA Adventure Quest is an educational and entertaining way to reinforce fundamental DSA

concepts. With its intuitive design and interactive challenges, the game bridges the gap between learning and application, making DSA accessible to learners of all levels.