AI for Research – Traveling Salesman Problem (TSP)

This repository contains an **AI for Research** project focused on solving the **Traveling Salesman Problem (TSP)** using computational and algorithmic approaches. The work is implemented primarily in a Jupyter Notebook for experimentation, visualization, and analysis.

📌Project Overview

The **Traveling Salesman Problem (TSP)** is a classic optimization problem where the goal is to find the shortest possible route that visits each city exactly once and returns to the starting city.

In this project, we: - Formulate the TSP as an optimization problem - Apply AI/algorithmic techniques to find efficient solutions - Analyze and visualize results for research and learning purposes

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📂Project Structure

```
.
├── Ai_for_research_Project_.ipynb   # Main Jupyter Notebook
├── README.md                        # Project documentation
```

⚙️Requirements

To run this project, you will need:

- Python 3.8+
- Jupyter Notebook / JupyterLab
- Common Python libraries (may include):
- numpy
- matplotlib
- pandas
- math / random (standard library)

You can install required libraries using:

```
pip install numpy pandas matplotlib
```

📩How to Run

1. Clone or download this repository
2. Navigate to the project directory
3. Launch Jupyter Notebook:

```
jupyter notebook
```

1. Open **Ai_for_research_Project_.ipynb**
2. Run the cells sequentially to see the implementation and results

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📊Features

- Clear explanation of the TSP problem
- Algorithmic implementation for solving TSP
- Step-by-step execution in notebook format
- Visualization of routes and distances
- Suitable for academic and research purposes

🎓Academic Context

This project was developed as part of a **university AI for Research assignment**, focusing on: - Problem formulation - Experimental evaluation - Documentation of methods and results

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📜License

This project is intended for **educational and research use**. You may modify and reuse it with proper attribution.

Author

Developed by a university student as part of an AI research project.

If you would like, I can: - Customize this README for a specific algorithm (GA, A*, heuristics, etc.) - Add dataset details - Add result screenshots or figures - Rewrite it to meet IEEE / academic standards