AI-Math-Solver

TITLE	:	Math-Solver-Agent Step By Step Explanation
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Abstract

In the modern educational environment, solving mathematical problems accurately and understanding the underlying steps is a major challenge for students. Most existing digital tools and calculators provide only final answers, which limits conceptual learning. To overcome this limitation, the **AI-Math-Solver** project proposes an intelligent system that not only solves mathematical problems but also generates **step-by-step explanations** using Artificial Intelligence techniques.

Introduction

- Mathematics is a fundamental subject in science, engineering, and technology.
- Many students face difficulty in solving mathematical problems and understanding solution steps.
- Existing tools and calculators mostly provide only final answers without explanations.
- With the advancement of Artificial Intelligence, intelligent systems can assist in problem solving and learning.
- AI-Math-Solver is designed to automatically solve mathematical problems and generate step-by-step explanations using AI techniques.

Requirements

🖥️ Software Requirements

- **Operating System:** Windows
- **Programming Language:** Python
- **Framework:** Flask (Web Application)
- **Deep Learning Library:** TensorFlow / Keras
- **Symbolic Computation:** SymPy
- **Frontend Technologies:** HTML, CSS, JavaScript
- **Development Tools:** VS Code / Google Colab

💻 Hardware Requirements

- **Processor:** Intel i3 or above
- **RAM:** Minimum 4 GB (8 GB recommended)
- **Storage:** 10 GB free disk space
- **Input Devices:** Keyboard, Mouse
- **Output Device:** Monitor

System Architecture

User Input

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Flask Web Server

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Problem Classifier

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Deterministic Solver / Seq2Seq Model

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Step-by-Step Solution + Answer

Modules

1 User Interface Module

- Provides a web-based interface for users
- Allows users to enter mathematical problems
- Displays solutions and explanations clearly

2 Problem Classification Module

- Analyzes the input problem
- Classifies it into categories such as:
  - Linear equations
  - Quadratic equations
  - Calculus (Derivative & Integral)
  - Trigonometry
- Helps in selecting the appropriate solving method

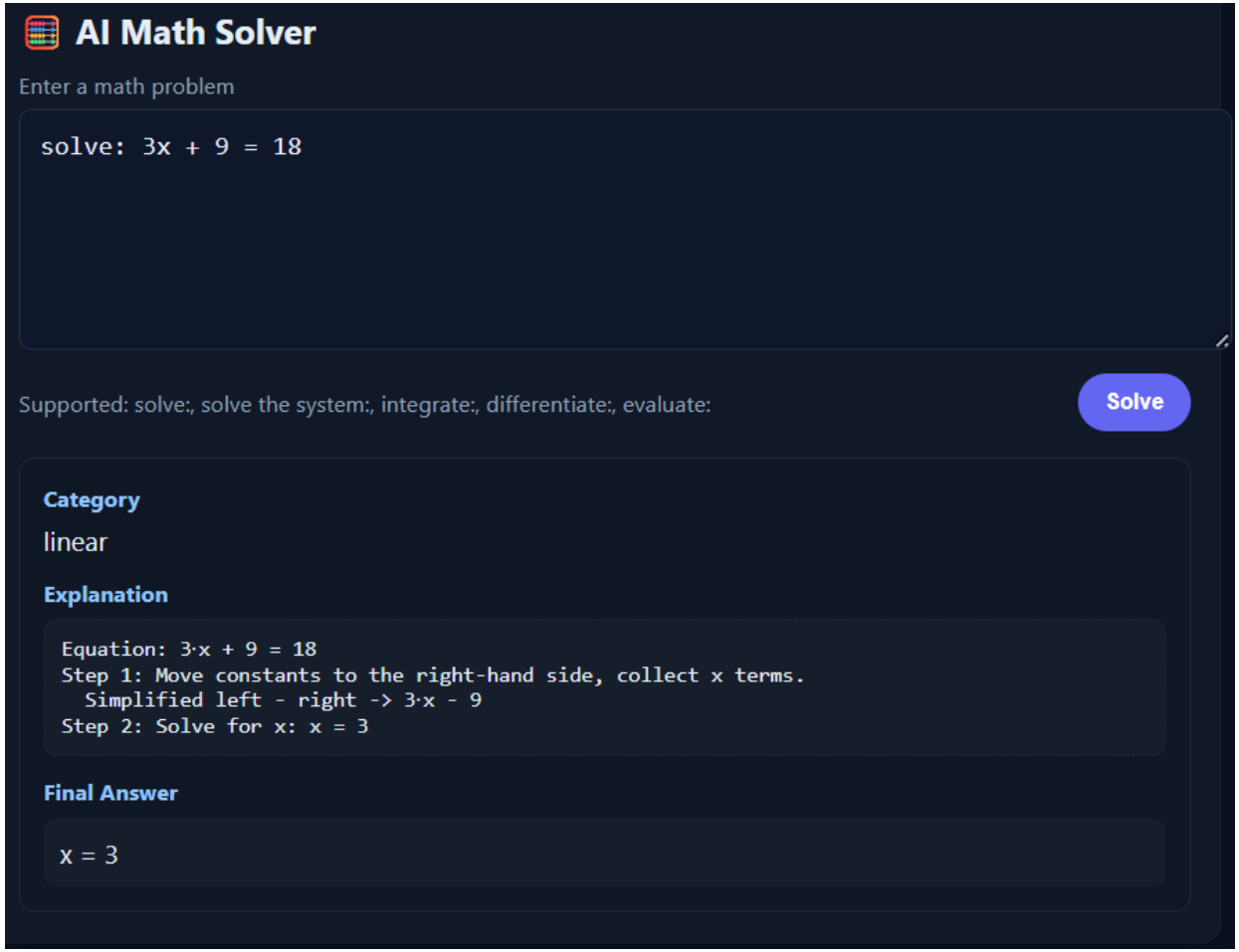
4 Seq2Seq Deep Learning Module

- Uses LSTM-based Seq2Seq model
- Generates step-by-step explanations
- Acts as a fallback when rule-based logic is insufficient

5 Output Generation Module

- Combines explanation and final answer
- Formats results in a readable form
- Sends the output back to the user interface

Input & Output



Conclusion

- AI-Math-Solver successfully automates the solving of mathematical problems.
- The system provides step-by-step explanations along with accurate final answers.
- Integration of Deep Learning (Seq2Seq LSTM) and Symbolic Computation (SymPy) improves reliability and clarity.
- The web-based interface makes the system easy to use and accessible.
- The project demonstrates the effective application of Artificial Intelligence in education.

Future Scope

- Word problem solving
- Voice & handwriting input
- Mobile application
- Advanced AI models