

# A1\_Maze\_CPP Documentation

## Project Description

A1\_Maze\_CPP is a comprehensive application for working with mazes and caves, featuring pathfinding algorithms and machine learning capabilities for agent training.

## Program Features

The application consists of three main modules accessible through the toolbar:

### Maze Module

- Load or save maze files
- Generate mazes with customizable parameters
- Set start and end points to find paths through the maze
- Visualize the found path with notification if no path is available

### Cave Module

- Load or save cave configurations
- Generate cave structures with specified parameters for cellular automata applications
- Control and visualize cellular automata evolution

### Learning Module

- Load maze configurations for training purposes
- Train an agent to navigate from any starting point to a fixed finish point using customizable training parameters
- Multiple training sessions recommended for optimal Q-table population
- Test trained agents by setting start points and visualizing derived routes
- Save Q-tables for future use
- Reset training data when needed

## Installation and Usage

- Navigate to the project working directory: `cd src`
- Install the program: `make install`
- Launch the application: `make open`
- Uninstall the program: `make uninstall`
- Complete cleanup (program and dependencies): `make clean`

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