Educator's Companion: Applied Probability and Automation Framework for High-RTP Game

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Introduction

This Educator's Companion is designed to provide a comprehensive overview of the "Applied Probability and Automation Framework for High-RTP Games" project, tailored for educational purposes. It highlights the interdisciplinary nature of the project, showcasing its relevance to computer science, mathematics, statistics, and even behavioral economics. This document can serve as a valuable resource for instructors seeking to demonstrate advanced concepts in a practical, engaging context.

Project Overview

Our framework is a sophisticated system that combines advanced algorithms, machine learning techniques, and statistical models to analyze and optimize strategies for high-Return-to-Player (RTP) games, such as Mines. It transcends a simple "bot" by integrating academic rigor and engineering principles, making it an ideal case study for various educational disciplines.

Key Educational Modules and Concepts

1. Probability and Statistics in Action

Concept: The project provides a tangible application of probability theory, expected value (EV), and statistical analysis. Students can explore how theoretical probabilities translate into practical outcomes in a simulated environment.

Relevance:

- **Mathematics:** Combinatorics, conditional probability, Bayesian inference.
- **Statistics:** Hypothesis testing (A/B testing), Monte Carlo simulations, statistical significance, risk metrics (Sharpe Ratio, Max Drawdown).

Example: The framework calculates the probability of hitting a mine based on board state, and the A/B Testing Framework demonstrates how to statistically compare the performance of different strategies.

2. Algorithmic Game Theory and Decision Making

Concept: The project implements various strategies, including the