Analysis of the Game Who am I using Reinforcement Learning and Stochastics

Boris Steiner

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Dr. David Schedl / Dr. Phillipp Wintersberger

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Abstract

The essence of the game "Who Am I" lies in the challenge of correctly guessing the identity each player represents. This thesis delves into determining the number of questions necessary to pinpoint the person being portrayed. Such an inquiry serves as an ideal candidate for employing reinforcement learning (RL) techniques, given their iterative and experimental nature. It is expected that the outcomes achieved through RL will parallel those of a stochastic solution, as RL essentially simulates stochastic calculations. However, given the relatively straightforward nature of this task, utilizing RL may seem excessive. Therefore, this thesis embarks on a comprehensive comparison between stochastic and RL methodologies, aiming to discern the most suitable approach for this specific use case.

Exposé

1 Introduction

The game 'Who Am I' has various names and exists in numerous forms and variations. Each player can represent virtually anything, which increases the difficulty, and the number of players can also vary. A typical version of the game for children is a 4×6 board that includes only persons. This version is further referred to for a more specific analysis, but a similar ratio is expected for a scaled-up version.

2 Theoretical Background and State of the Art

Theoretical Background and State of the Art: The field of reinforcement learning (RL) has witnessed significant advancements in recent years, particularly in its application to complex decision-making processes. RL algorithms, inspired by behavioral psychology, have demonstrated remarkable capabilities in learning optimal strategies through trial and error interactions with environments. Concurrently, stochastic modeling techniques have long been employed to analyze uncertainty and randomness in various systems. This includes stochastic processes, which offer powerful frameworks for modeling dynamic systems influenced by probabilistic factors. In the context of the discussed topic, the integration of RL with stochastic approaches presents a promising avenue for addressing challenges such as uncertainty, scalability, and adaptability. Recent research has explored the synergy between RL and stochastic methods in diverse domains, ranging from robotics and game theory to finance and healthcare. By leveraging the strengths of both paradigms, researchers aim to develop more robust and efficient solutions for decision-making tasks in complex and uncertain environments.

3 Research Question

These approaches lead to the following research question for this bachelor thesis:

> What is the optimal number of questions required to accurately identify a specific individual out of a set of 24 persons using a combination of reinforcement learning and stochastic modeling techniques?

4 Methodology

Discussed in the upcoming exercises...

5 Expected Results

The study anticipates two key outcomes: firstly, a detailed analysis of the number of questions required to identify a person from a group of 24 using an RL algorithm. Secondly, a comparative examination of the same scenario employing stochastic modelling techniques. It is expected that the result of both the RL algorithm and the stochastic solution are almost the same.

References