

A white and black kitten is being held gently by a large, metallic robotic hand. The hand is made of various mechanical components, including gears, bolts, and hydraulic cylinders, giving it a complex and industrial appearance. The kitten has a fluffy white coat with dark spots and is looking directly at the camera with large, expressive eyes. The background is dark, making the metallic textures of the robot and the soft fur of the kitten stand out.

HOW TO TRAIN YOUR AGENT

A Memorial University Presentation

Brandon Evans

PROJECT OVERVIEW

Introduction

Theoretical
Development

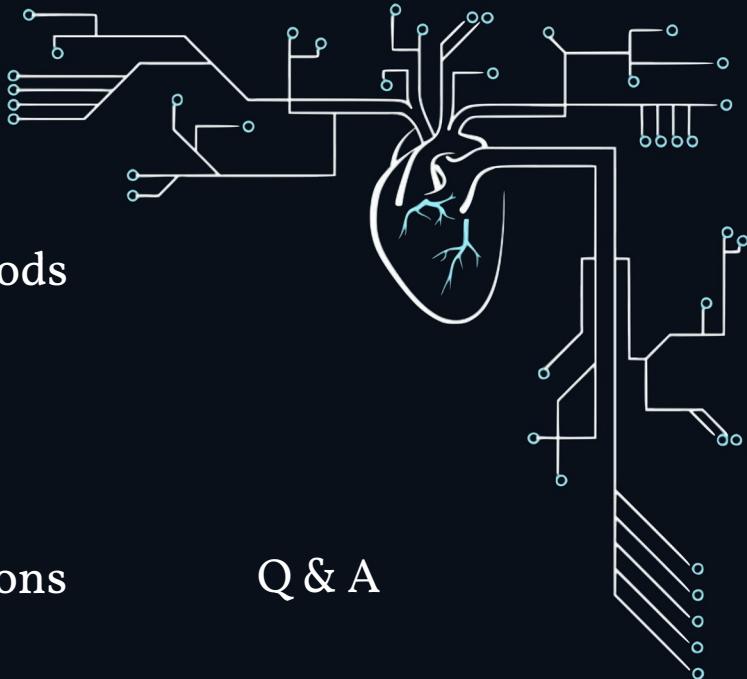
Methods

Theoretical
Analysis

Conclusion

Citations

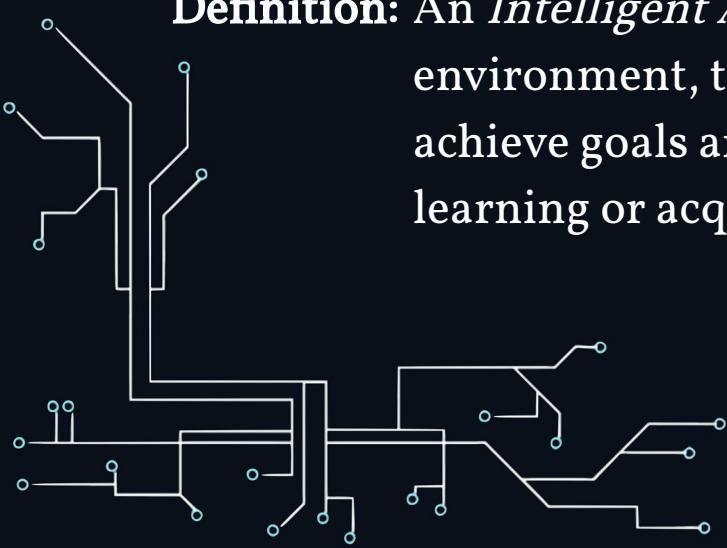
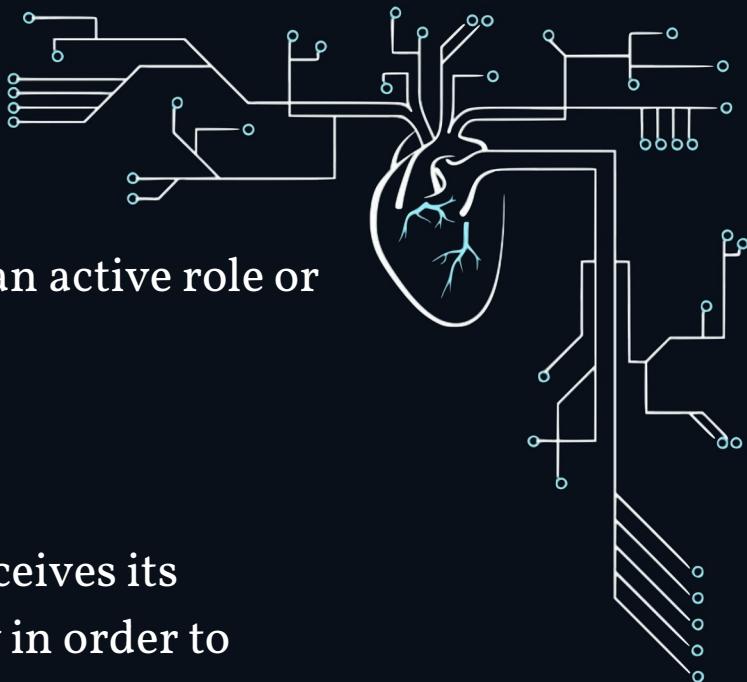
Q & A



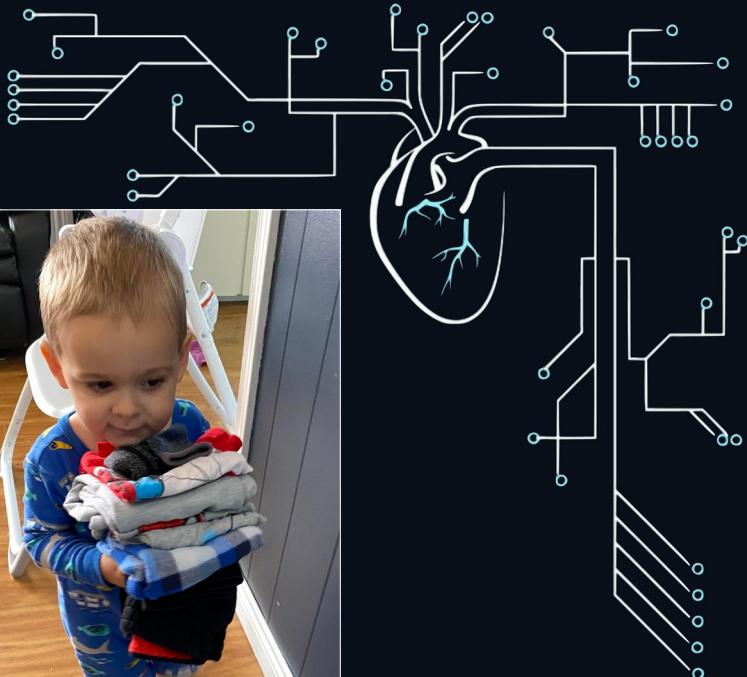
INTRODUCTION

Definition: An *Agent* is a person or thing that takes an active role or produces a specified effect.

Definition: An *Intelligent Agent* is an agent that perceives its environment, takes action autonomously in order to achieve goals and may improve its performance with learning or acquiring knowledge.



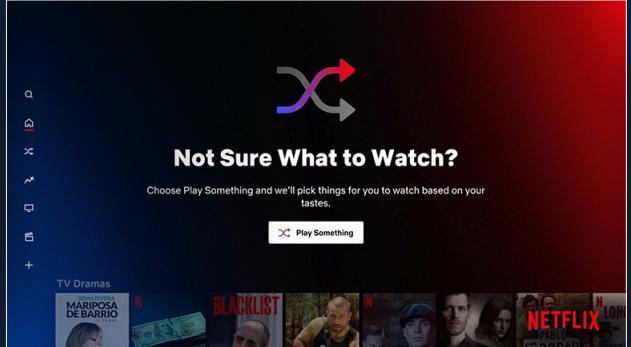
INTRODUCTION



A handsome agent

INTRODUCTION

Intelligent Agents



Algorithms to recommend entertainment by learning from the user's previous activities.



Robots designed to clean your home without being supervised.

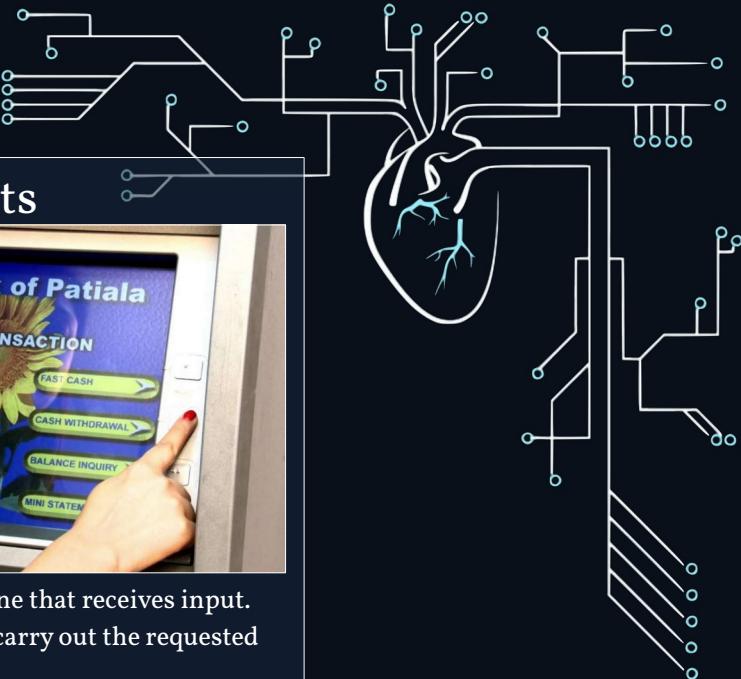
Agents



An automated teller machine that receives input. If the input is valid, it will carry out the requested monetary transaction(s).

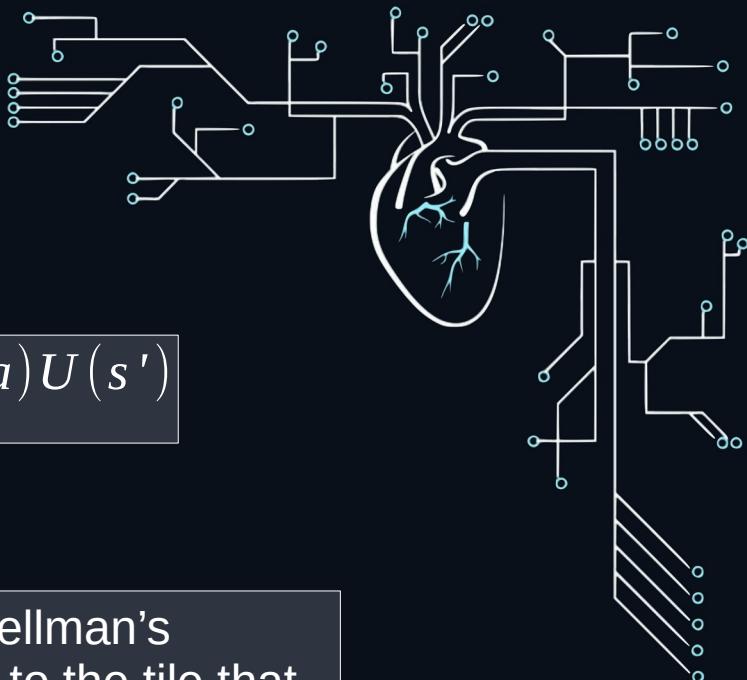


The microwave, users inputs the desire heat settings for their food, which may be found on the food package .

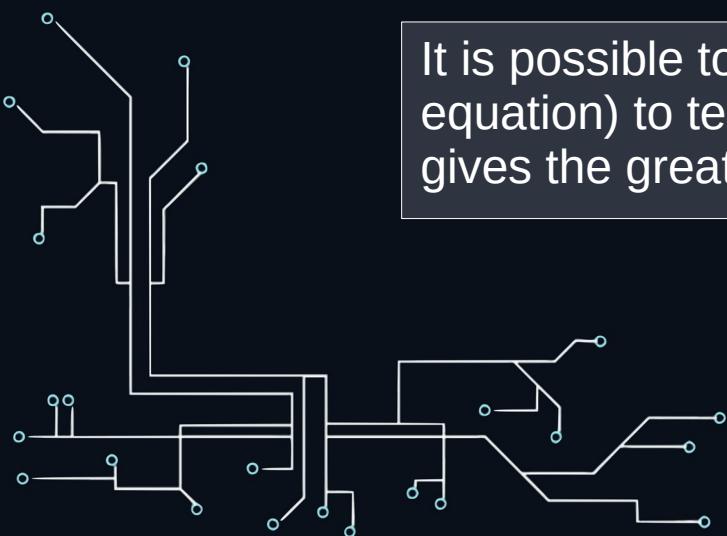


THEORETICAL DEVELOPMENT

$$U(s) = R(s) + \gamma \max_{a \in A(s)} \sum_{s'} P(s'|s, a) U(s')$$

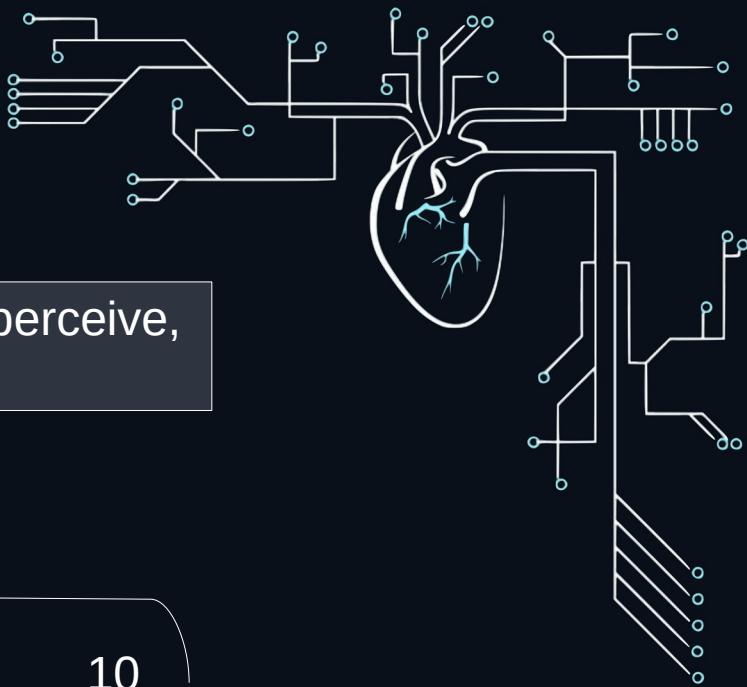
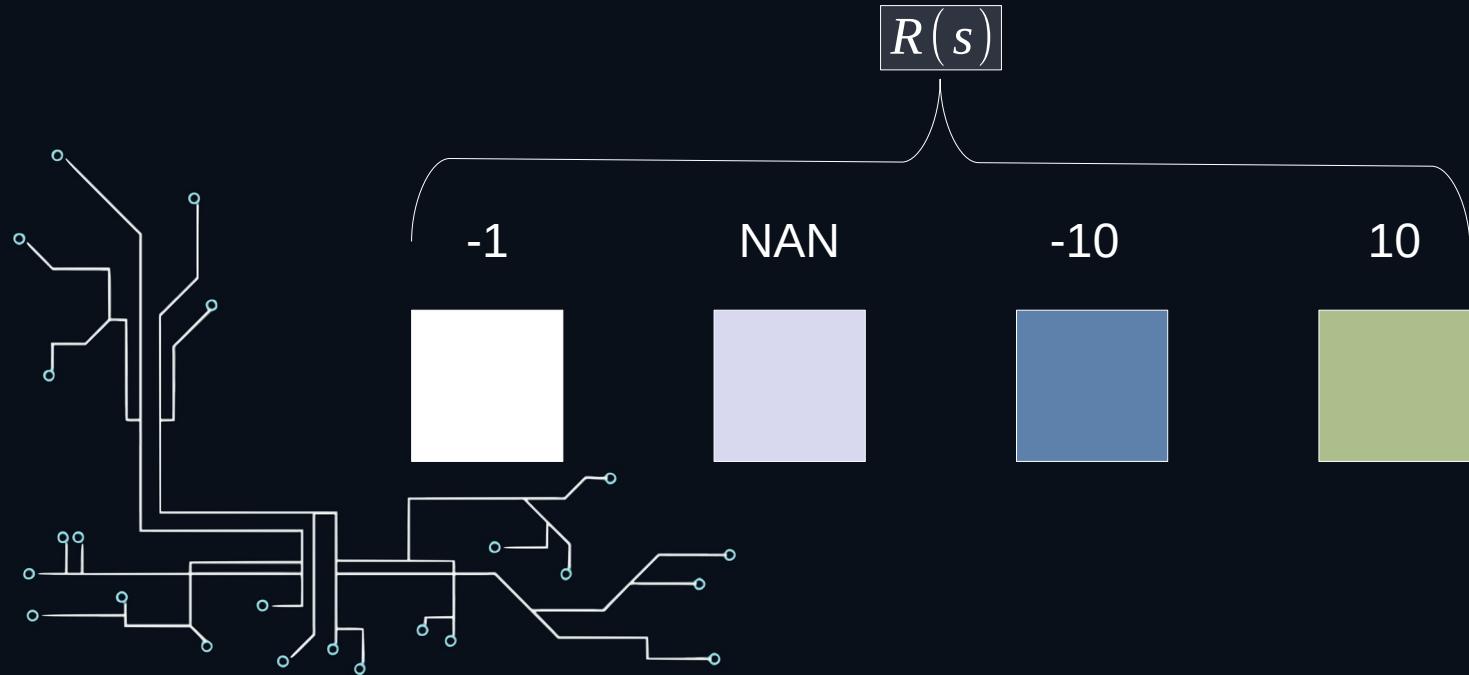


It is possible to program an algorithm (Bellman's equation) to teach an agent to converge to the tile that gives the greatest rewards.



METHODS OF DEVELOPMENT

A virtual environment that our agent can perceive, interpret, and make intelligent decisions.

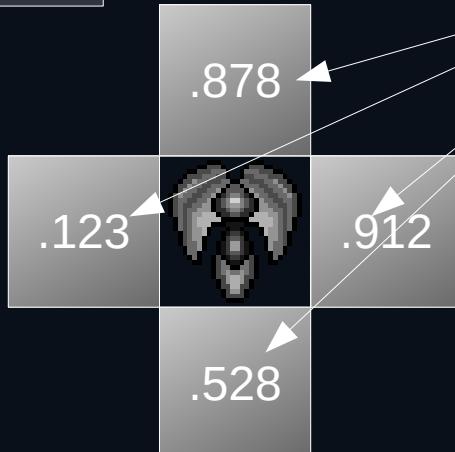


METHODS OF DEVELOPMENT

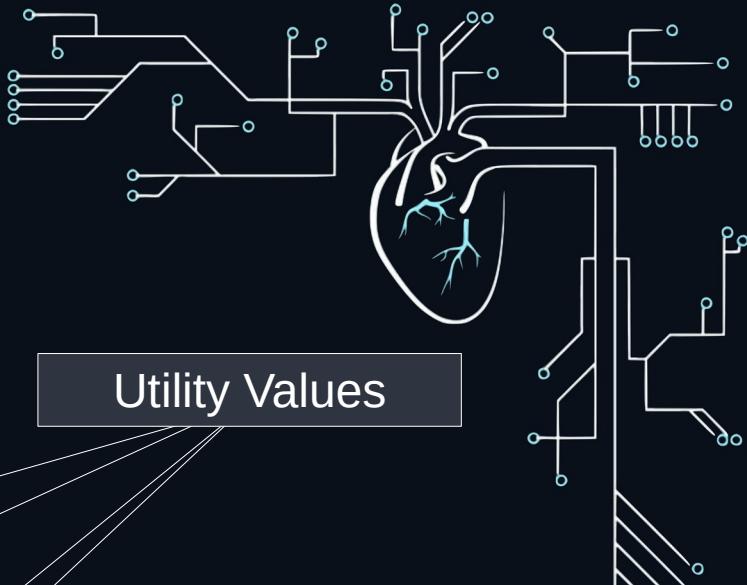
$$\sum_{s'} P(s' | s, a) U(s')$$

In our simulation, the Utility values of all locations will be set to zero initially.

A parameter gamma, assigns the agent a discount value.



We implement a stochastic process. This process is to mimic intelligent behaviour and curiosity of exploration.



Utility Values

The agent chooses its action from the set of possible actions. The action that is chosen by the agent is the action that gives the best probability of transitioning to the location with the highest utility value.

METHODS OF DEVELOPMENT

$$\sum_{s'} P(s'|s,a)U(s')$$

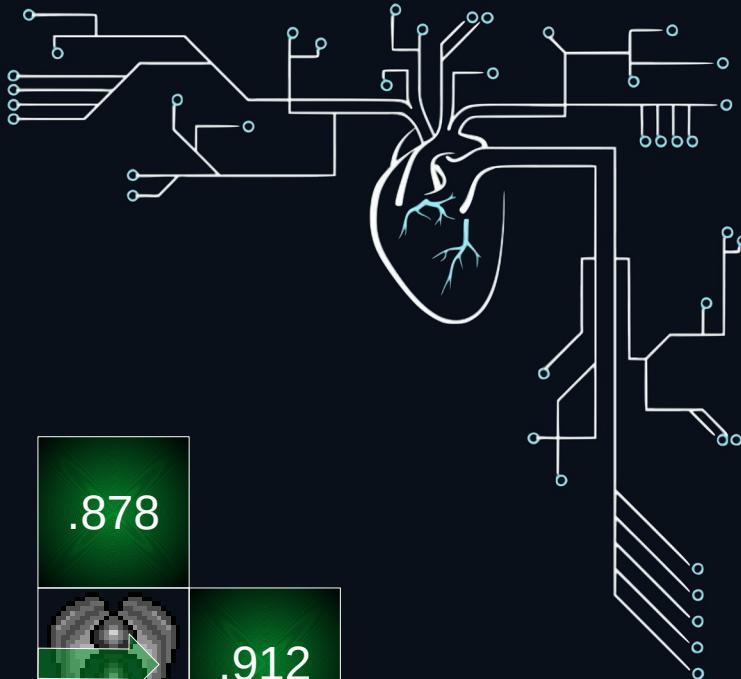
.878



$$.1 \cdot .123 + .8 \cdot .878 + .1 \cdot .912$$



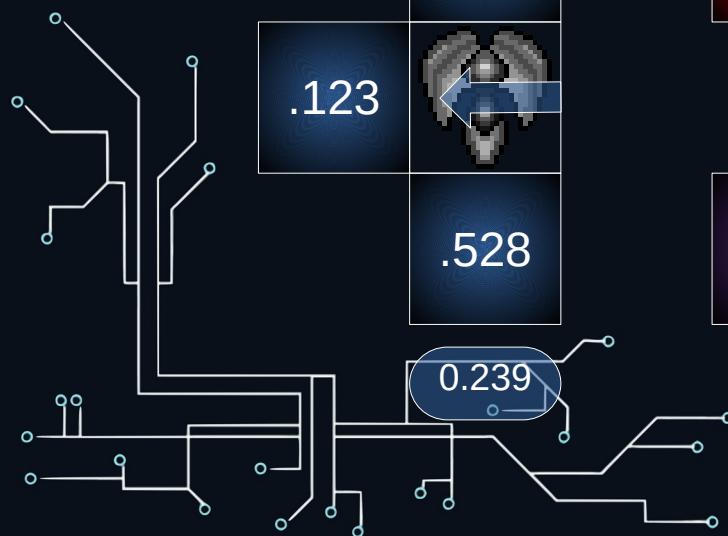
$$.1 \cdot .123 + .8 \cdot .528 + .1 \cdot .912$$



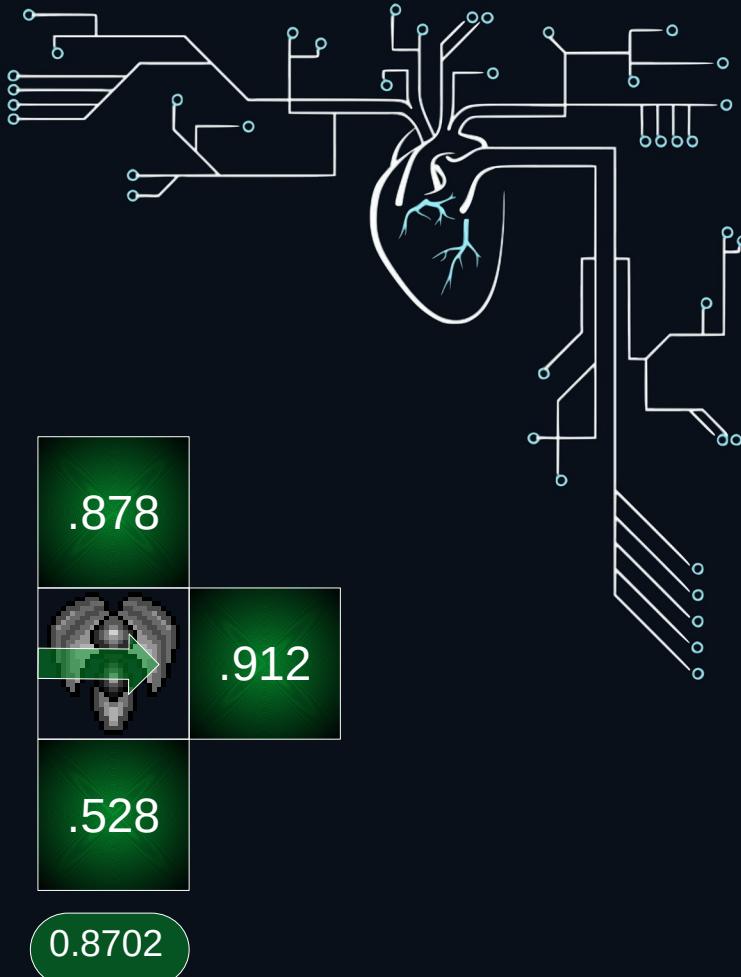
$$.1 \cdot .878 + .8 \cdot .912 + .1 \cdot .528$$

METHODS OF DEVELOPMENT

$$\sum_{s'} P(s'|s,a)U(s')$$

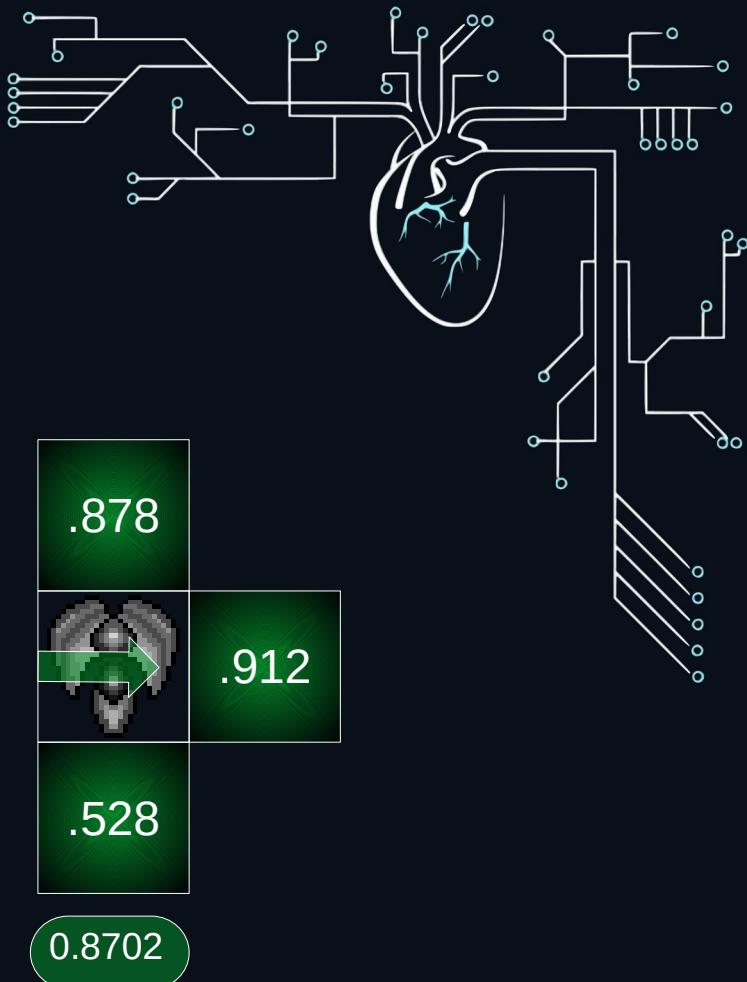


0.5259



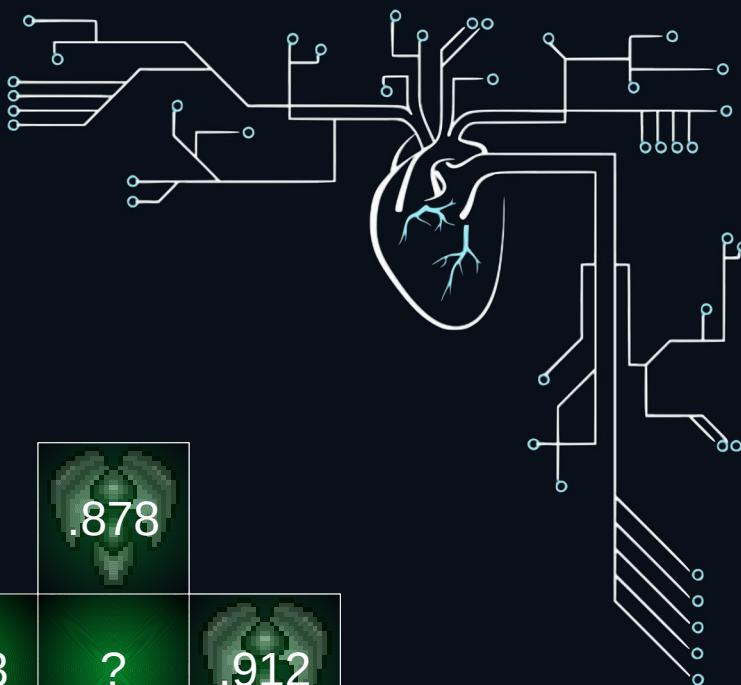
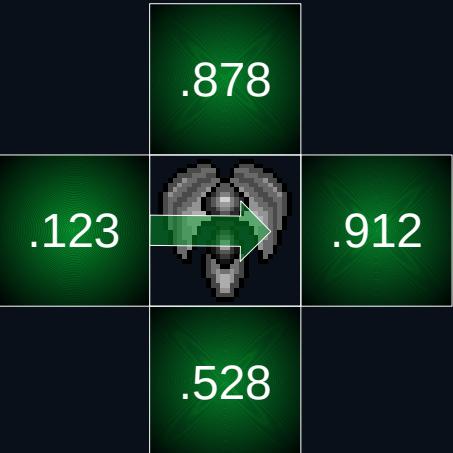
METHODS OF DEVELOPMENT

$$\max_{a \in A(s)} \sum_{s'} P(s'|s, a) U(s') = 0.8702$$

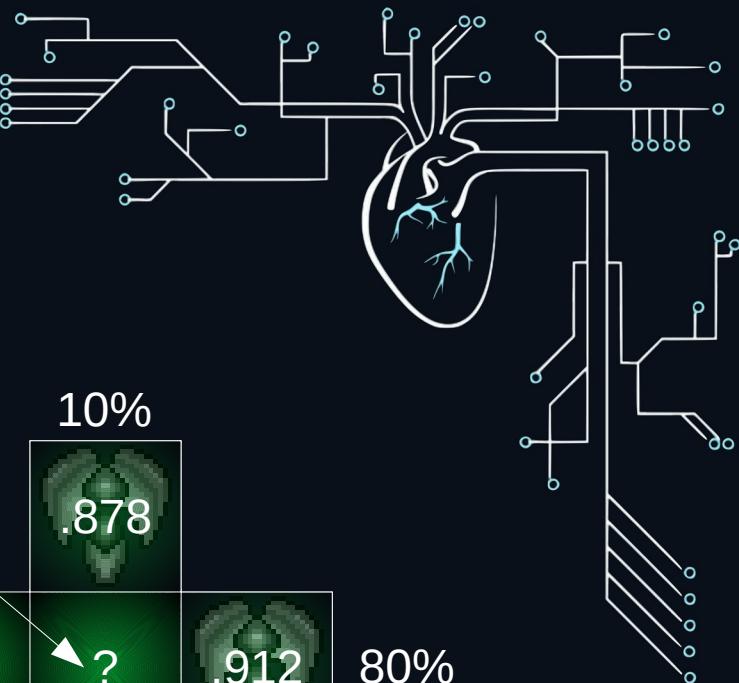


METHODS OF DEVELOPMENT

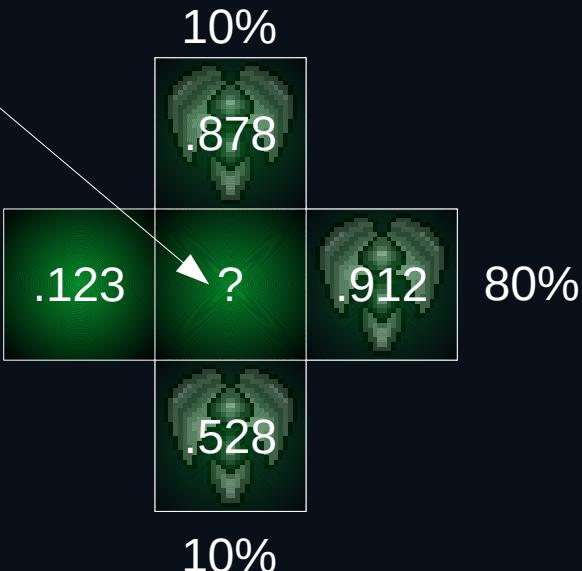
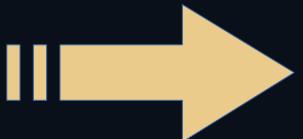
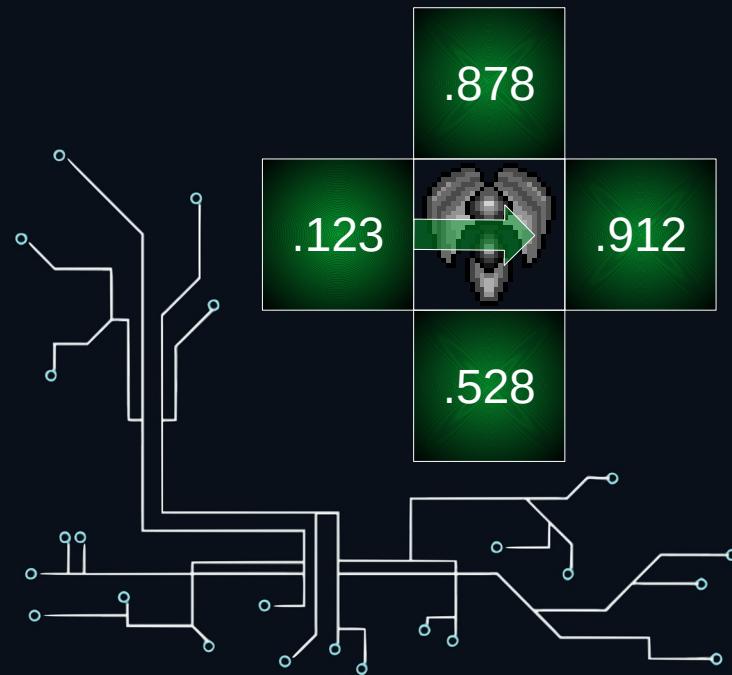
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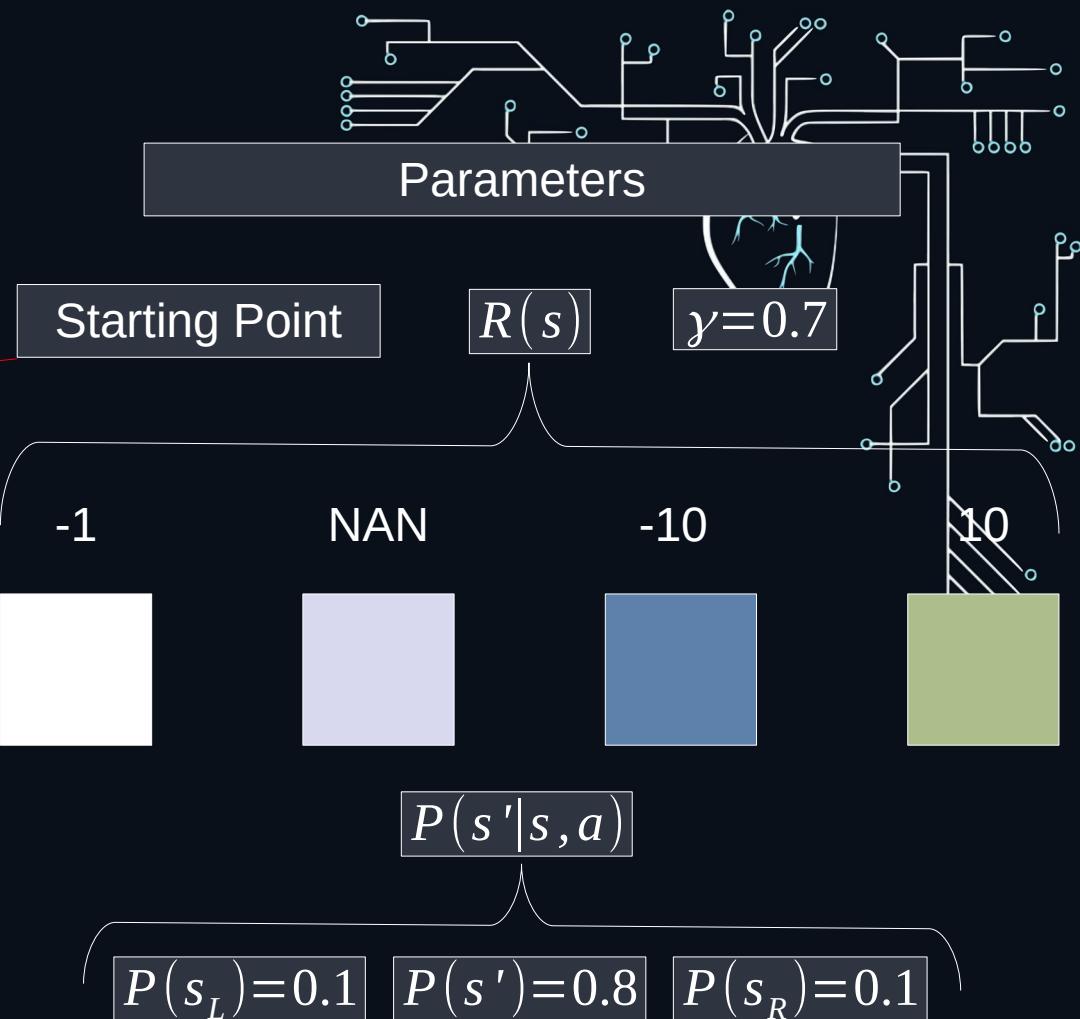
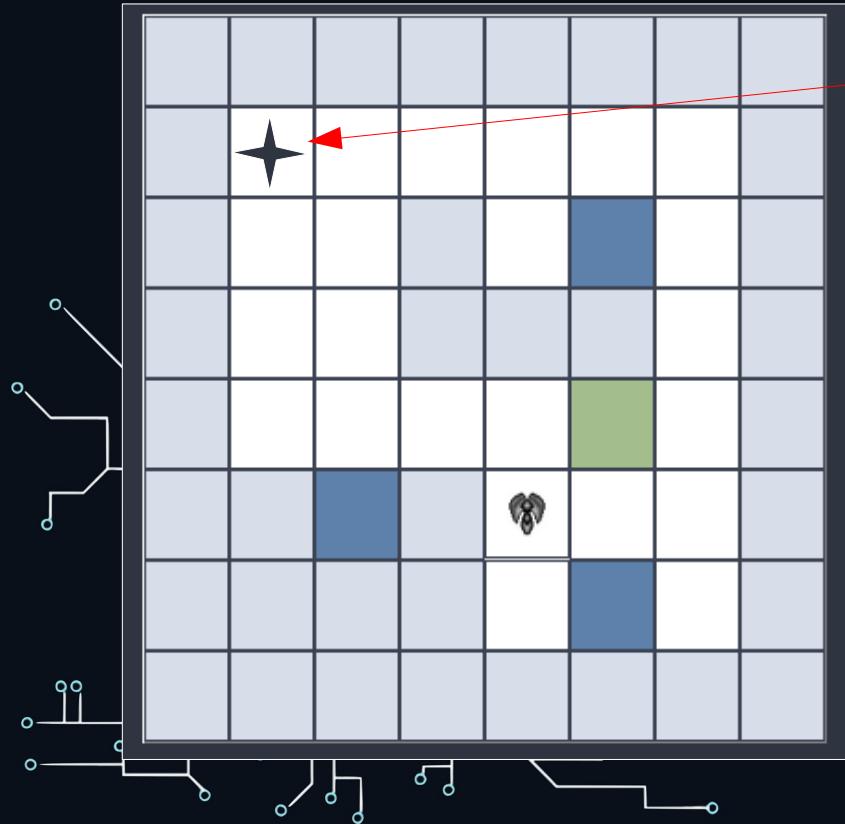
METHODS OF DEVELOPMENT



$$U(s) = R(s) + \gamma(0.8702)$$

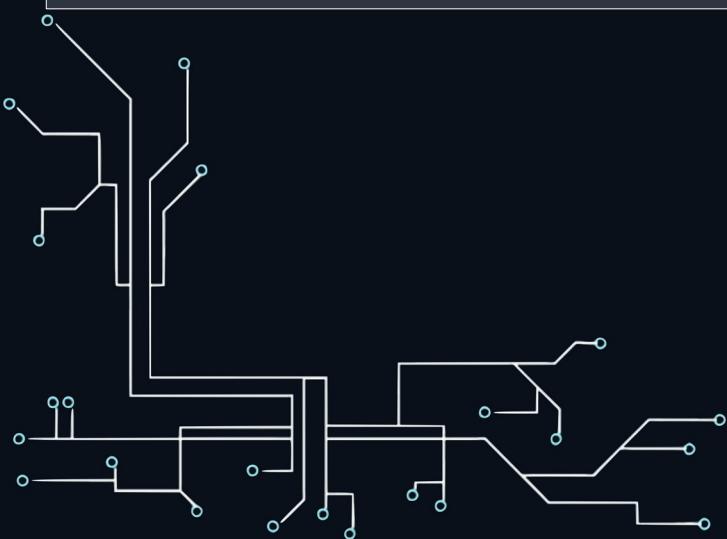
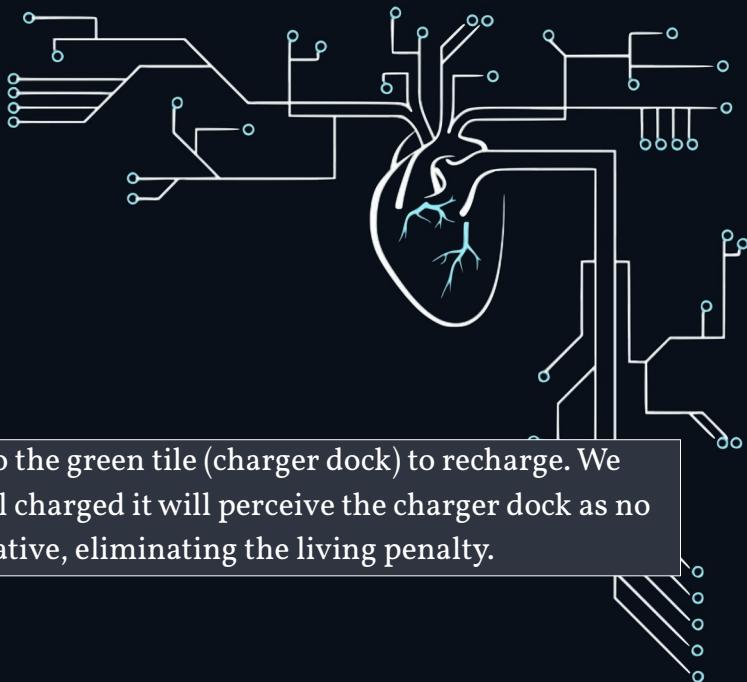


THEORETICAL ANALYSIS



CONCLUSION

We have essentially program a robot AI on low battery that is trying to navigate to the green tile (charger dock) to recharge. We may go further, and have dynamic tile rewards. For example, when the robot is full charged it will perceive the charger dock as no rewards and the white tile rewards will change from negative rewards to non-negative, eliminating the living penalty.



CITATIONS

Croteam: The Talos Principle – images ,

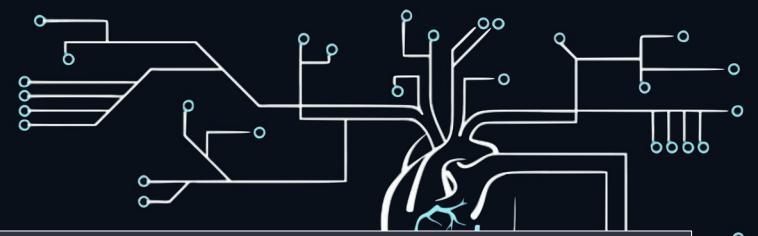
sprite (free license) - agent,

<https://www.amazon.com/Farberware-FMOIIAHTBKB-1000-Watt-Microwave-Stainless/dp/BoIEIZSF6I?th=1> - image

https://www.amazon.ca/dp/BoBBYWK3HY?asc_campaign=web&asc_refurl=https://bgr.com/deals/todays-deals-ii-wireless-charger-peloton-deals-asus-vivobook-15-vitamix-blenders-more/

<https://hindi.oneindia.com/news/business/sbi-big-news-net-banking-yono-app-service-will-not-available-for-3-hours-today-he-re-is-details-672600.html> - image

<https://www.protocol.com/netflix-play-something-button> - image





Q & A

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