



AI IN PACMAN

CSE5058 Artificial Intelligence

Osman Alper MISIRLI



Outline

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Brief History of Pacman

Mechanics of Pacman

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Ghost Personalities

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INTRODUCTION



OSMAN ALPER MISIRLI

MASTER'S DEGREE, Computer Engineering –
Akdeniz University

SUMMARY

I had a passion for playing video games which eventually triggered an interest in me to become a computer engineer to code and design my own games. Now I am doing master's degree to better develop myself in terms of both practical and scholar aspects. Also I am interested in the Recommender Systems area which I am doing my thesis on it.

CONTACT

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<https://www.linkedin.com/in/osmanalpermisirli/>

LANGUAGES

Turkish (Native)
English (Professional Working)

TALENTS

UNITY
C# Programming
Python
Recommender Systems
Design Patterns
Object Oriented Principles
Teamwork
Game Design
Game Programming
Engineering

EXPERIENCE

Witchcraft Video Oyun Animasyon Tasarım

Gameplay Programmer

February 2019 – June 2019

I was responsible for gameplay programming and game mechanics design.

Hatay Büyükşehir Belediyesi

Intern

June 2019 – July 2018

We developed a social platform for the citizens of Hatay.

EDUCATION

Akdeniz University GPA 3.91/4 Current

September 2020 – Current

Master's degree, Computer Engineering (Thesis Phase)

Middle East Technical University GPA 4/4

September 2019 – September 2020

Master's degree, Multimedia Informatics Game Technologies

Poliitechnika Krakowska im. Tadeusza Kościuszki

September 2016 – January 2017

Erasmus+ Student

Anadolu University GPA 3.02/4

September 2015 – May 2019

Bachelor's degree

2 Times High Honor Student

1 Time Honor Student

Project Fair Winner Thesis:

My graduation project was to design a simple game on Unity and implement a reinforcement learning agent that learns how to play the game from scratch. I utilized Unity ML-Agents and TensorFlow to realize the learning process of the agents. Moreover, my graduation project was awarded the Best Project among current graduate by the Chamber of Industry - 01 May 2019 Eskişehir Chamber of Industry Project Fair.



What is
Pacman ?



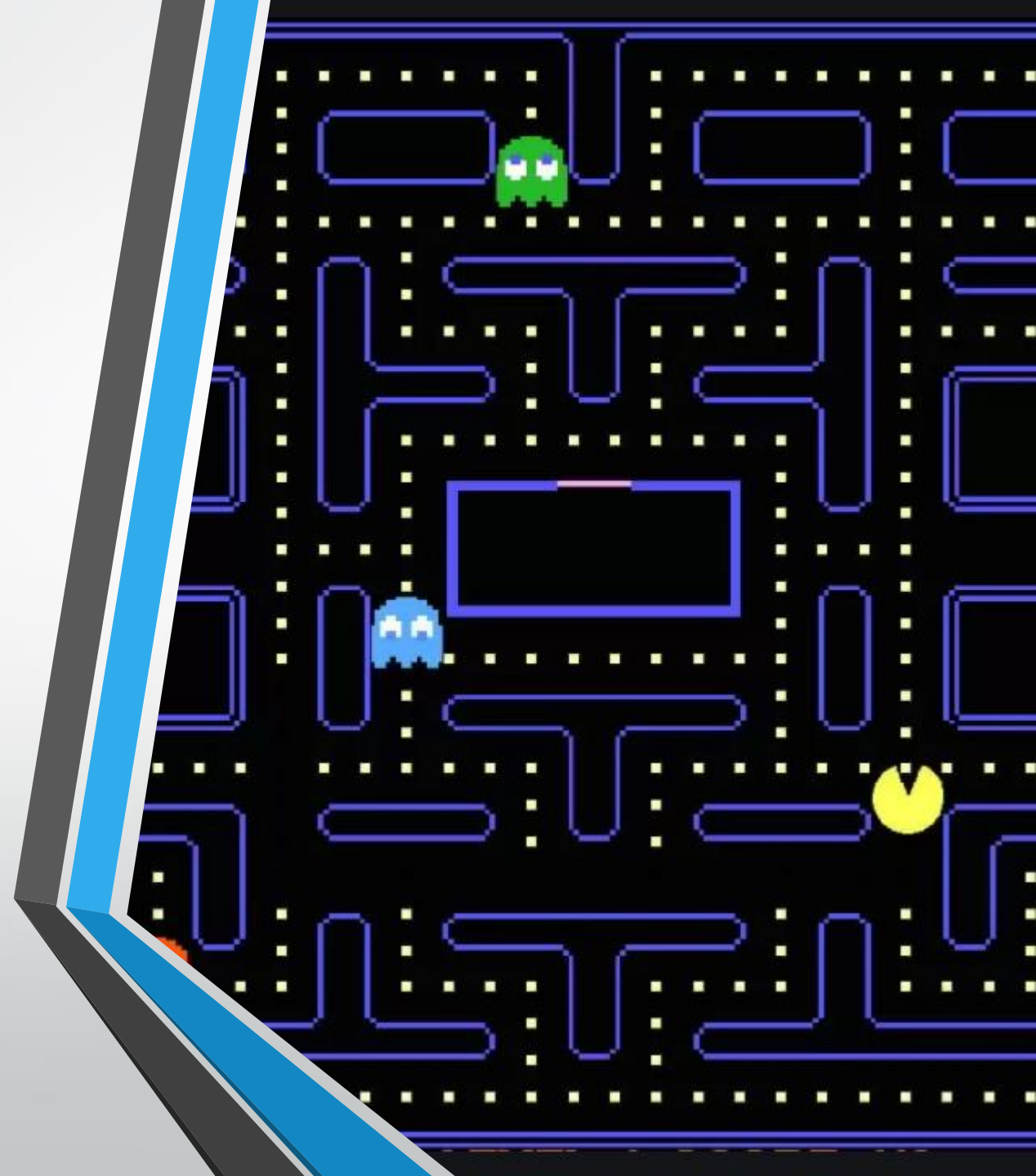
Pac-Man's Brief History

- Pac-Man is a maze action game developed and released by Namco for arcades in 1980.
- Game development began in early 1979, directed by Toru Iwatani with a nine-man team. Iwatani wanted to create a game that could appeal to women as well as men, because most video games of the time had themes of war or sports.
- The Pac-Man video game franchise remains one of the highest-grossing and best-selling game series of all time, generating more than \$14 billion in revenue (as of 2016) and 43 million units in sales combined. The character of Pac-Man is the mascot and flagship icon of Bandai Namco Entertainment and has the highest brand awareness of any video game character in North America.



Pac-Man's Mechanics

- The player controls Pac-Man, who must eat all the dots inside an enclosed maze while avoiding four colored ghosts. Eating large flashing dots called "Power Pellets" causes the ghosts to turn blue, allowing Pac-Man to eat them for bonus points.
- It looks like a simple game, right? However, what they don't tell us is that each ghost has a different personality in the game which we will see in detail.





AI in Video Games

- AI in gaming refers to responsive and adaptive video game experiences. These AI-powered interactive experiences are usually generated via non-player characters, or NPCs, that act intelligently or creatively, as if controlled by a human game-player. AI is the engine that determines an NPC's behavior in the game world.
- AI is also interesting in scholar aspects aswell in terms of gaming.





BLINKY



INKY



PINKY

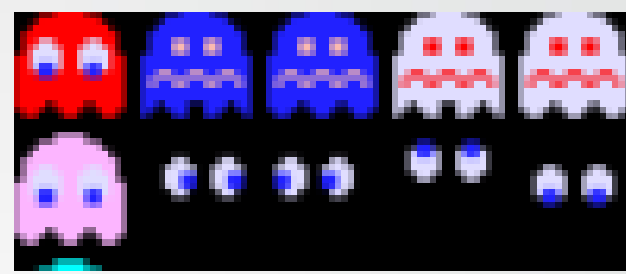


CLYDE

AI in Pac-Man

Meet with Inky, Pinky, Blinky and Clyde.





Ghost States



CHASE : This is the state when ghosts are chasing after PacMan



SCATTER: To give player some time to think and collect pellets ghost scatter around their designated points.



FRIGHTENED: When PacMan eats a power pellet ghosts starts to run away to their base in order to hide from PacMan since PacMan can eat ghosts while they are frightened.





Personalities Of Ghosts



Clyde

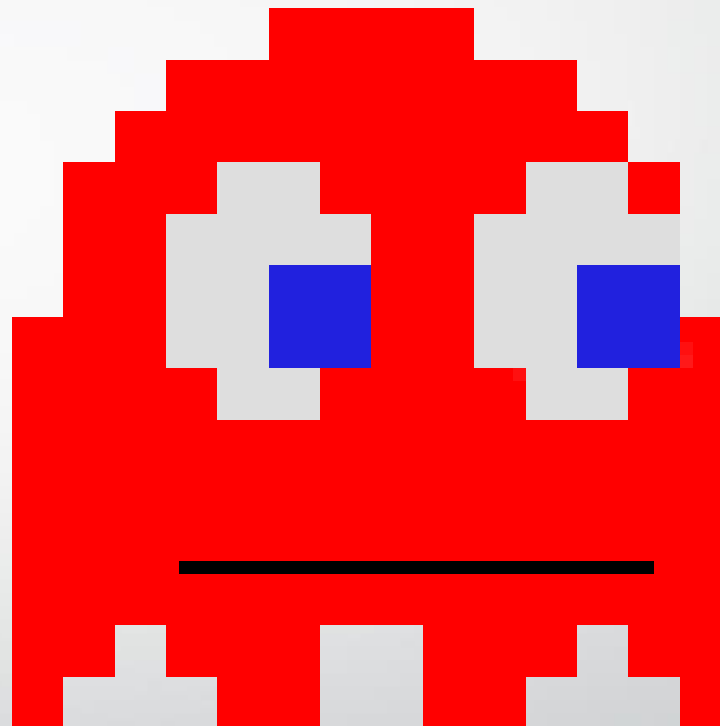
- Clyde is the most naive ghost. When chasing PacMan if clyde gets too close to PacMan it switches to scatter state. So actually clyde is never trying to catch pacman at all.





Blinky

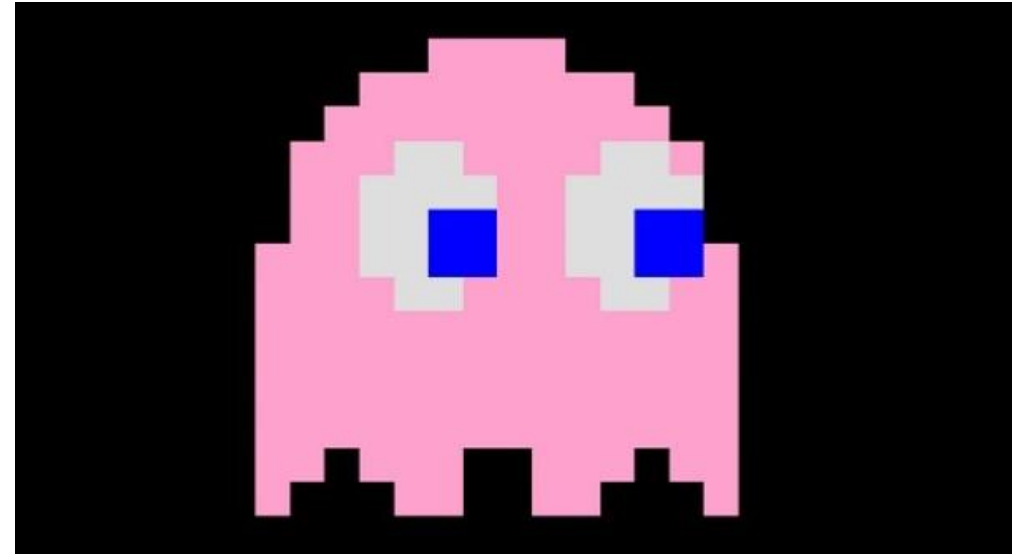
- Blinky is a relentless chaser. Blinky in the increasing levels never switches to scatter mode. IT KEEPS CHASING !





Pinky

- Pinky is even more dangerous than Blinky since in its chase mode, it does not aim for PacMan but to a location to where the PacMan is trying to move to. So, it aims in front of PacMan. If other ghosts are close to PacMan, PacMan can encounter Pinky while trying to escape from other ghosts.





Inky

- Inky is in another level. While considering the Pinky's target location Inky is also following where the Blinky is and trying to corner PacMan.



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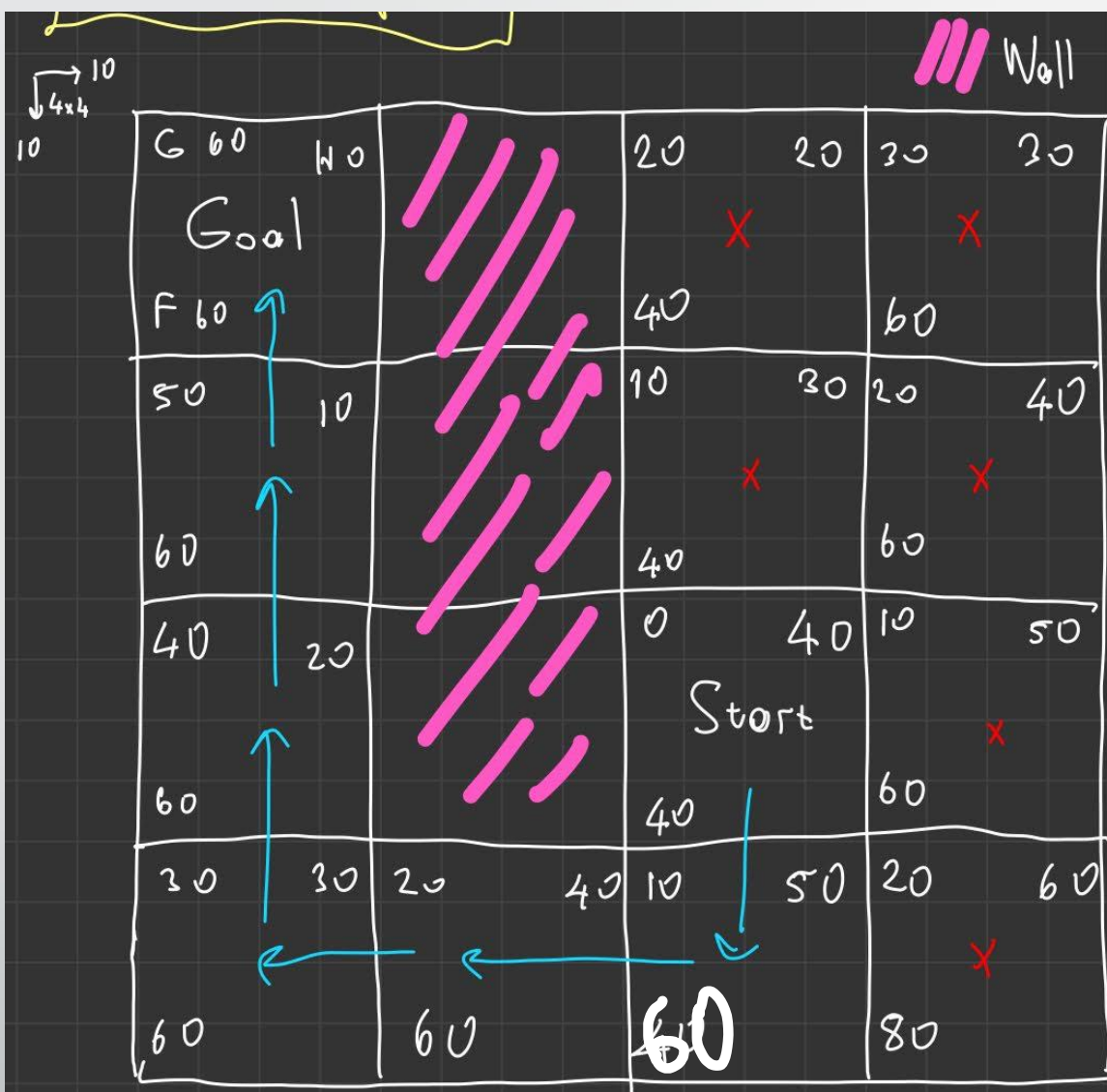
How Ghosts Find the Path

- Ghosts are given a target, such as PacMan, scatter points or home. Later on, they are utilizing the A* algorithm to find the shortest path. A grid-based approach is taken in my case to utilize the A* algorithm which we will see in detail in the demo.





A*



G	H
F	

G cost is the current cost on the path used.
H cost = heuristic cost (estimated cost)
(Manhattan method distance is used which ignores walls)

$$F_{\text{cost}} = G_{\text{cost}} + H_{\text{cost}}$$

[No diagonal move is possible]

H : distance to goal
G : cost of path

A* demo



A close-up photograph of a mechanical assembly. The image shows a dark, metallic surface with four screws arranged in a 2x2 grid. Each screw has a hexagonal head and a threaded shaft. Four thin, light-colored rods or wires extend from the screws towards the left side of the frame. The background is blurred, showing a light-colored, textured surface.

Demo

Thanks for Listening!

- You can contact me via teams or my email
- alpermisirli@gmail.com
- Source code will be available in my GitHub after a cleanup.
- <https://github.com/RedLegend97>