

# AI

DAMIEN, HONGXI  
AND ALEX



# What Is AI?

- Artificial Intelligence: A program or system that mimics human intelligence
- Systems that think like humans
- Systems that act like humans
- Systems that think rationally
- Systems that act rationally



# Application of AI

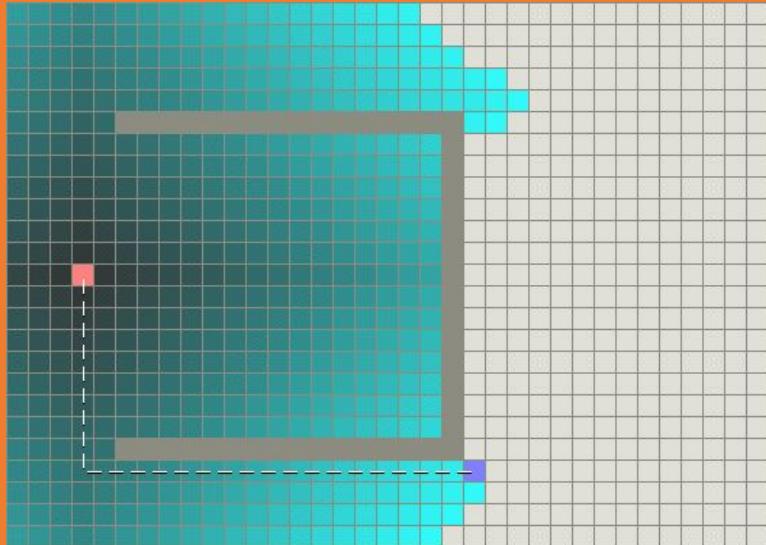
- Recommendation engines (google, youtube, twitch, etc.)
- Computer vision (image recognition)
- Speech recognition
- LLMs
- NPC in Games
- Demos in Games



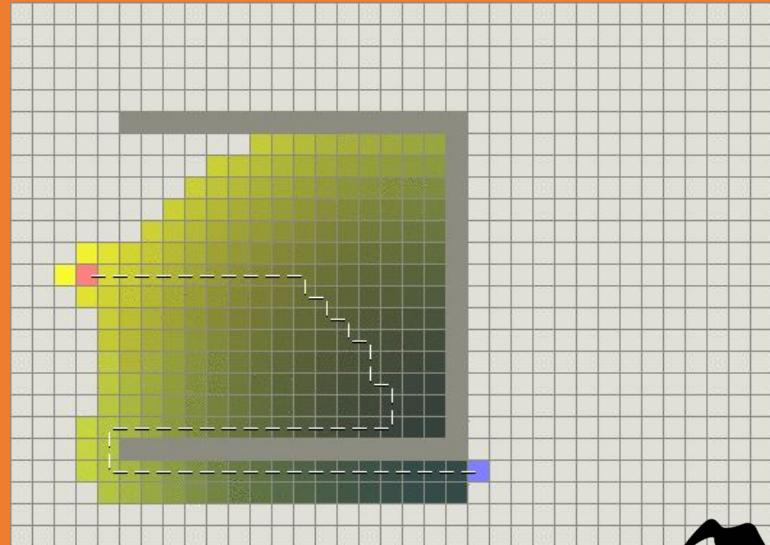
# AI in Games

- Dijkstra's Algorithm (DYKE-straz this is for me not you (-\_-))
- Greedy Best-First-Search
- A\* Pathfinding
- Decision tree
- Procedural-content generation
- Player-experience modeling
- Machine Learning/Deep learning AI





Dijkstra's Algorithm

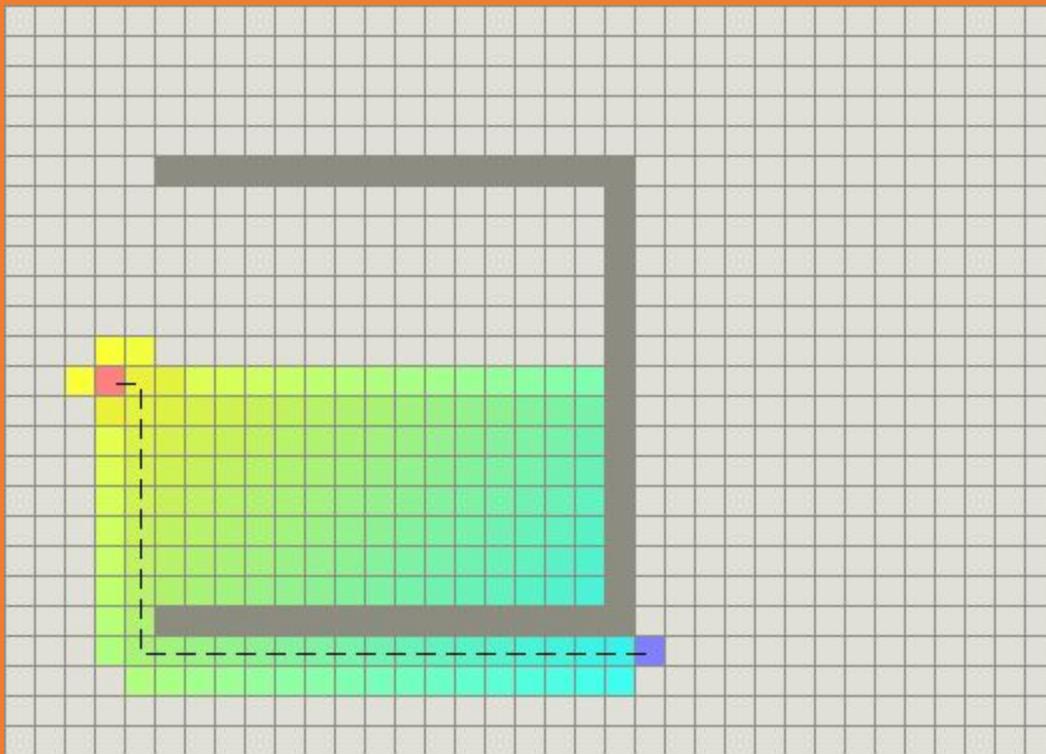


Greedy Best-First-Search

LLC



# A\* Pathfinding



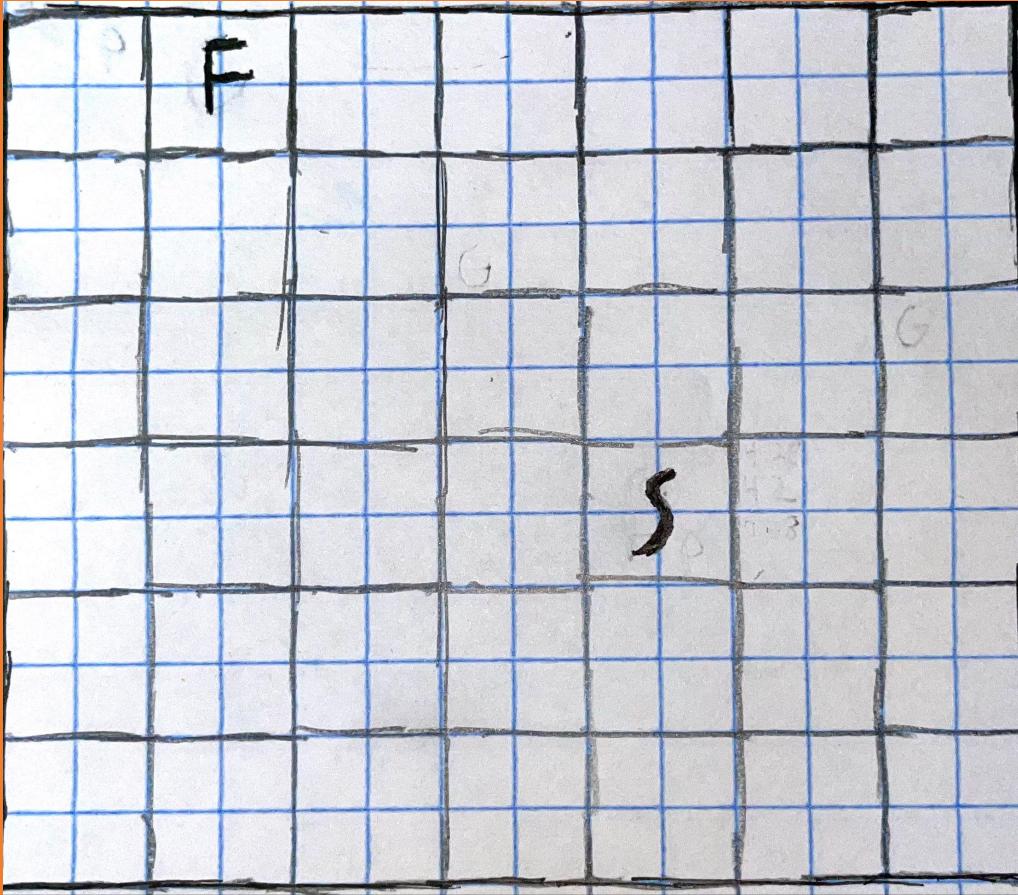
LLC



# A\*Pathfinding

- Uses three things
  - G: Distance from node to start
  - H: Distance from node to goal (optimistic approach)
  - $F = G + H$  “priority” for a node to be picked
- For a grid each horizontal and vertical space has a movement value of 1
- While the diagonals have a movement value of 1.4 (root 2ish)





LLC



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	F						
	G						
14	28	10	38	14	48	G	
42		48		62			
10	38			15	52		
48		S		62			
14	48	10	52	14	56		
62		62		70			

LLC



Damien



F						
28	14	24	24	28	35	
42		48		62		
24	24	14	28	10	38	14
48		42		48	62	G
38	34	10	38		16	52
62		48		5	62	
14	48	10	52	14	56	
62		62		70		

LLC



42	0	38	10	42	20			
F								
42		48		62				
38	10	28	14	24	24	28	34	
48	42			48	62			
42	20	24	24	14	28	10	38	14
62	48			42		48	62	G
38	34			10	38			
62	48			S		15	52	
14	48			10	52	14	56	
62	62					62		
						70		

LLC



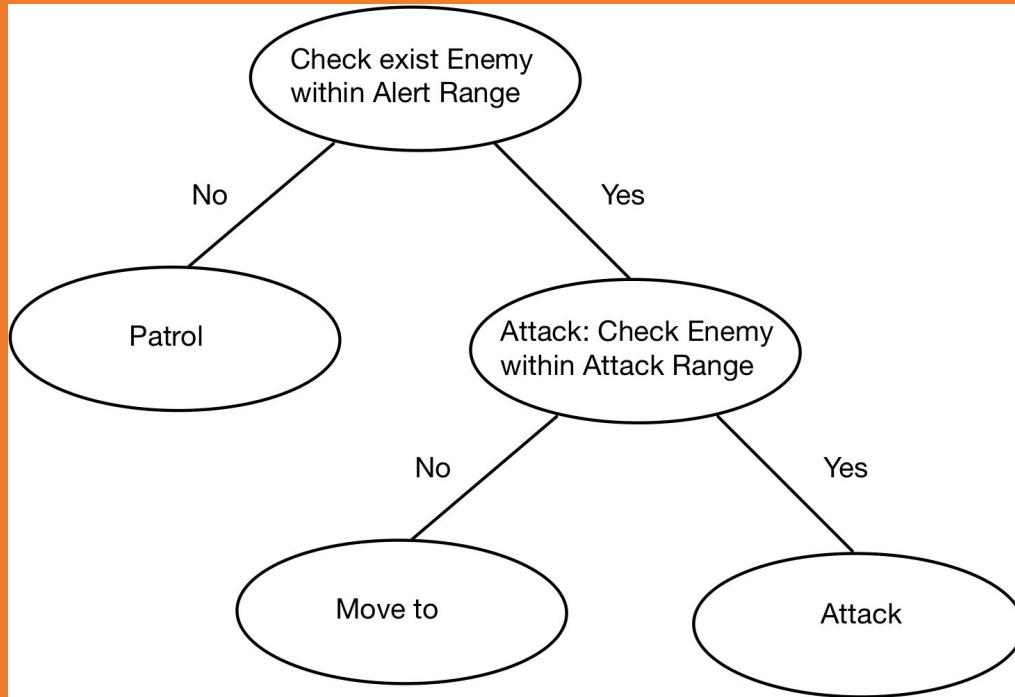


# DEMO TIME

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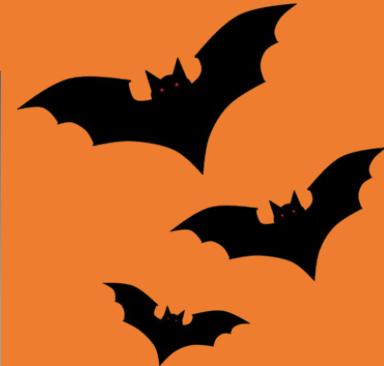
# Decision Tree



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# Machine Learning - Overview

- Supervised Learning
- Unsupervised Learning
- Reinforcement Learning



# Machine Learning - Supervised Learning

In supervised learning, the algorithm is trained on a labeled dataset, where it learns to predict the output from the input data. Common algorithms include linear regression, decision trees, support vector machines, and neural networks.

**WE WILL LOOK AT A NEURAL NETWORK  
EXAMPLE LATER!**



# Supervised Learning Example - NEAT

- NeuroEvolution of Augmenting Topologies
- Kenneth O. Stanley in 2002
- Category: Evolving artificial neural networks (ANNs)
- Mutation and Crossover Operations



ALEX

# NEAT EXAMPLE - MARI/O



# NEAT MAR/IO - Notable Species

- Species 19 - First Species to Chargin' Chuck
- Species 14 - Second Species to Chargin' Chuck
- Species 30-32 - Learned to crouch everywhere?
- Species 5 - Also evolved to crouch everywhere



**Generation 42, Species 10, Genome 4 BEAT IT**



# Machine Learning - Unsupervised Learning

Unsupervised learning involves training the algorithm on an unlabeled dataset, where the algorithm tries to learn the patterns and relationships within the data. Clustering and dimensionality reduction are common tasks associated with unsupervised learning. Algorithms include k-means clustering, hierarchical clustering, and principal component analysis.

**CHATGPT USES UNSUPERVISED LEARNING**



# Unsupervised Learning Example - GPT

- ChatGPT is the most well known GPT model
- Generative Pre-trained Transformer
- Large-scale unsupervised learning approach, which enables it to capture the statistical regularities and patterns in the data without explicit task-specific supervision. (Curated, but not supervised)



# GPT EXAMPLE - CHATGPT



# GPT - GPT 4 Changes

- Enhanced Contextual Understanding
- Ethical and Bias Mitigation
- Multimodal Capabilities



# Machine Learning - Reinforcement Learning

Reinforcement learning involves training an agent to make decisions in an environment in order to maximize some notion of cumulative reward. It learns from a system of rewards and punishments without any explicit guidance.

Some common algorithms include Q-learning, deep Q-networks, and policy gradients.



# Reinforcement Learning - Boston Dynamics

- Not well documented on the method
- Atlas Robot
- Actors learn optimal “State-Action” Values and are rewarded



# RL EXAMPLE - ATLAS



# Ethical principles of AI



Public

Client and Employer

Product

Judgement

Management

Profession

Colleagues

Self

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# Some News about AI



## pixiv's policy on AI-generated work

10/20/2022

Share X

Greetings from pixiv.

We have recently witnessed a surge of inquiries regarding artworks in which all or most of the production process is carried out by AI (hereinafter referred to as "AI-generated work").

Starting in late October 2022, we'll make the following changes to pixiv to help you discern between regular posts and AI-generated work.

### ■ Upcoming changes

- We'll introduce a feature enabling anyone to set their own AI-generated work as such when uploading it
- You'll be able to filter out AI-generated work in your searches
- We'll add separate rankings for AI-generated work

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# Some News about AI

## Valve has been quietly banning newly submitted Steam games using AI-created art assets!

News/Article



Simon Carless

@simoncarless · Follow

X

PSA: Valve has been quietly banning newly submitted Steam games using AI-created art assets - if submitters can't prove they have rights for the assets used to train the algorithms: [reddit.com/r/aigamedev/](https://www.reddit.com/r/aigamedev/)...

we have identified intellectual property in [Game Name Here] which appears to belong to third parties. In particular, [Game Name Here] contains art assets generated by AI which appears to be relying on copyrighted material owned by third parties. As the ownership of generated art is unclear, we cannot ship your game while it contains these AI-generated assets. Please affirmatively confirm that you own the rights to all of the IP used in the development of your game, and that you have the right to use the assets in your game.

You will receive a notice from us regarding your build and will give you one (1) opportunity to remove all content that is found to be infringing. If you do not remove the infringing content from your build,

After we have removed all such content, we will not be able to ship your game on Steam, and



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# Public, Client and Employer, Profession



**Public:** Software engineers shall act consistently with the public interest.

**Client and Employer:** Software engineers shall act in a manner that is in the best interests of their client and employer consistent with the public interest.

**PROFESSION** - Software engineers shall advance the integrity and reputation of the profession consistent with the public interest.

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# Data amount for training GPT4

**410 billion tokens**

**About 300 billion words**

**About 3.1 billion web pages**

**About 320TB of text information**



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Dataset	Quantity (tokens)	Weight in training mix	Epochs elapsed when training for 300B tokens
Common Crawl (filtered)	410 billion	60%	0.44
WebText2	19 billion	22%	2.9
Books1	12 billion	8%	1.9
Books2	55 billion	8%	0.43
Wikipedia	3 billion	3%	3.4

# Product, Management, Self



**PRODUCT** - Software engineers shall ensure that their products and related modifications meet the highest professional standards possible.

**MANAGEMENT** - Software engineering managers and leaders shall subscribe to and promote an ethical approach to the management of software development and maintenance.

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**SELF** - Software engineers shall participate in lifelong learning regarding the practice of their profession and shall promote an ethical approach to the practice of the profession.



# Judgement, Colleagues

**JUDGMENT** - Software engineers shall maintain integrity and independence in their professional judgment.



**COLLEAGUES** - Software engineers shall be fair to and supportive of their colleagues.

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# Alert!

The Eight Principles are need  
to know for ethics quiz!



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# THANKS!

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AND ALEX



# Sources

<https://theory.stanford.edu/~amitp/GameProgramming/AStarComparison.html#:~:text=A%20is%20the%20most%20popular,a%20heuristic%20to%20guide%20itself.>

<https://www.ibm.com/topics/artificial-intelligence>

[\[pixiv\] Announcements - pixiv's policy on AI-generated work](#)

[Valve has been quietly banning newly submitted Steam games using AI-created art assets! : r/pcmasterrace \(reddit.com\)](#)

[ChatGPT 的训练集来自哪里？ - 知乎 \(zhihu.com\)](#)