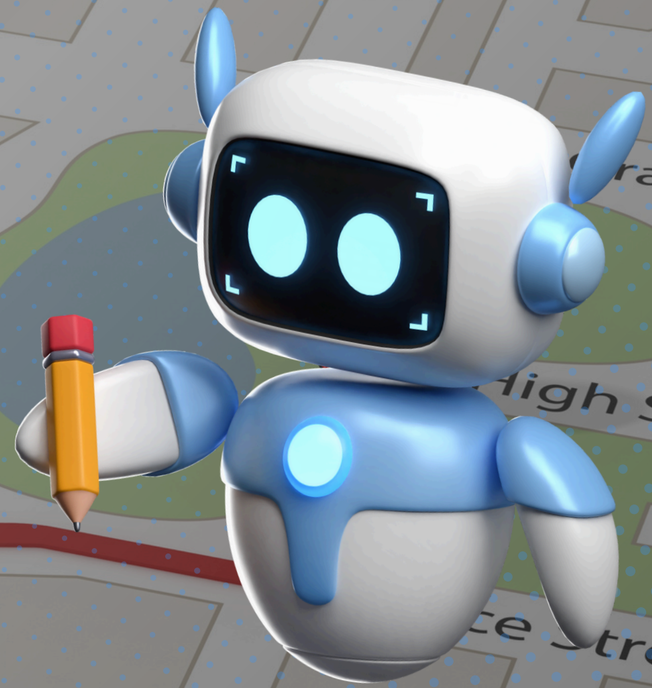
KU5005 ENGLISH FOR PROFESSIONAL COMMUNICATION

FIND THE FASTEST ROUTE TO
ENGLISH CLASSS WITH

A* ALGORITHM



Meet the Team!
Group 13


Erdianti **Wiga** Putri Andini
13522053


M. **Neo** Cicero Koda
13522108

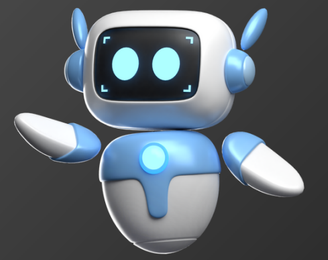

Dinda **Thalia** Fahira
18222055


Josia Ryan Juliandy Silalahi
18222075


Timotius Vi**valdi** Gunawan
18222091

What is AI?

Artificial Intelligence is a technology which can percept and do actions in an environment that mimics the human's life daily tasks



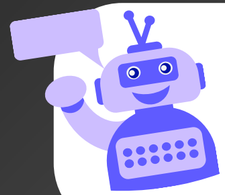
What is Artificial Intelligence?

A Developed technologies that allow computers to perform tasks that are typically done by humans, such as learning, reasoning, and problem-solving

Four Approaches on AI Definition

Thinking Humanly

Thinking Rationally

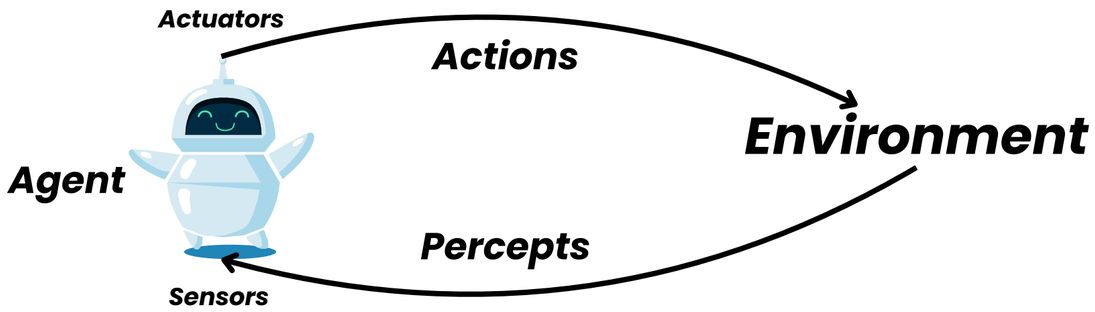


Acting Humanly

Acting Rationally

What is Intelligent Agent?

A core concept how AI works, **AI is an agent**



anything that can be viewed as **perceiving** an **environment** using **sensors** and able to do **actions** upon that environment using **actuators** **is an agent**

DID YOU KNOW ?

AI is more than we thought. Let's explore more!

Types of AI agents

AI agents can be classified in several ways, depending on their capabilities, function, or interaction with the environment.

Problem Solving Agent

- All problem states and possible actions to reach the goal are **predefined**.
- The agent's task is to search for a **path from the start state to the goal**.
- Simple, with no advanced reasoning required—just **choose actions** that move the **agent closer to the goal**.
- Examples: DFS, BFS, A*

Knowledge Based Agent

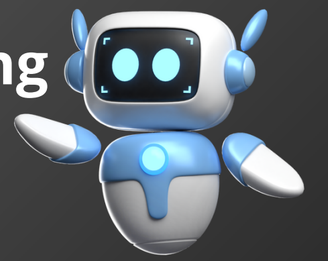
- Not all states are given upfront, but the agent is **provided with basic knowledge** or premises to reason and derive new states.
- The agent can **reason** and **make more intelligent decisions**.

Learning Agent

- Initially, **no information is provided**.
- The agent **learns from data gathered through observation** over time.
- The agent must be able to **form knowledge and solve problems from this data**, which makes it more complex.

A As Problem Solving Agent*

Explore how the A* algorithm acts as a problem-solving agent, transforming complex routes into clear and efficient paths



What is A* Algorithm?

An algorithm used for efficiently **finding the shortest route between two points**

Why is A* Algorithm a Problem-Solving Agent?

- It has information about **all states in the problem** (locations and costs)
- Continuously expands paths with **the least cost** until reaching the destination.

How Does It Work?

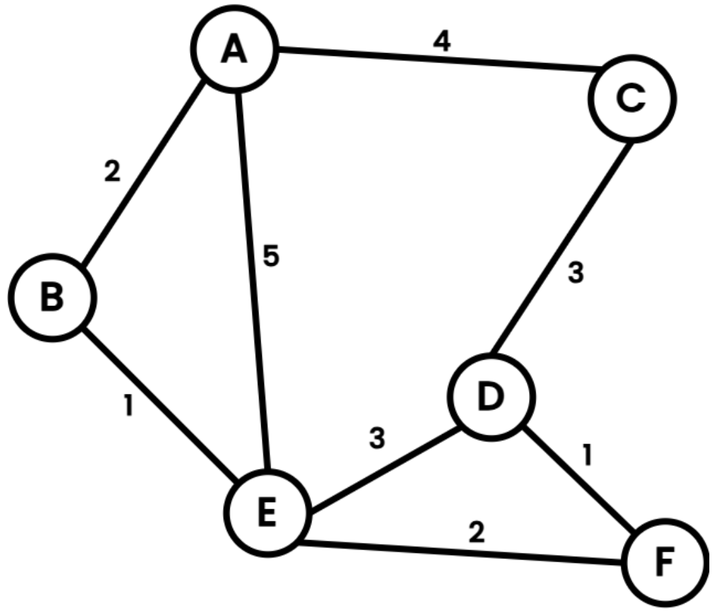
Functions used:

$$f(n) = g(n) + h(n)$$

- **g(n)**: **Actual cost** from the start point to the current point.
- **h(n)**: **Estimated cost** from the current point to the destination (heuristic).

There are **various methods** for determining heuristics, such as the **straight line distance** to the destination.

Find the shortest path from City A to F?



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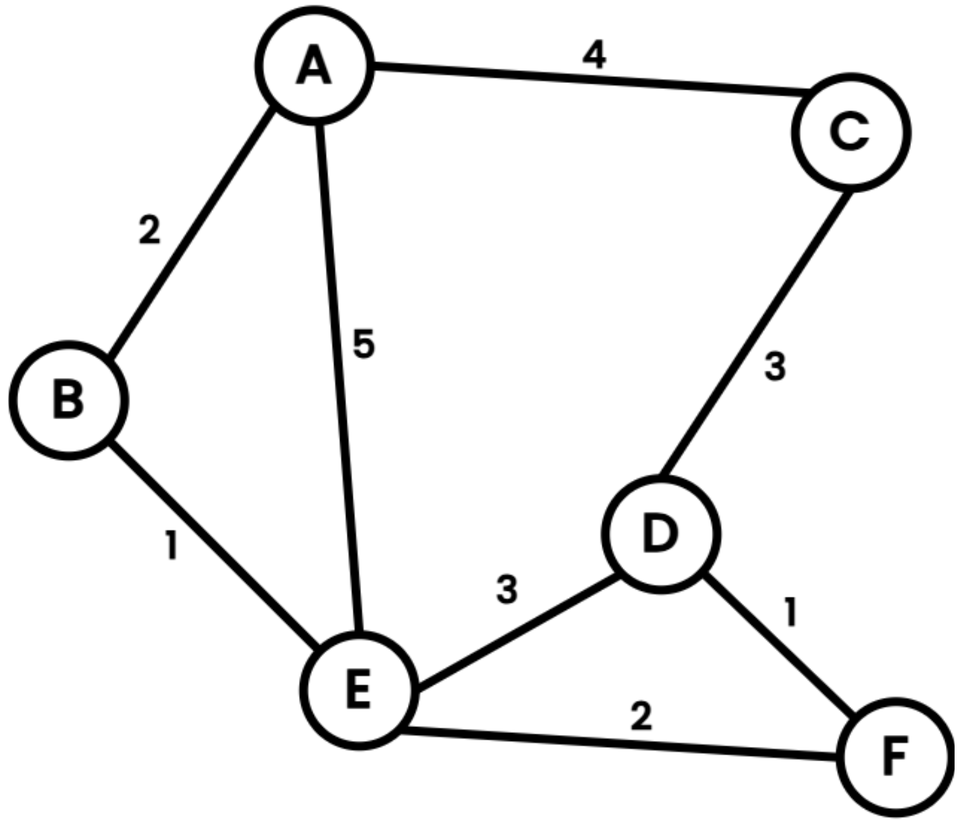

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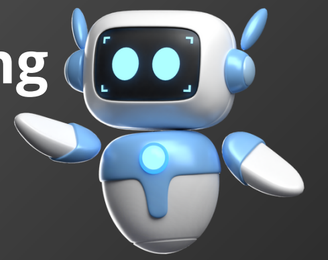

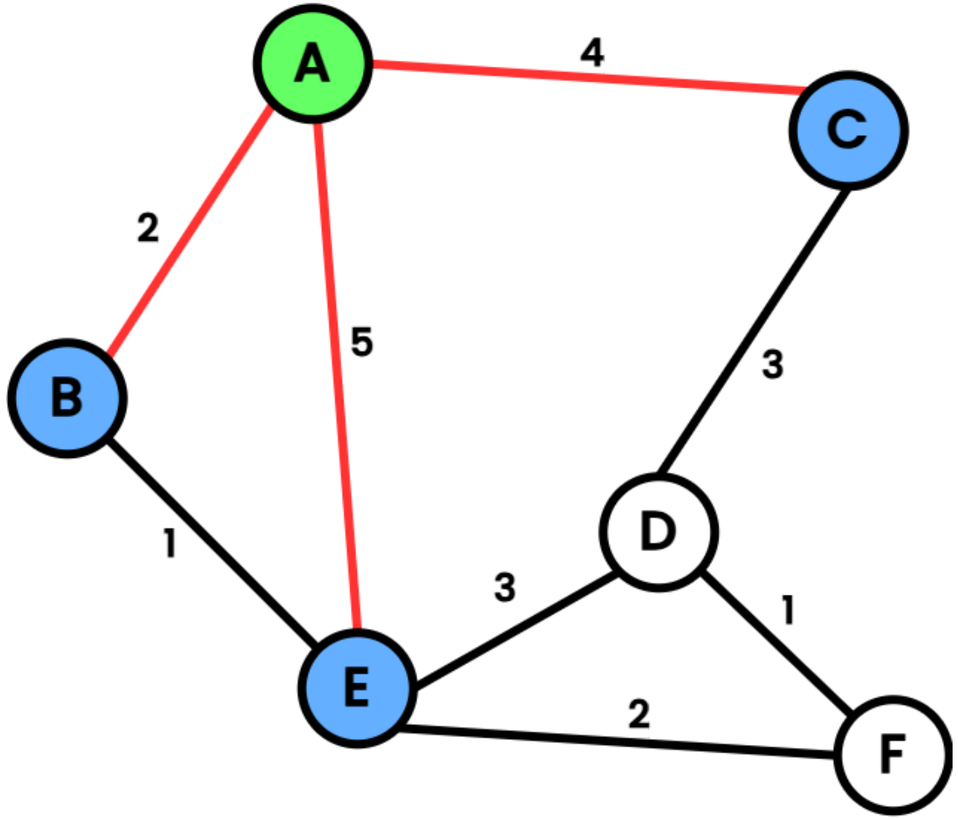

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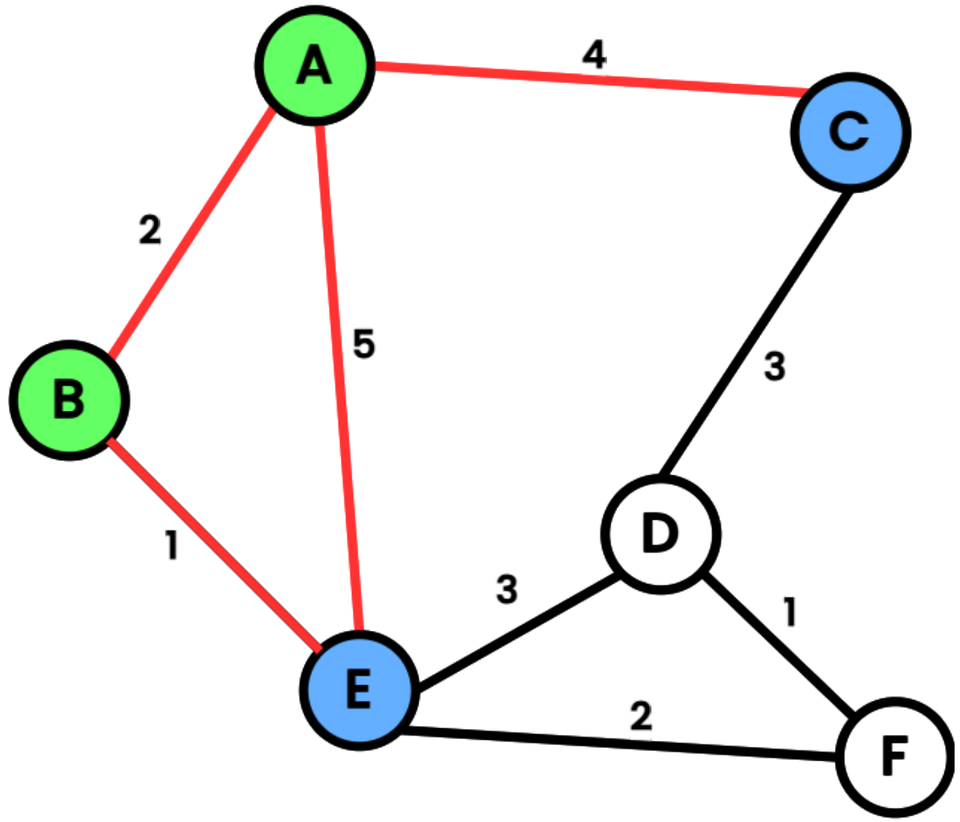

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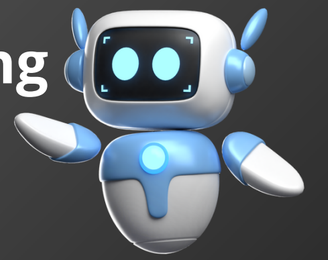

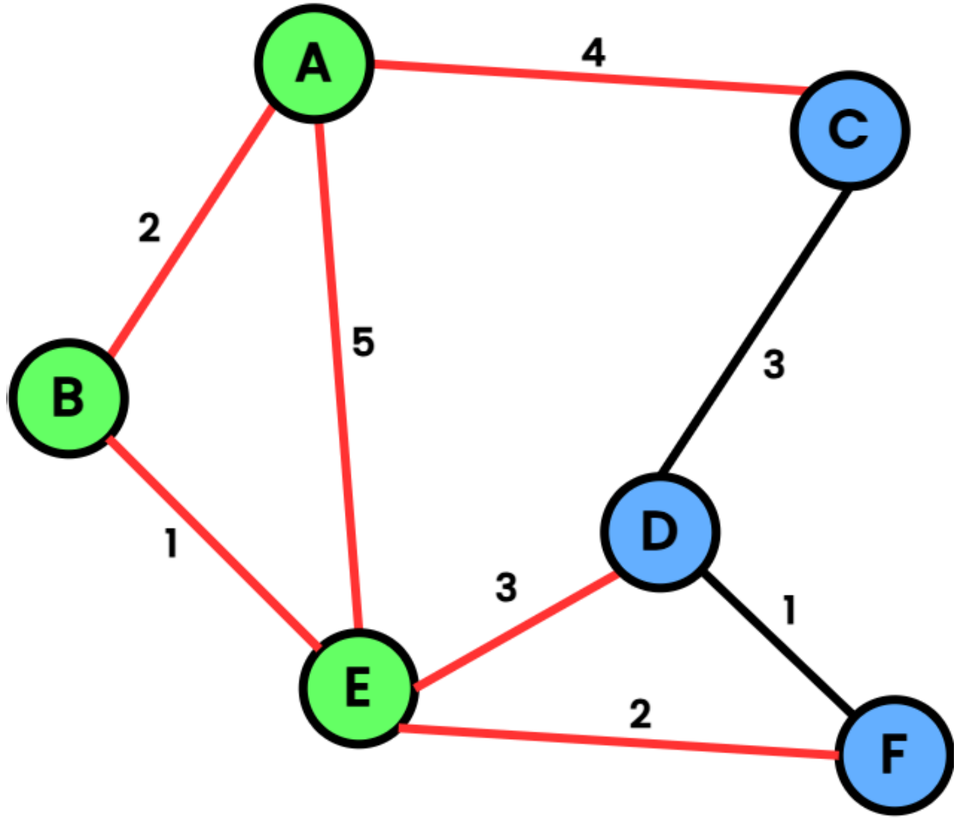

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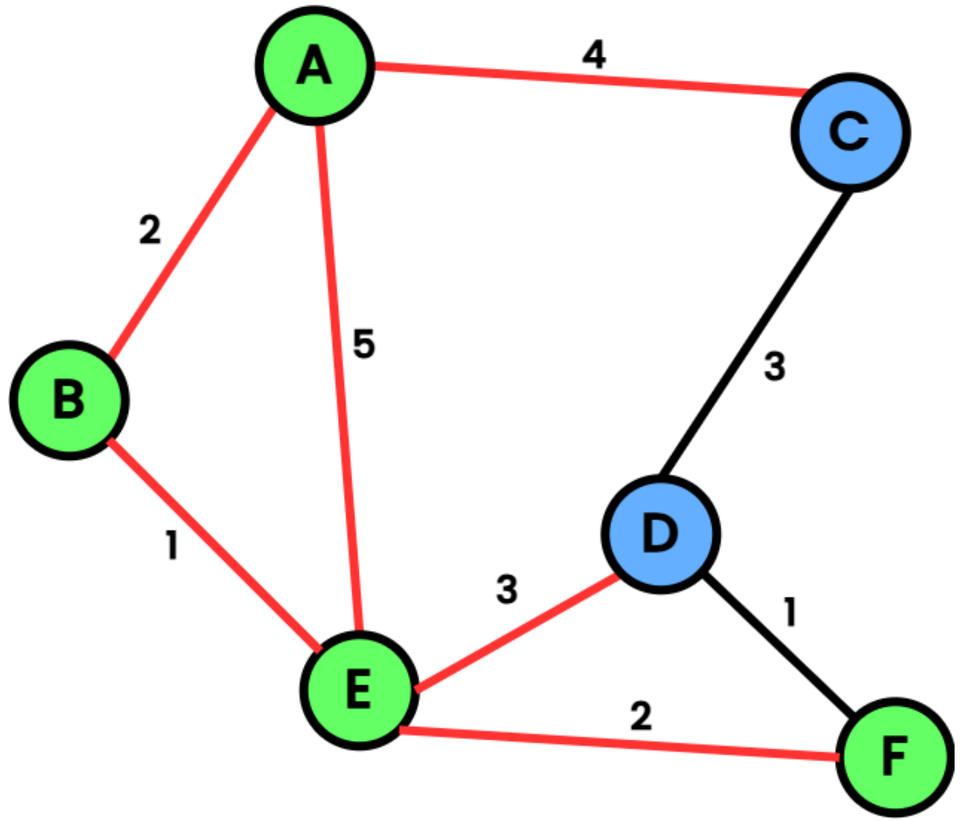
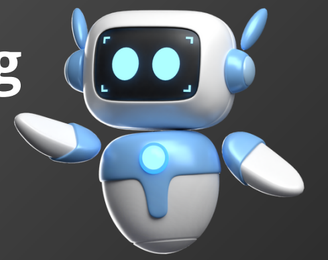


AI's Implementation in Real Life

AI enables efficient path-finding in large-scale road networks by optimizing routes in real-time.

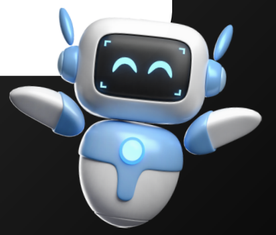


Bidirectional A* and Landmark Heuristics

- **Enhances efficiency** by conducting searches from **both** the starting point and destination at the same time.
- The two searches meet in the middle, **minimizing** unnecessary exploration.
- Use **predefined landmarks** to estimate distances, which directs the search more effectively.

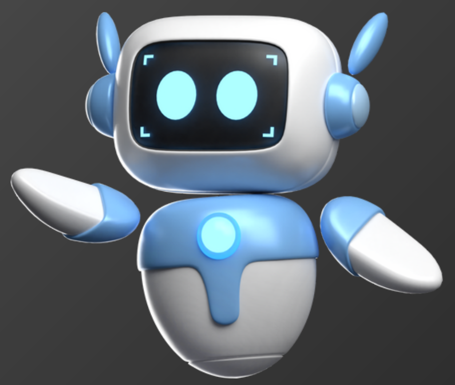
Real-Time Adaptation with Time-Dependent Costs

- Path-finding algorithm adapts to **changing traffic conditions**.
- Each segment of the route is assigned a **variable cost** that adjusts over time.
- The algorithm **prioritizes** nodes **closer** to the destination.
- This approach allows the algorithm to **respond effectively** to **live traffic shifts**.



AI's Implementation in Real Life

Example:
Path-finding from Bandung Institute of Technology to Kiara Artha Park



Final A* Route

The A* algorithm calculated the route from Bandung Institute of Technology to Kiara Artha Park using a **heuristic-based approach** that prioritizes nodes closer to the destination, effectively **narrowing** the **search space**. By balancing the **actual path cost** (g(n)) and **estimated distance** (h(n)) to the destination, A* focuses on the most promising routes within Bandung's dense road network. This approach allows it to avoid **unnecessary exploration**, optimizes **pathfinding** in dense urban environments, prioritizing quicker solutions and adapting well to **complex routes**, with potential for further enhancement in **real-time navigation systems**.