

Natural Language Processing

CS 174 Section B TTh 1100-1230

CTC214



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Artificial Intelligence v1.0

What comes to mind when
you think about AI?









DID YOU SEE
THE CLEVERBOT-
CLEVERBOT CHAT?

I AM NOT A
ROBOT. I'M A
UNICORN.



YEAH. IT'S HILARIOUS,
BUT IT'S JUST CLUMSILY
SAMPLING A HUGE DATABASE
OF LINES PEOPLE HAVE
TYPED. CHATTERBOTS STILL
HAVE A LONG WAY TO GO.



SO... COMPUTERS HAVE MASTERED
PLAYING CHESS AND DRIVING
CARS ACROSS THE DESERT, BUT
CAN'T HOLD FIVE MINUTES
OF NORMAL CONVERSATION?



PRETTY MUCH.

IS IT JUST ME, OR
HAVE WE CREATED
A BURNING MAN
ATTENDEE?



Is AI actually intelligent?

Define intelligence

- the ability to **acquire** knowledge and skills
- the ability to **react**, **alter**, and **respond** to an environment towards an economic advantage

Definition of Intelligence

Merriam Webster

- A branch of computer science dealing with the **simulation** of **intelligent behavior** in computers
- The capability of a machine to **imitate** intelligent human behavior

Definition of Artificial Intelligence

Merriam Webster

VERY ANTHROPOCENTRIC



Artificial Intelligence v2.0

The capability of a **machine** to exhibit
intelligent behavior

Domains of AI

Problem Solving

Planning

Knowledge Representation

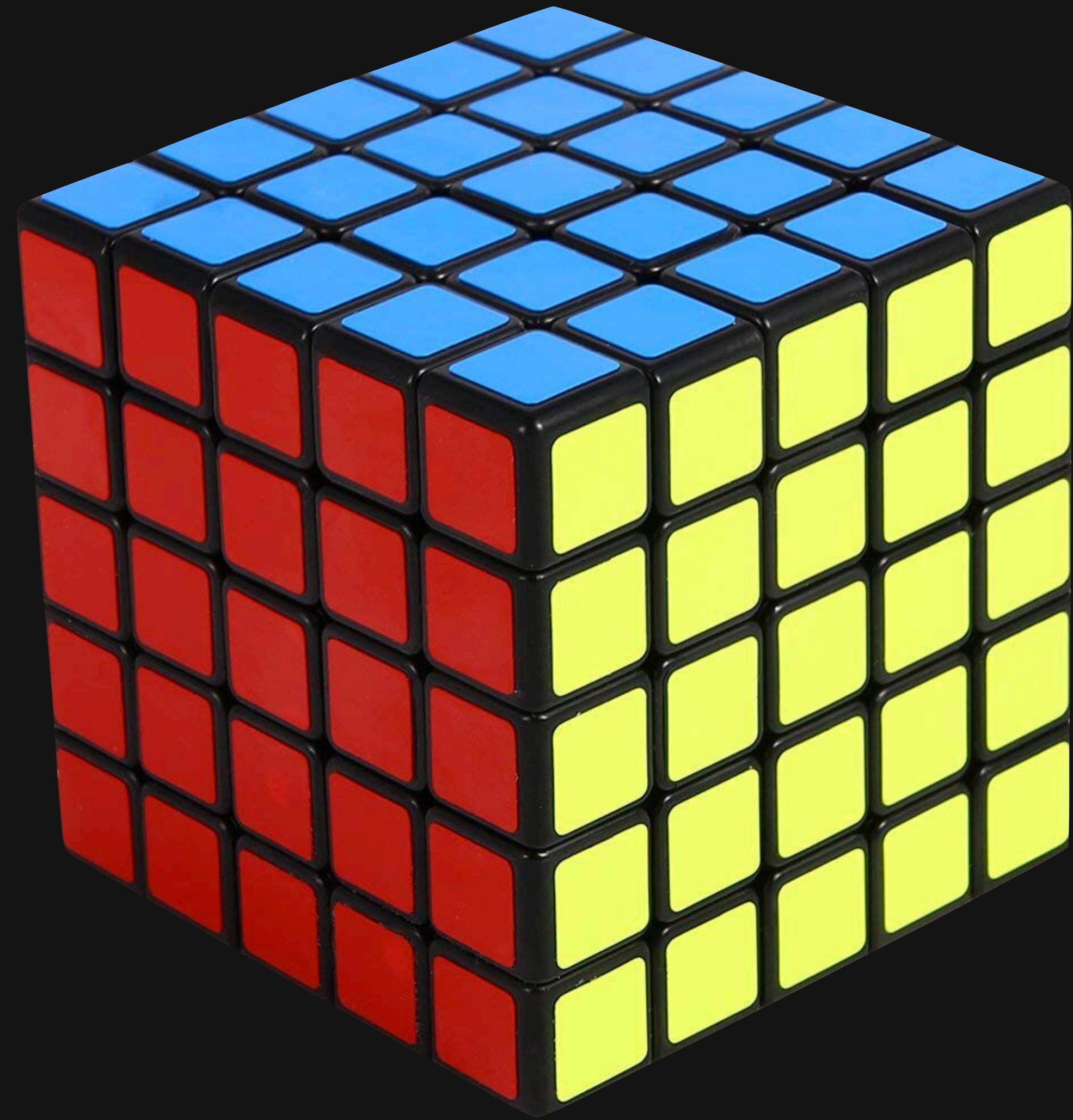
Learning

Natural Language Processing

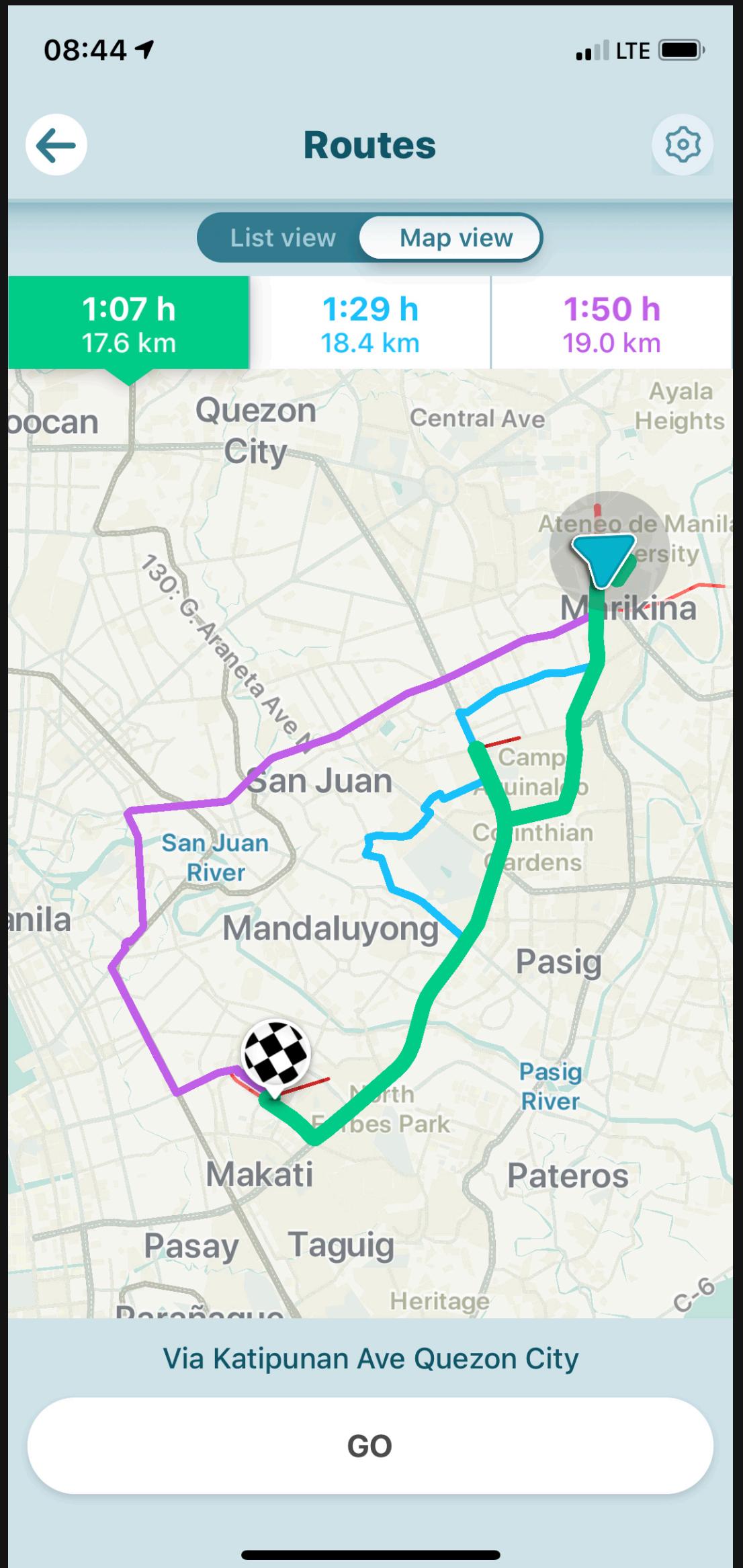
Perception

Motion

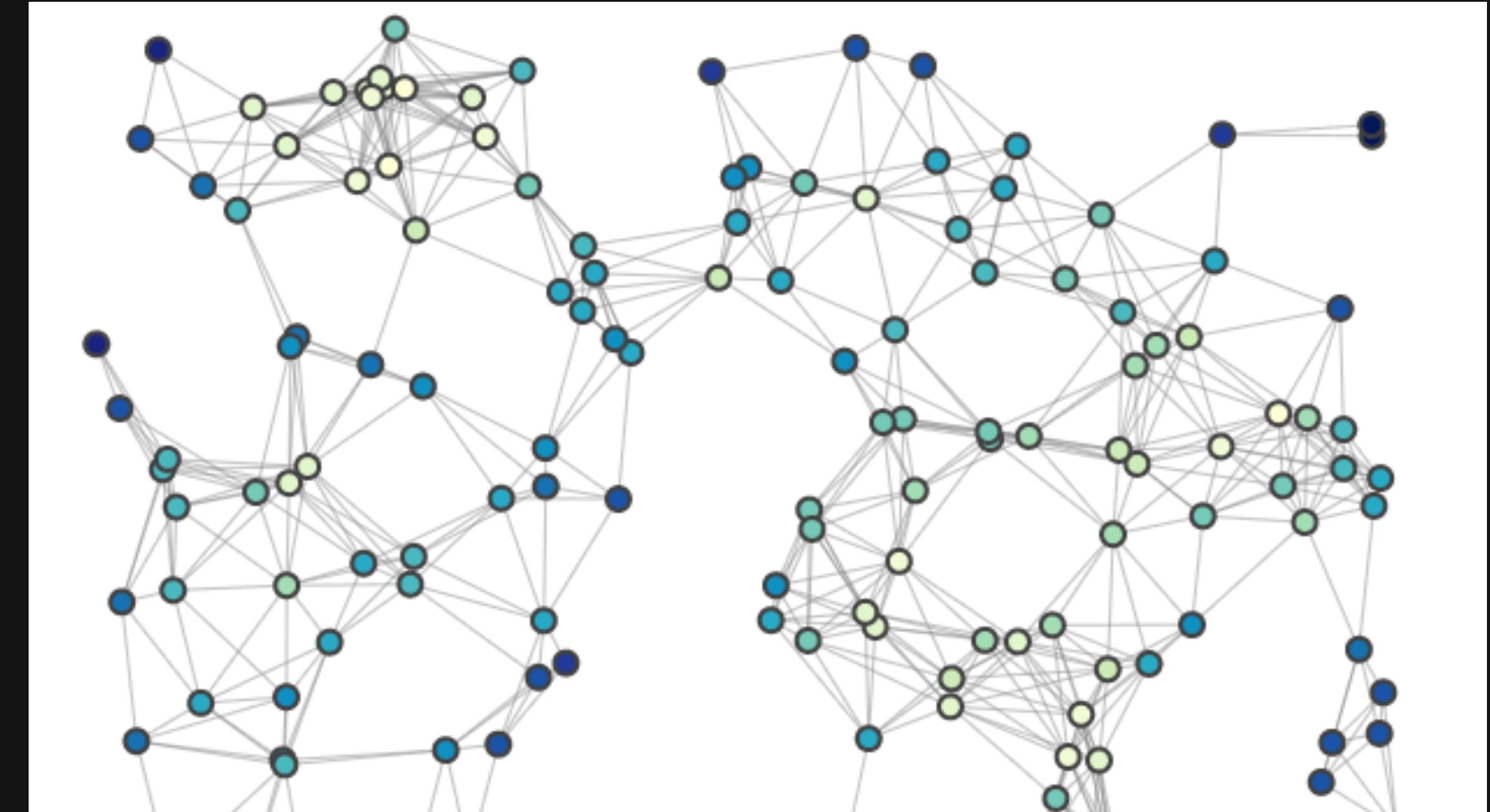
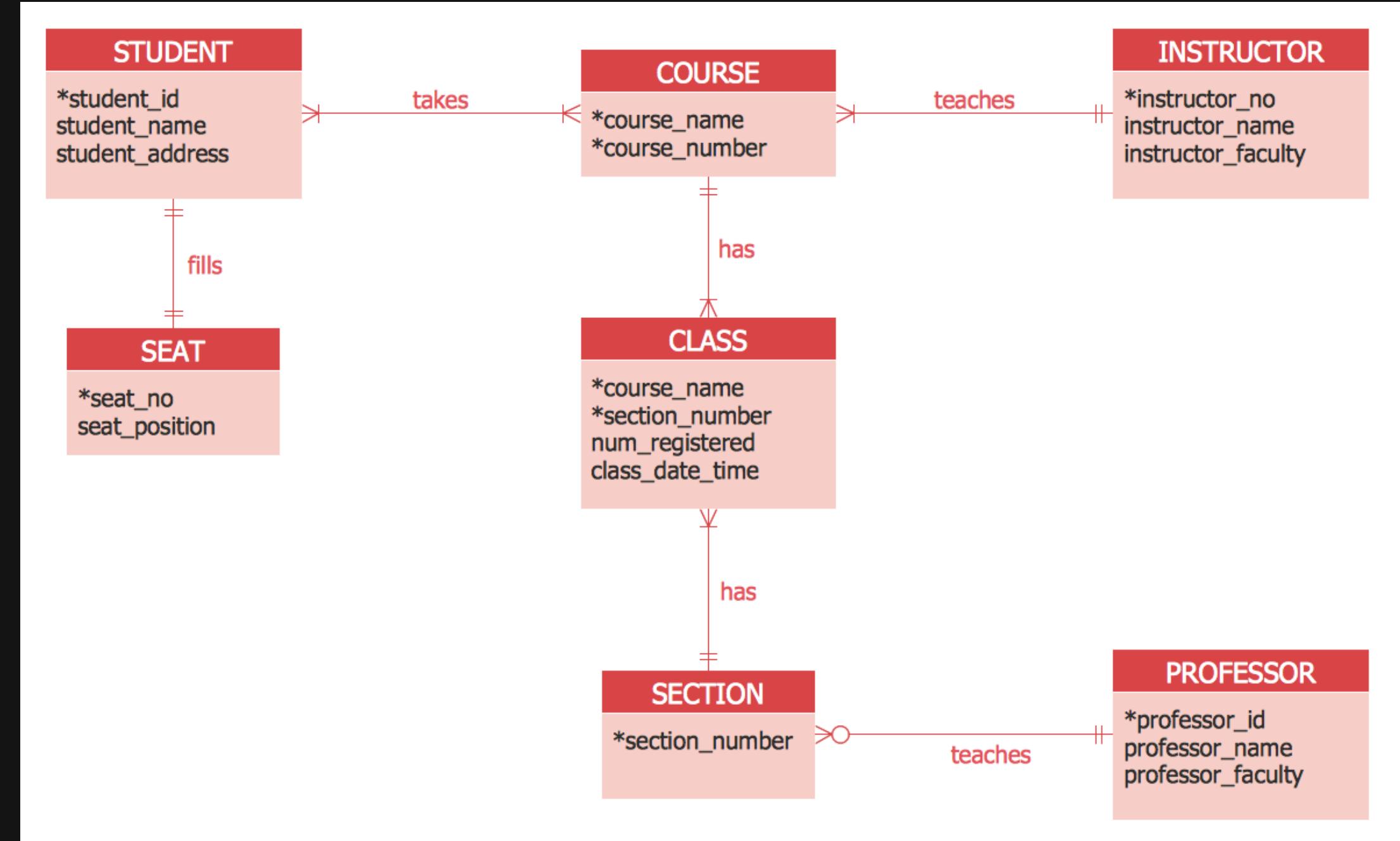
Social Intelligence



Problem Solving
Representation of solution space and algorithm used

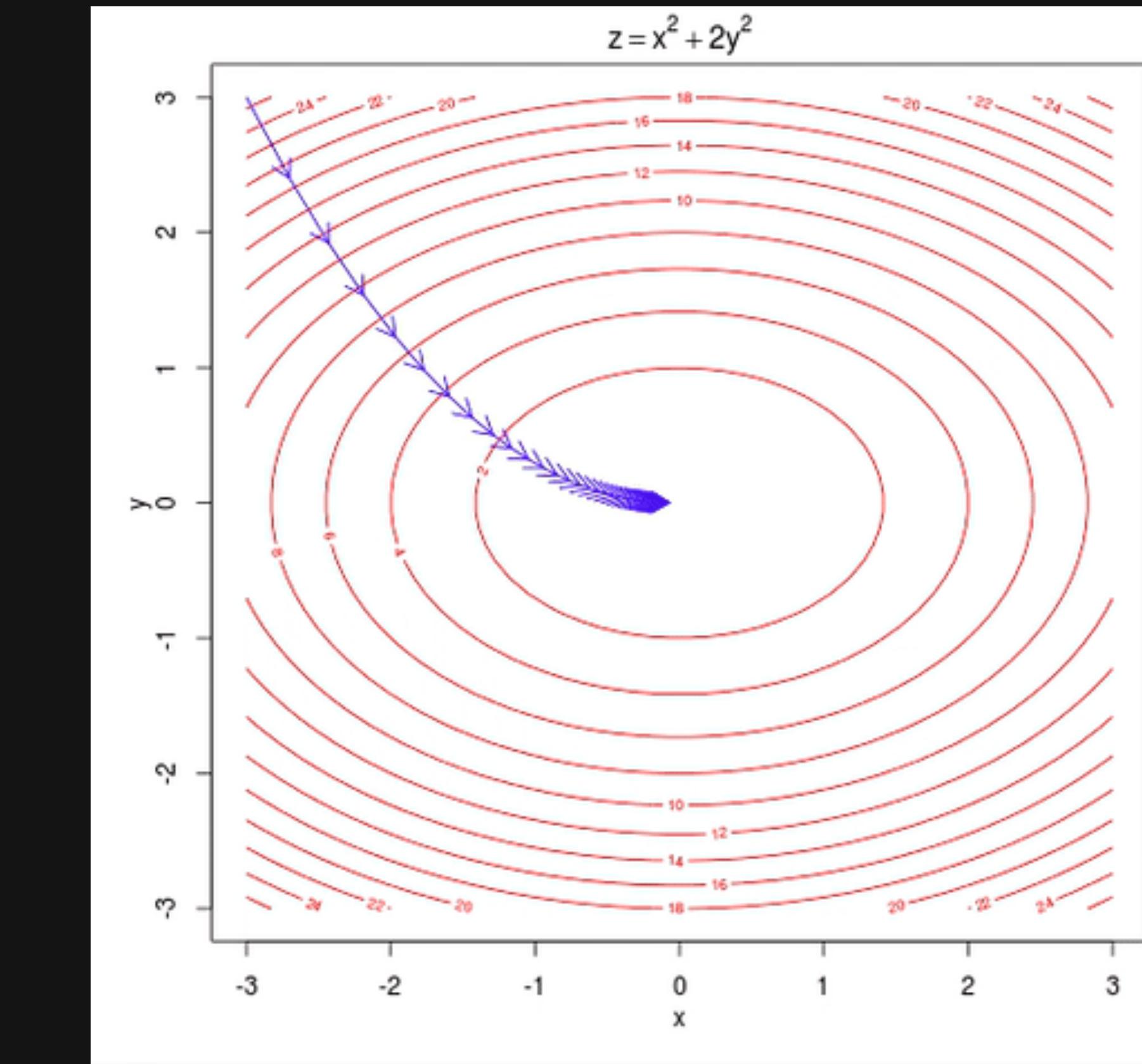


Planning
Which states/goals to target?



Knowledge Representation

How to form relationships and hierarchies



Learning
Updating information and processes

TESLA



360°

Rear, side and forward-facing cameras provide maximum visibility

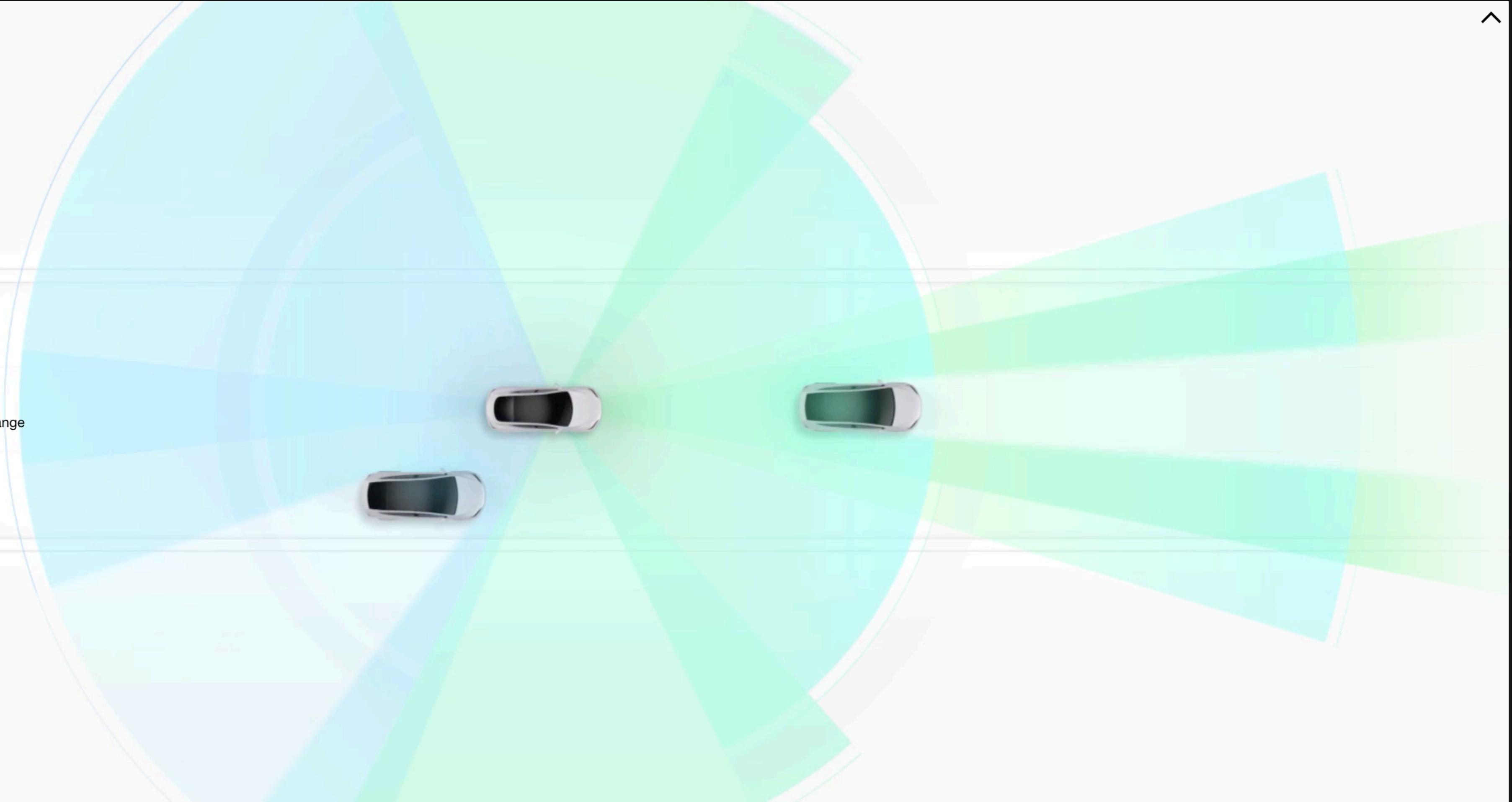
250m

Forward-facing radar provides a long-range view of distant objects

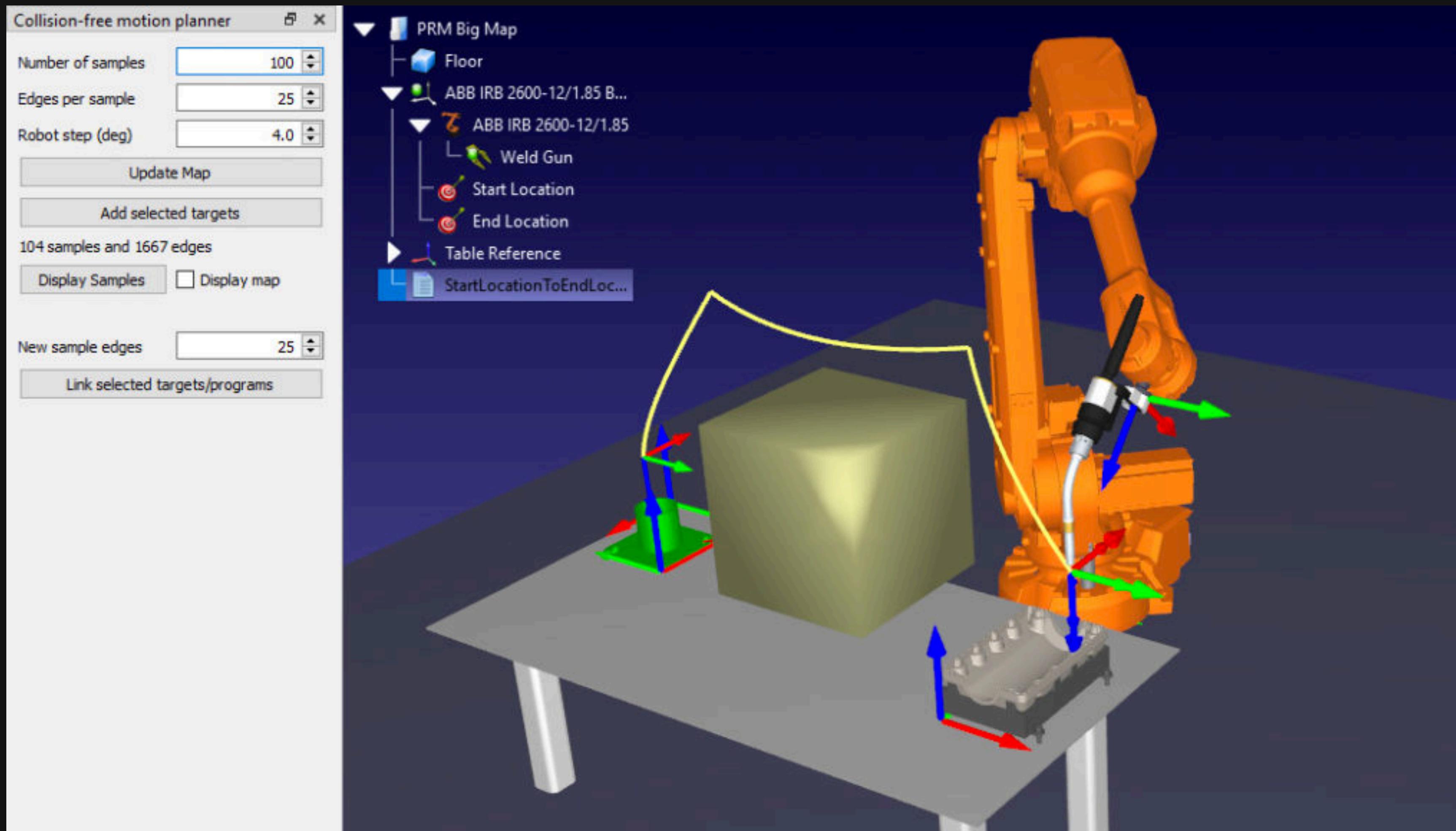
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Ultrasonic Sensors

Detects nearby cars, prevents potential collisions and assists with parking



Perception
Sensing the environment



Motion
Knowing where and how to apply motion

GAME THEORY

The art of thinking strategically

PRISONER'S DILEMMA

	Betrays	B Stays silent
	A Betrayed	Each serves 2 years A = free B = 3 years
Stays silent	A = 3 years B = free	Each serves 1 year

Business 50MINUTES.com



Social Intelligence
Cooperation and Competition

Natural Language Processing

Natural language processing (NLP) is a subfield of linguistics, computer science, information engineering, and artificial intelligence concerned with the interactions between computers and human (natural) languages, in particular how to program computers to process and analyze large amounts of natural language data.

linguistics + computer science

Making sense of **language** to extract **information**



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NATURAL LANGUAGE

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We stand on a hill, between the earth and sky

RESET

[See supported languages](#)

Entities

Sentiment

Syntax

Categories

We stand on a <hill>₁, between the <earth>₃ and <sky>₂

1. hill

Salience: 0.54

LOCATION

2. sky

Salience: 0.28

LOCATION

3. earth

Salience: 0.18

LOCATION

Dashboard

[Dashboard](#)[Activity History](#)

Model

[Custom Entities](#)

Developer

[Sandbox](#)

Billing

[Tier Pricing](#)[Credits](#)[Usage Bill](#)

```
},
  ▶{
    word: "sky",
  ▶similar: [
    ▶{
      word: "sun",
      similarity: 0.7380496263504028
    },
    ▶{
      word: "clouds",
      similarity: 0.7016589641571045
    },
    ▶{
      word: "moon",
      similarity: 0.6928390264511108
    },
    ▶{
      word: "dark",
      similarity: 0.6858587265014648
    },
    ▶{
      word: "cloud",
      similarity: 0.634981632232666
    },
    ▶{
      word: "skies",
      similarity: 0.6267581582069397
    },
    ▶{
      word: "surface",
      similarity: 0.6247024536132812
    },
    ▶{
      word: "milky",
      similarity: 0.610293447971344
    },
    ▶{
      word: "horizon",
      similarity: 0.6087921261787415
    },
    ▶{
      word: "cloudy",
    }
  ]
}
```

The image shows a digital interface for translating text. At the top, there are language selection menus. The left side shows 'DETECT LANGUAGE' followed by four options: 'FILIPINO' (underlined in blue), 'ENGLISH', 'SPANISH', and a dropdown menu indicated by a downward arrow. The right side shows 'FILIPINO' followed by four options: 'ARABIC' (underlined in blue), 'ENGLISH' (underlined in blue), a dropdown menu indicated by a downward arrow, and a star icon. Below these menus, the text 'pababa ka ba' is entered in the source field, and 'are you down' is shown in the target field. A large 'X' icon is positioned between the two fields. At the bottom of the interface, there are several icons: a microphone, a speaker, a character count '12/5000', a keyboard, a dropdown arrow, a speaker icon, and three additional icons for sharing, editing, and saving.

DETECT LANGUAGE

FILIPINO ENGLISH SPANISH ▾

↔ FILIPINO ARABIC ENGLISH ▾

pababa ka ba X are you down ☆

12/5000

MICROPHONE SPEAKER

SHARING EDIT SAVING

Tools



The spaCy logo consists of the word "spaCy" in a bold, blue, sans-serif font.



The TensorFlow logo is repeated here with the word "TensorFlow" in a dark blue, sans-serif font.

All using Python 3.5 and above

Syllabus