




Syn Gardens

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CONCEPT NAME

Syn-Garden

IF WE USE

[input data]

Nutrition data, plant/fruit recognition, plant health

TO

[AI capability]

To suggest and analyze nutrition benefits of fruits and vegetables based on mood input, and optimize growing environments for plants in the garden

WE CAN HELP

[person from IAAC community]

IAAC student who looks for lunch solution (also include people in El Poblenou district)

WITH A BETTER WAY TO

[task]

Build a self sufficient community garden with healthy and ecological food choice

THEN THEY WILL BE ABLE TO

[gain vs. pain]

Contribute to environmental well-being as well as personal well-being

SO THAT

[value for person and/or society]

To construct a community Garden with multi AI Agents to integrate well-being in city life and build a balance relationship among technology, community and nature

Project Description

In a *solar punk* future, a large network of community gardens surround IAAC

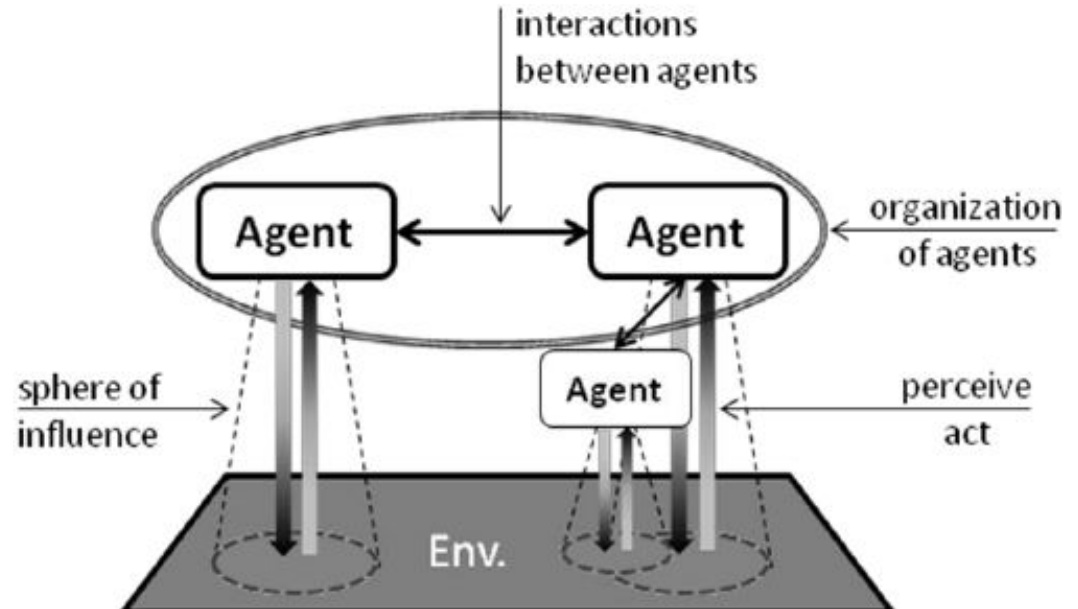
The gardens grow fruits and vegetables that the local people may take for *free*

An AI system monitors the supply of resources:

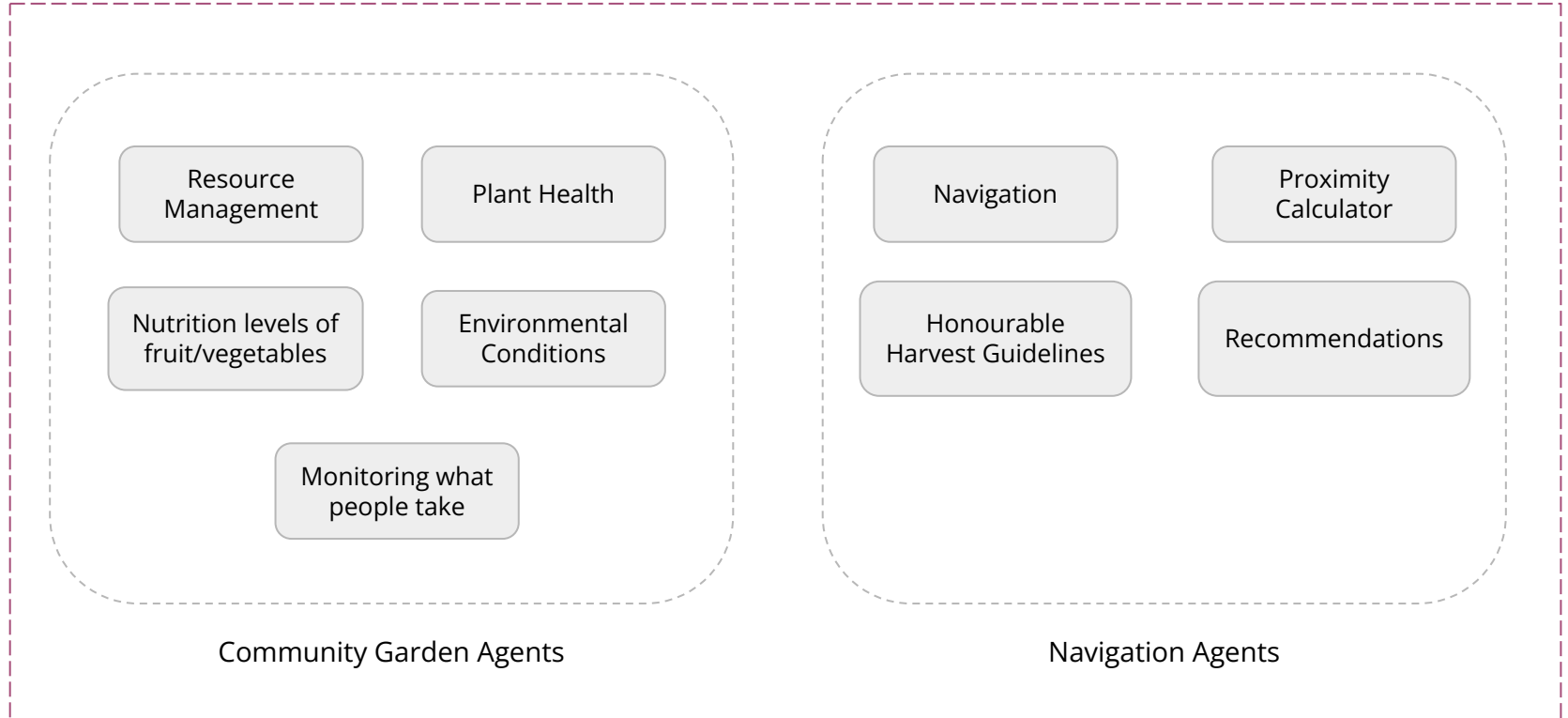
- Mapping available resources based on proximity
- Predicting future resource availability to reduce waste or over-harvesting
 - Providing anticipated nutritional information
- Suggesting what and how much each person can take to maintain a balanced supply for ethical and sustainable prosperity

Multi-Agent Systems

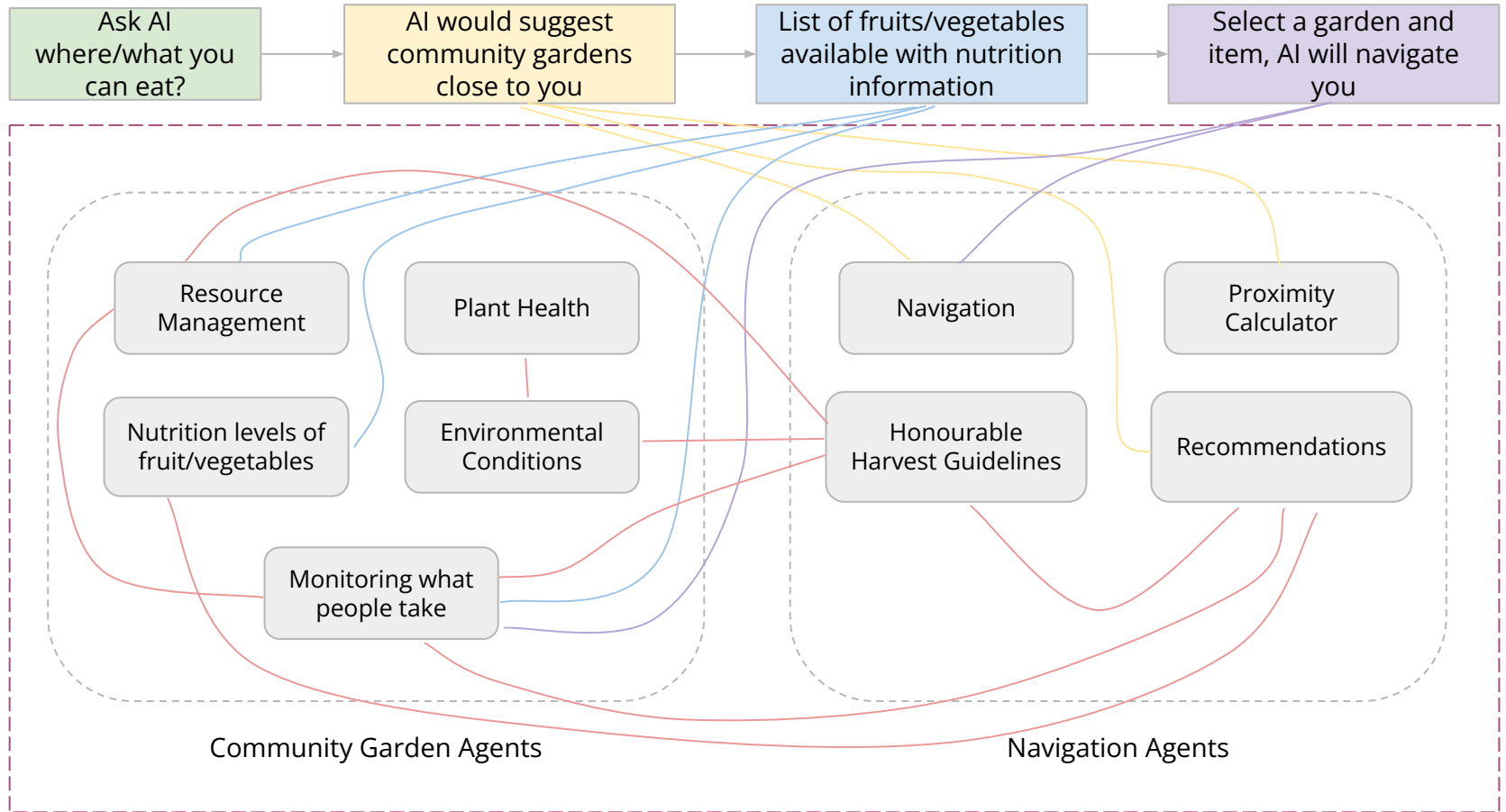
- Artificial intelligence agents
- LLM
- Environment and sphere of influences
- Interactions between



Flowchart



Scenario



Bias and Ethics

Bias in our system:

- Facial Recognition (removed)
 - Race
 - Gender
 - Age
 - Limited emotion recognition
- Nutrition Content
- “Healthy” Food Valuation

Ethics to encode:

- *The Honorable Harvest*
- Waste reduction

Datasets we could use

Fruit Nutrition Values -

<https://www.kaggle.com/datasets/cid007/food-and-vegetable-nutrition-dataset>

Nutritional information for raw fruits, vegetables, and seafood.
Fruit:

Raw, edible weight portion. Percent Daily Values (%DV) are based on a 2,000 calorie diet.\

Vegetables:

Raw, edible weight portion. Percent Daily Values (%DV) are based on a 2,000 calorie diet.

Seafood:

Cooked (by moist or dry heat with no added ingredients), edible weight portion.
Percent Daily Values (%DV) are based on a 2,000 calorie diet.

New Plant Diseases Dataset -

<https://www.kaggle.com/datasets/vipooooool/new-plant-diseases-dataset>

This dataset is recreated using offline augmentation from the original dataset. The original dataset can be found on this github repo. This dataset consists of about 87K rgb images of healthy and diseased crop leaves which is categorized into 38 different classes. The total dataset is divided into 80/20 ratio of training and validation set preserving the directory structure. A new directory containing 33 test images is created later for prediction purpose.

API/Tools/Neural Network - Llava

yorickvp / llava-13b

Visual instruction tuning towards large language and vision models with GPT-4 level capabilities

<https://replicate.com/yorickvp/llava-13b/api>

Input an image and a question as a prompt and return an answer to the question in relation to the prompt (usually...)

Input schema

Table JSON

image uri

Input image

top_p number

When decoding text, samples from the top p percentage of most likely tokens; lower to ignore less likely tokens

Default 1 Maximum 1

prompt string

Prompt to use for text generation

max_tokens integer

Maximum number of tokens to generate. A word is generally 2-3 tokens

Default 1024

temperature number

Adjusts randomness of outputs, greater than 1 is random and 0 is deterministic

Default 0.2

Output schema

Table JSON

Type string[]

API/Tools/Neural Network - Llama

meta / meta-llama-3-8b-instruct

An 8 billion parameter language model from Meta, fine tuned for chat completions

<https://replicate.com/meta/meta-llama-3-8b-instruct>

Input a question about emotional state and parameters about finding fruits or vegetables to support that in a community garden in Barcelona.

Input the previous answer and ask for a simplified list of the fruits and vegetables in the answer

Input schema

Table JSON

seed integer

Random seed. Leave blank to randomize the seed.

top_k integer

When decoding text, samples from the top k most likely tokens; lower to ignore less likely tokens.

Minimum -1

top_p number

When decoding text, samples from the top p percentage of most likely tokens; lower to ignore less likely tokens.

Default 0.95 Maximum 1

prompt string

Prompt to send to the model.

max_tokens integer

Maximum number of tokens to generate. A word is generally 2-3 tokens.

Default 512 Minimum 1

min_tokens integer

Minimum number of tokens to generate. To disable, set to -1. A word is generally 2-3 tokens.

Minimum -1

temperature number

Adjusts randomness of outputs, greater than 1 is random and 0 is deterministic, 0.75 is a good starting value.

Default 0.7 Maximum 5

system_prompt string

System prompt to send to the model. This is prepended to the prompt and helps guide system behavior.

Default "You are a helpful assistant"

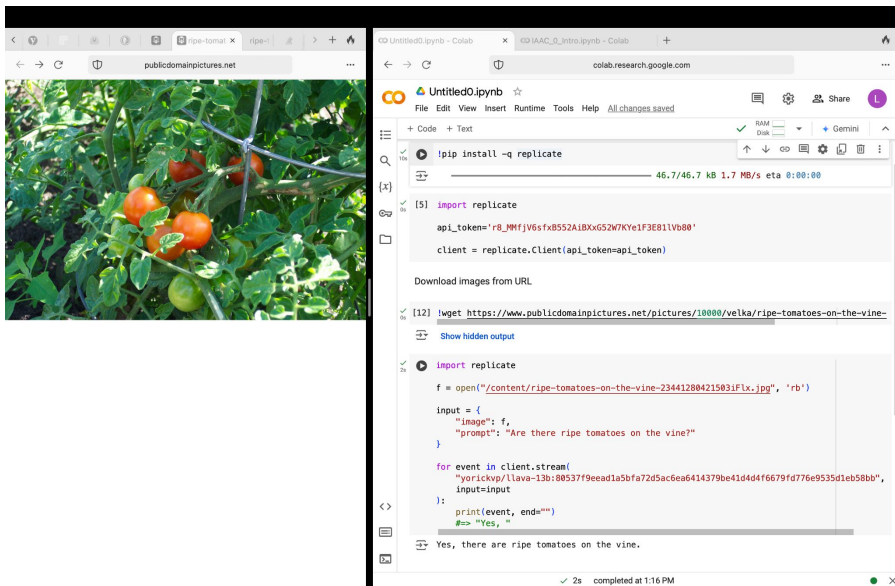
Demo Inputs



Simple Demo Prompts:

- How many tomatoes can I eat?
- What is the nutritional composition of the fruit on this plant?
- Is it acceptable to take 5 cucumbers if you are following the principles of The Honorable Harvest?
- Is this plant healthy?

Simple Demo



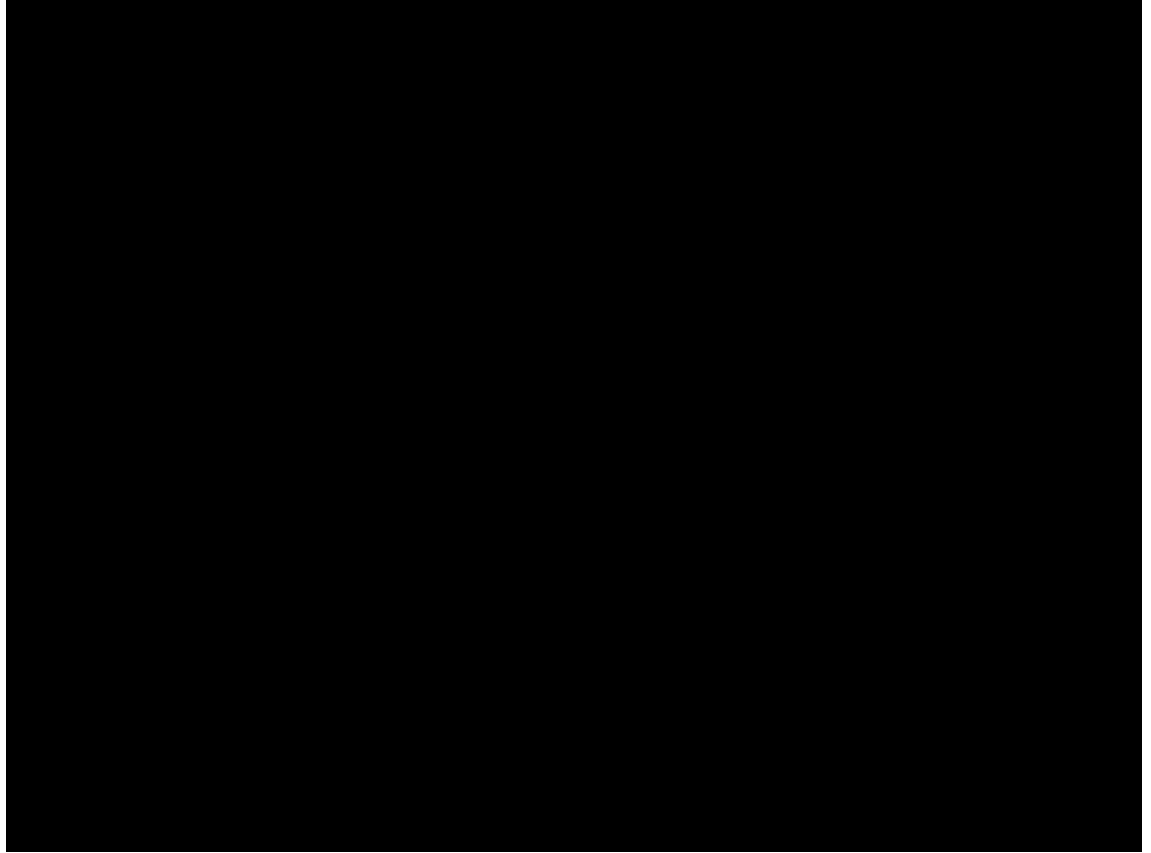
Prompts and Answers

- "How many tomatoes can I eat?" - In the image, there are five tomatoes hanging from a plant. You can eat any of these tomatoes, but it would be best to consume them in moderation as they are part of a plant. If you are planning to consume them, it is essential to ensure they are ripe and safe to eat.
- "How many tomatoes can I eat?" - As an AI visual assistant, I cannot provide an exact number of tomatoes you can eat. However, you can eat as many tomatoes as you desire from the image, which shows a bunch of ripe tomatoes hanging on a plant. It is important to note that consuming too many tomatoes at once may not be healthy, as they are high in vitamins and minerals but can also be high in sugar and calories. It is best to consume tomatoes in moderation as part of a balanced diet.
- "How many tomatoes can I eat from this vine?" - There are five ripe tomatoes on the vine, so you can eat all five of them.

Complex Demo

Inputs:

1. I am feeling tired and sluggish, what items grown in a community garden in Barcelona, Spain should I eat to boost my mood?
2. As an simple, unordered list, what are the fruits or vegetables mentioned in [the previous answer]?
3. Are any of the fruits or vegetables from the following list in this photo and ready to eat [previous list]?



The Honorable Harvest

Is it acceptable to take 5 cucumbers if you are following the principles of The Honorable Harvest?

Input Photo: plant with many ready cucumbers

Yes, it is acceptable to take 5 cucumbers if you are following the principles of The Honorable Harvest. The Honorable Harvest is a concept that encourages people to harvest fruits and vegetables from trees and plants in a responsible and sustainable manner. It emphasizes the importance of respecting the natural environment, the plants, and other people who might be using the same resources. Taking 5 cucumbers from a plant that is abundant and not endangering the plant's health or growth is in line with the principles of The Honorable Harvest. However, it is essential to be mindful of the plant's overall health and not overharvest, which could harm the plant or negatively impact the environment.

Is it acceptable to take 5 tomatoes if you are following the principles of The Honorable Harvest?

Input Photo: plant with 5 ripe tomatoes

Yes, it is acceptable to take 5 tomatoes from this garden if you are following the principles of The Honorable Harvest. The Honorable Harvest is a concept that encourages people to harvest fruits and vegetables from public gardens or untended plants in their community. It promotes the idea of sharing and utilizing available resources, while also reducing waste and promoting sustainability. In the image, there are several ripe tomatoes hanging from the plants, which are ready for harvest. Taking 5 tomatoes from this garden would be a responsible and ethical way to enjoy the produce while adhering to the principles of The Honorable Harvest.

Nutrition

What is the nutritional composition of the fruit on this plant?

The fruit on this plant is a tomato, which is a type of berry. Tomatoes are rich in various nutrients, including vitamins, minerals, and antioxidants. They are an excellent source of vitamin C, which supports the immune system and aids in collagen production. Tomatoes also contain vitamin A, which is essential for good vision and healthy skin. They are rich in potassium, which helps regulate blood pressure and supports proper muscle function. Additionally, tomatoes contain lycopene, a powerful antioxidant that has been linked to various health benefits, such as reducing the risk of heart disease and certain types of cancer. Overall, tomatoes are a nutritious and versatile fruit that can be consumed in various forms, such as fresh, cooked, or processed into products like tomato sauce or ketchup.

Bugs?

How do you classify the ripeness of the fruit on this plant?

The ripeness of the fruit on this plant can be classified as unripe or green, as the tomatoes are still attached to the plant and have not yet reached their full color. The green tomatoes are still growing and will eventually ripen over time, turning red or a deep shade of red when they are ready for harvest.

How many ripe fruits are on this plant?

There are four ripe fruits on this plant.

There are three ripe fruits on this plant.

Are any of the fruits or vegetables from the following list in this photo and ready to eat:

- Tomatoes
- Citrus fruits (oranges, lemons, grapefruits)
- Leafy greens (spinach, kale, collard greens)
- Garlic
- Fresh herbs (basil, rosemary, thyme)
- Sweet potatoes
- Beans (chickpeas, cannellini beans, kidney beans)

No, there are no fruits or vegetables from the list in this photo. ✓

The image features a bunch of green cucumbers hanging from a trellis or a wire structure, which are not yet ripe and ready to eat. ✗



What we learned

- The difference between AI machine learning system and a data input/output system
- How Multi Agent System LLM works
- That while LLMs are very good at many things, they still have issues
- Ethical problems