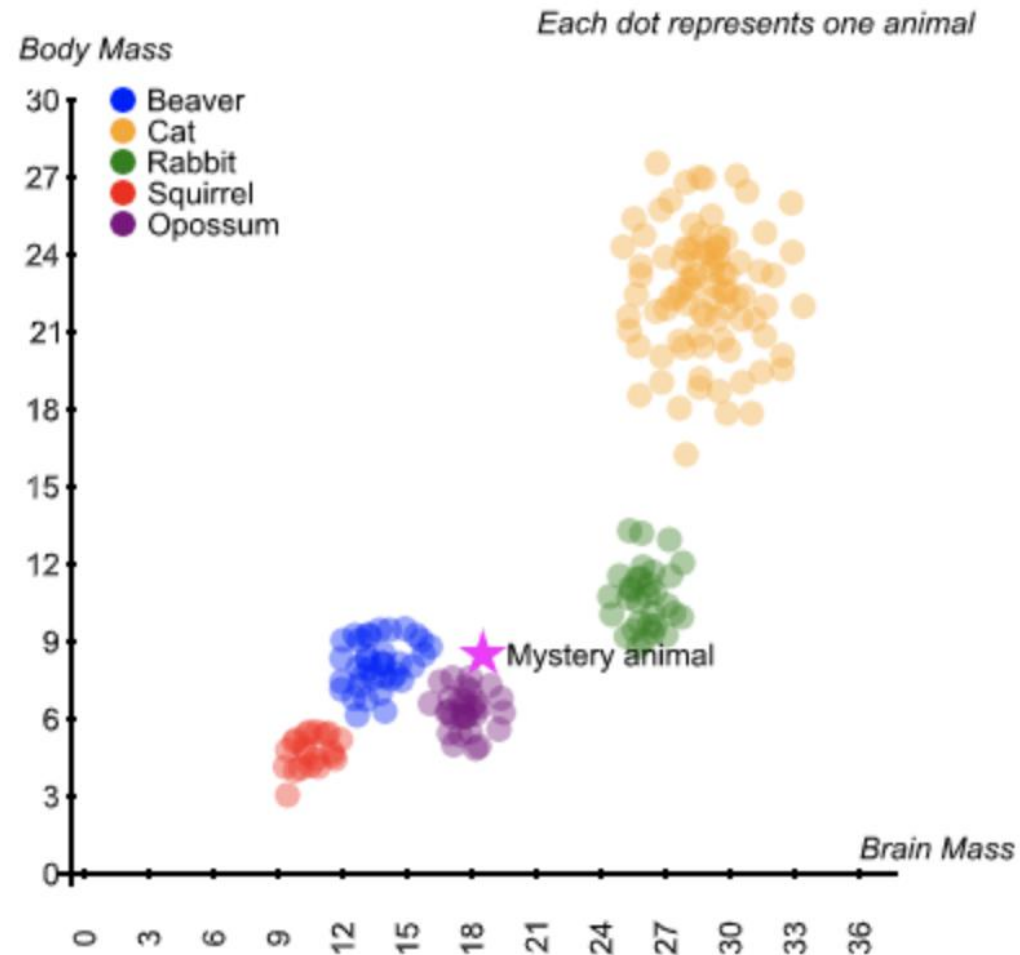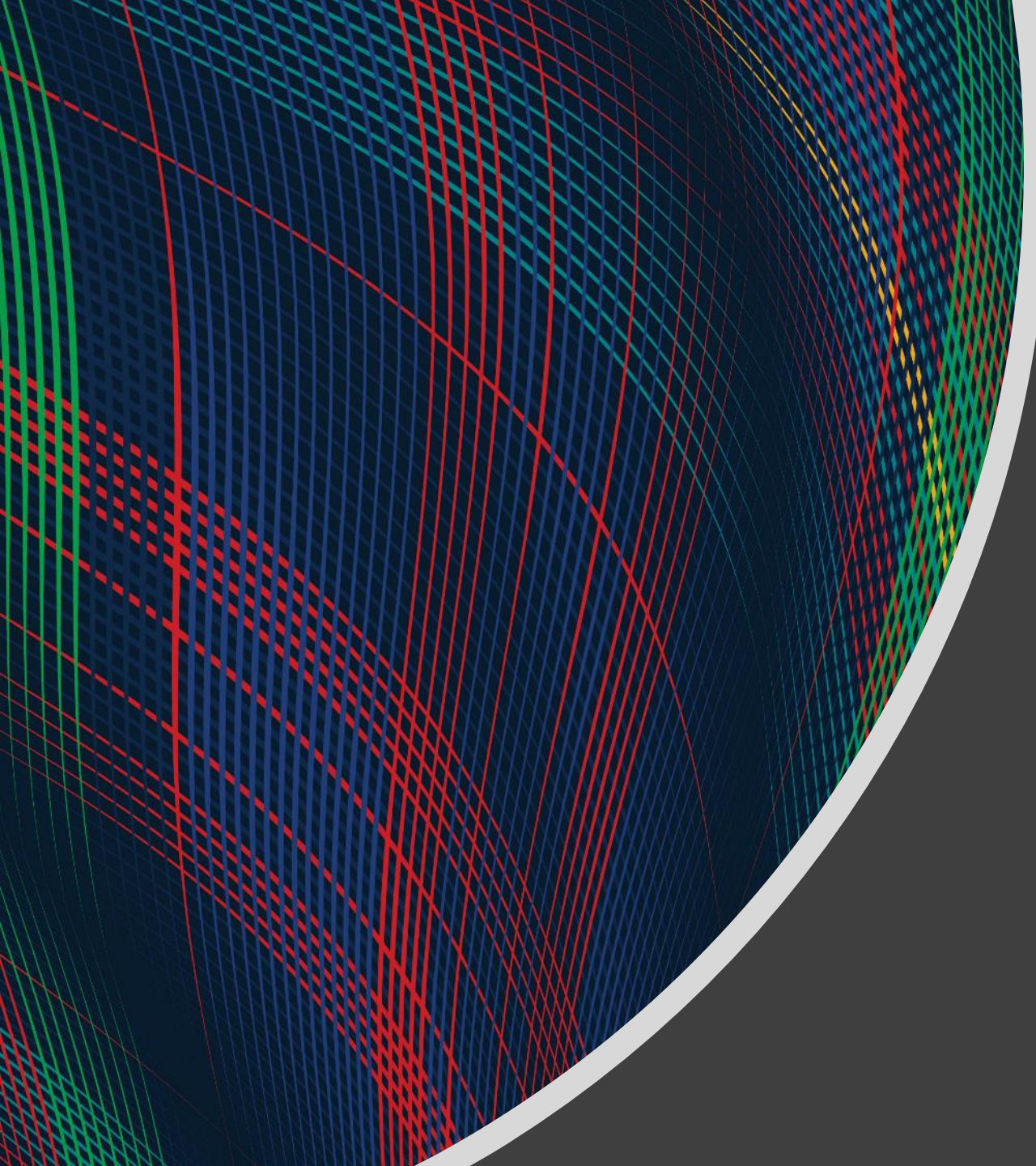# Visualizing Data to Make Predictions

What label should we assign the mystery point?
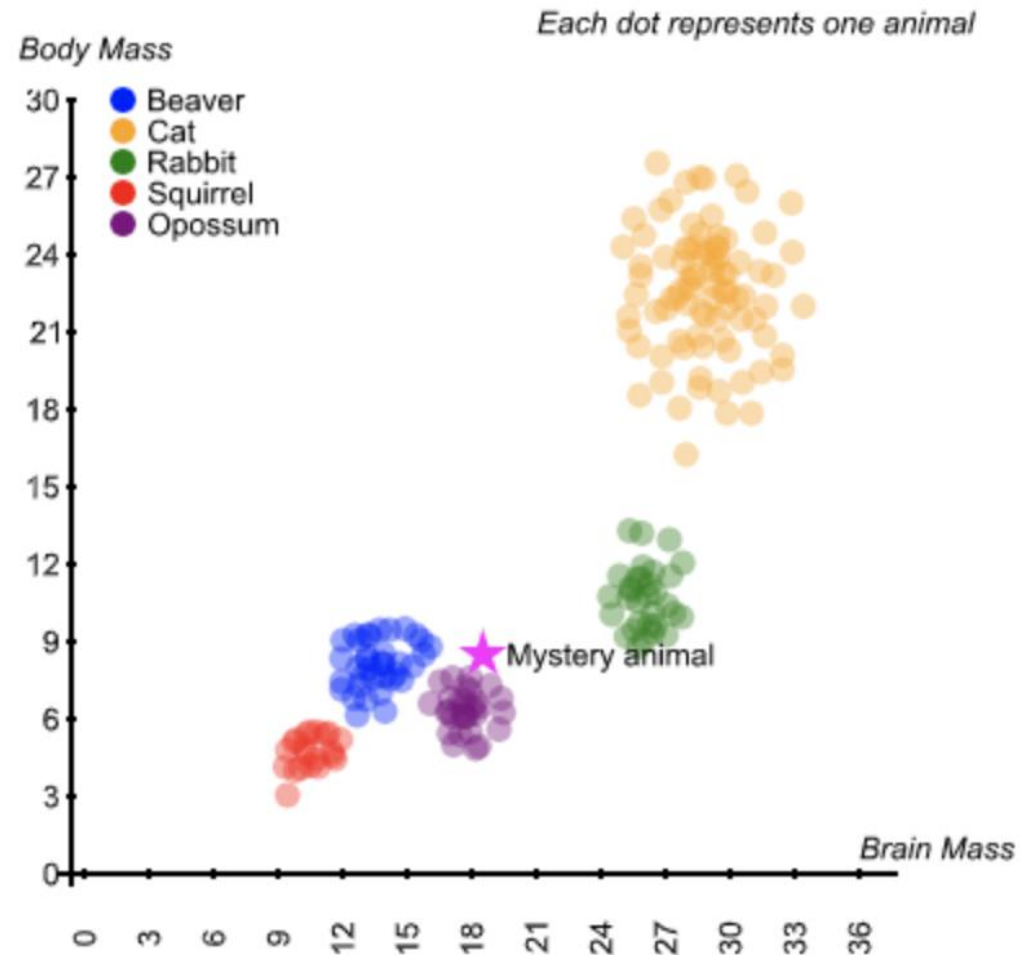
Demystifying AI

Nearest Neighbor
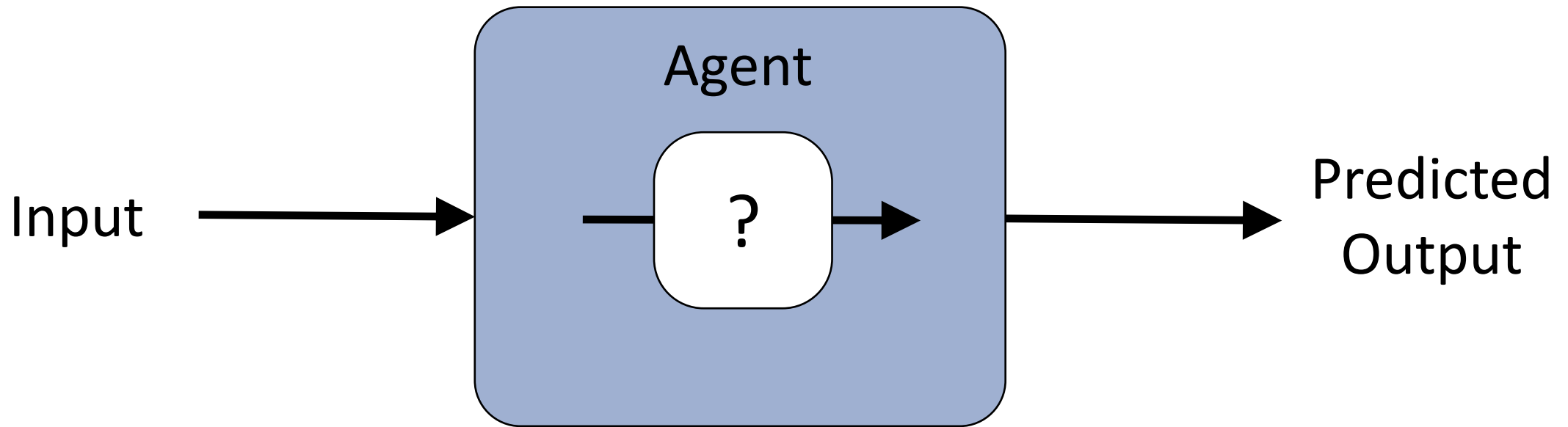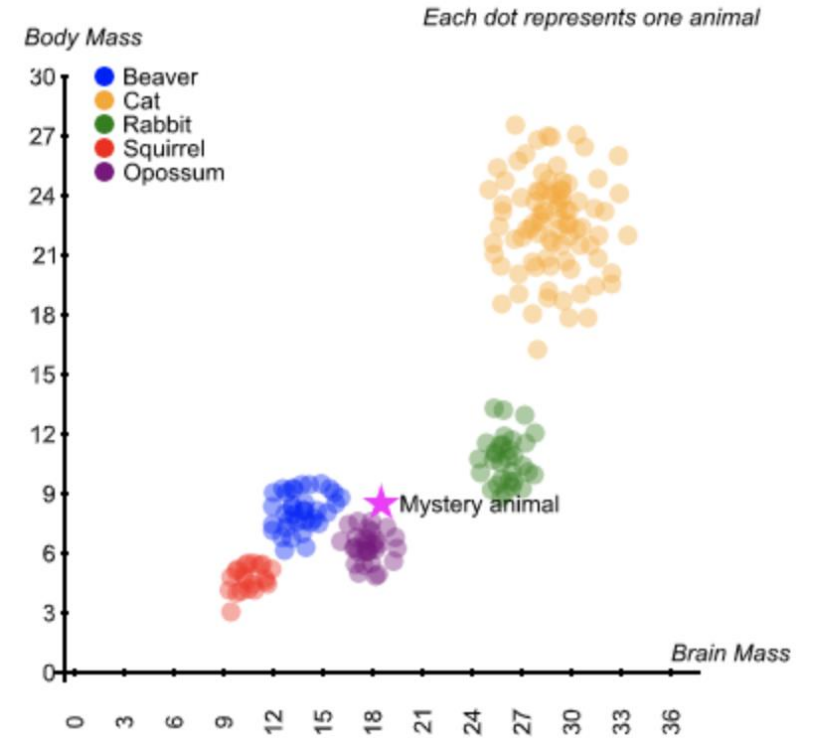
Instructor: Pat Virtue

Visualizing Data to Make Predictions

What label should we assign the mystery point?
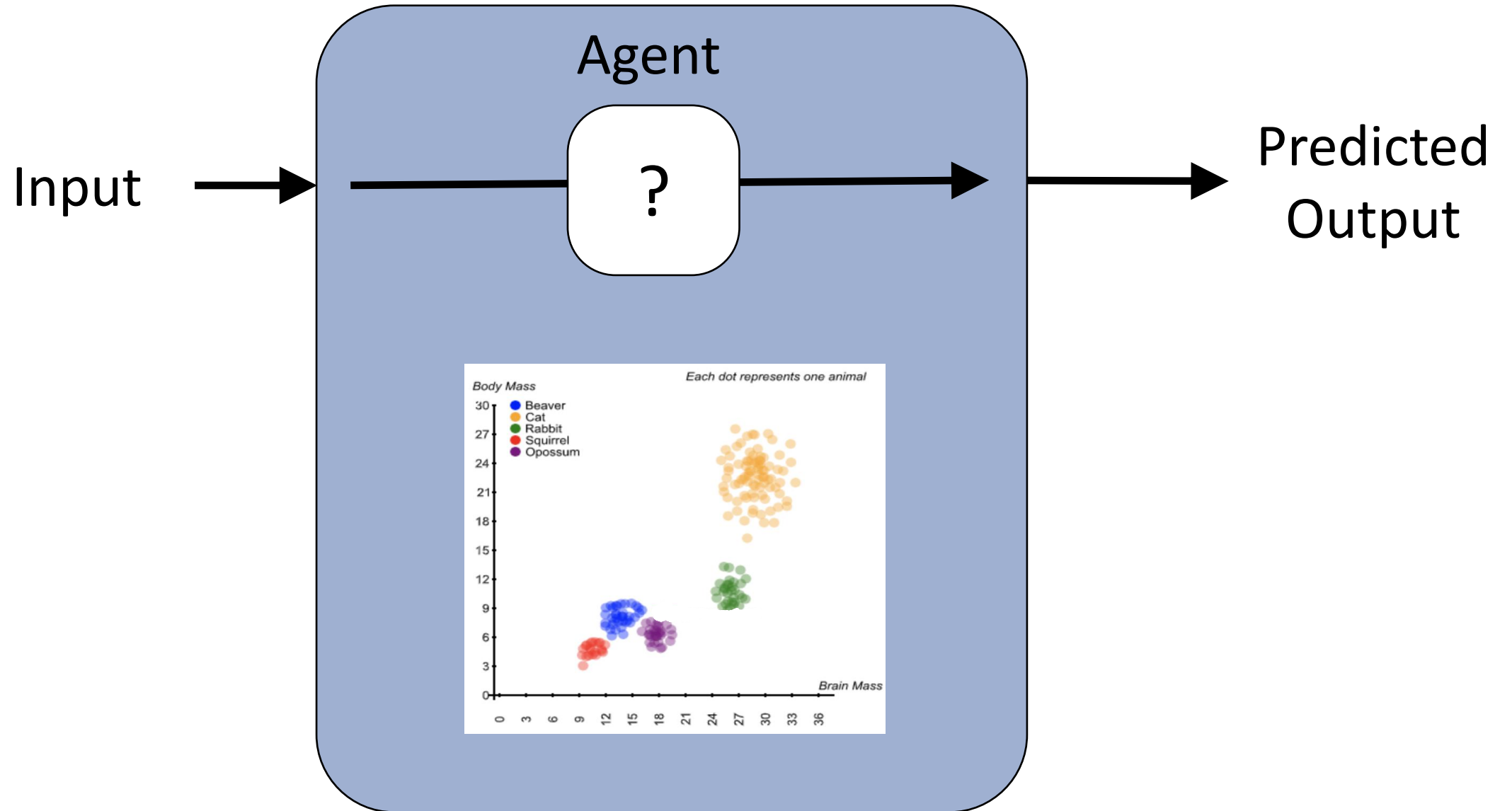
Input and Output?

What is the input and the output for this task?

Each dot represents one animal

Body Mass

- Beaver
- Cat
- Rabbit
- Squirrel
- Opossum

★ Mystery animal

Brain Mass

Input → Agent [?] → Predicted Output

Agent Uses Data to Make Decisions

Input → Agent **?** → Predicted Output

Body Mass

Each dot represents one animal

- Beaver
- Cat
- Rabbit
- Squirrel
- Opossum

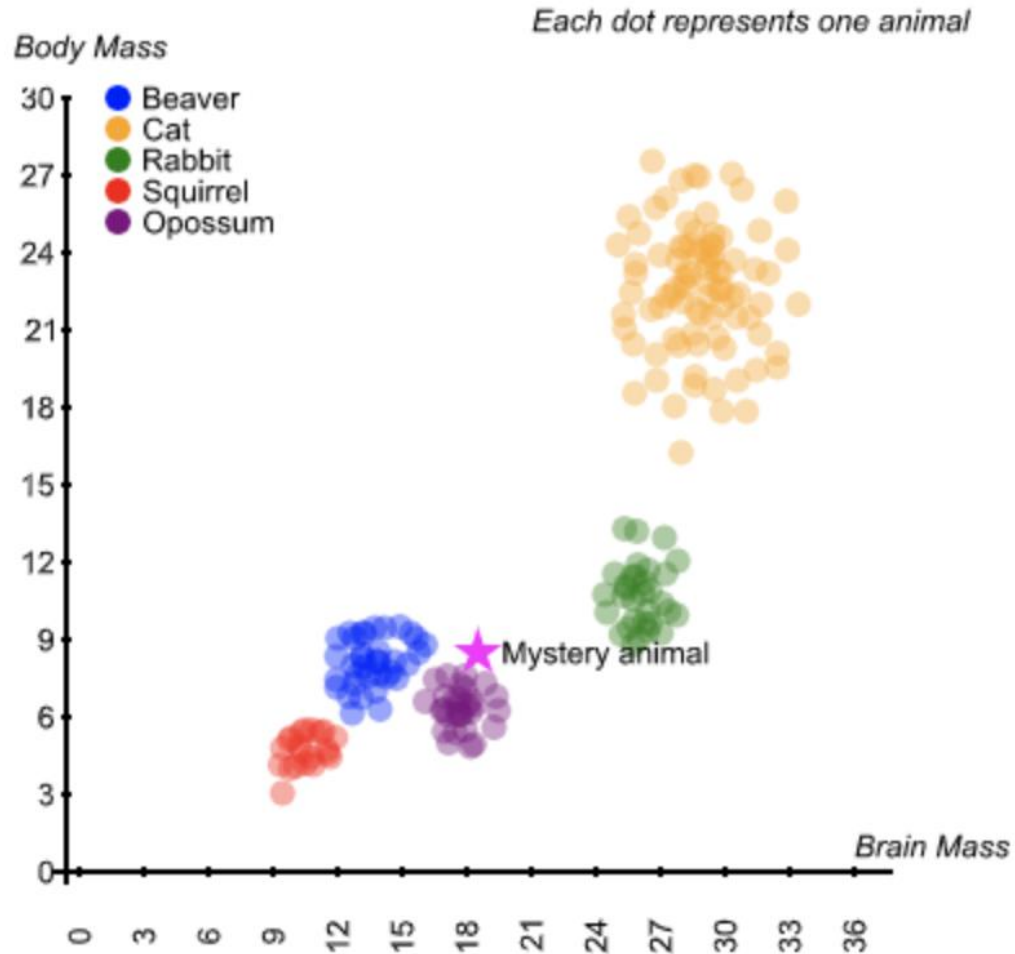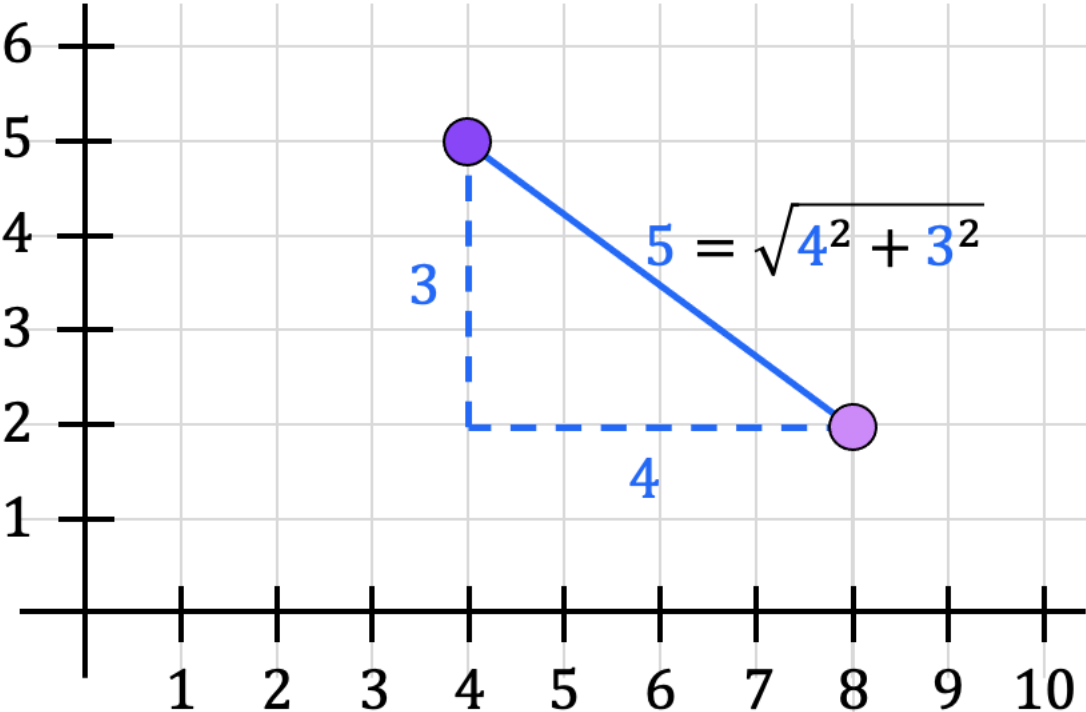Brain Mass

Using Distance as a Measure of Similarity

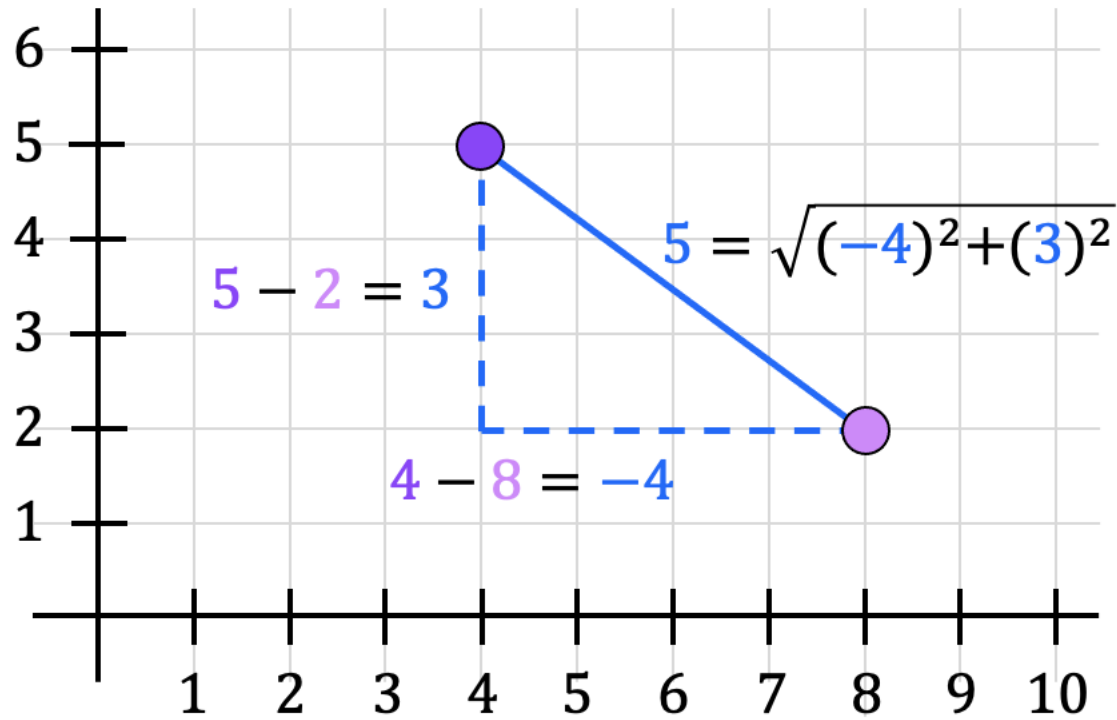Assumption: closer points are more likely to be in the same category
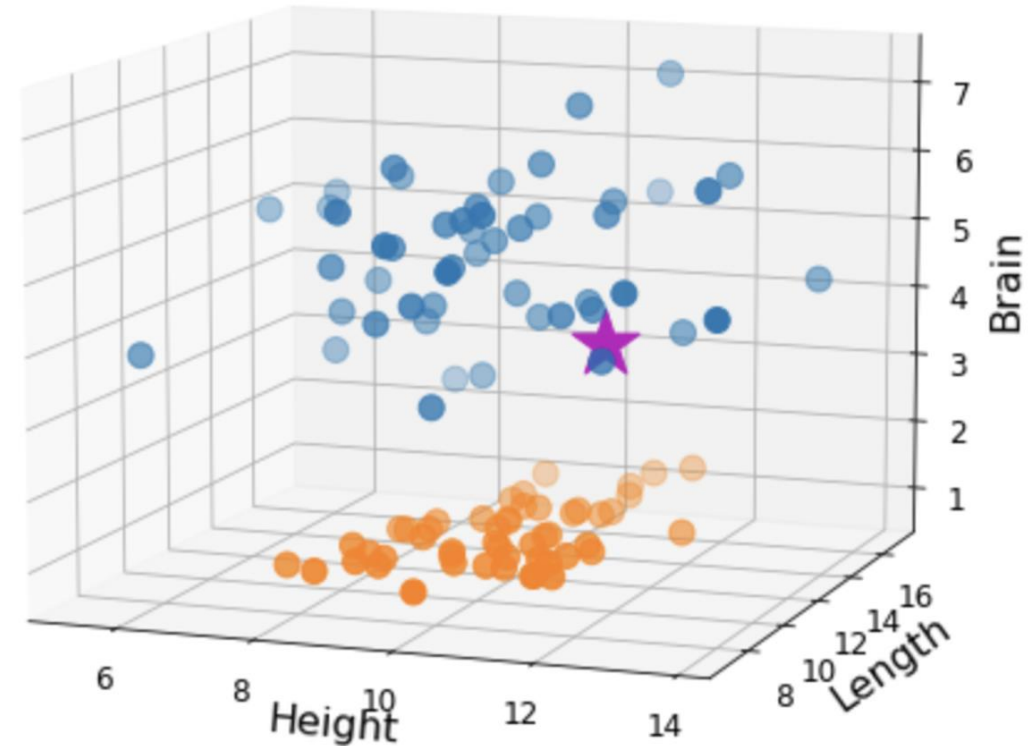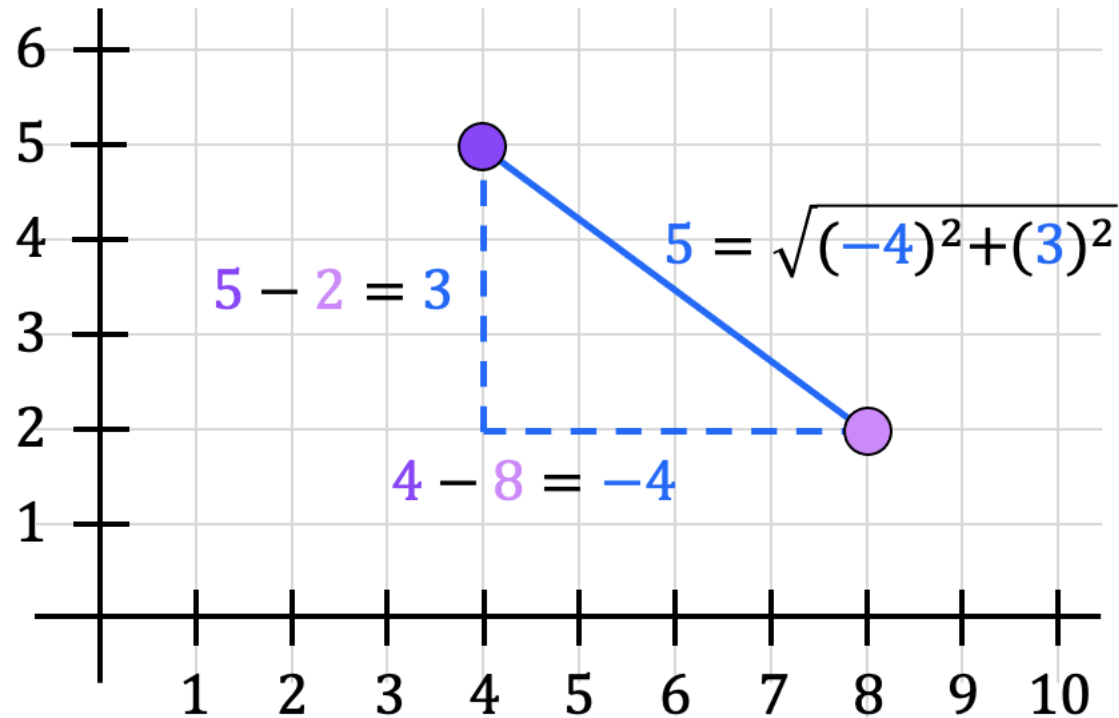
Distance

$$distance = \sqrt{a^2 + b^2}$$

$$5 = \sqrt{4^2 + 3^2}$$

Distance

$$distance = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$5 - 2 = 3$

$5 = \sqrt{(-4)^2 + (3)^2}$

$4 - 8 = -4$

Distance

$$distance = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$5 - 2 = 3$

$5 = \sqrt{(-4)^2 + (3)^2}$

$4 - 8 = -4$

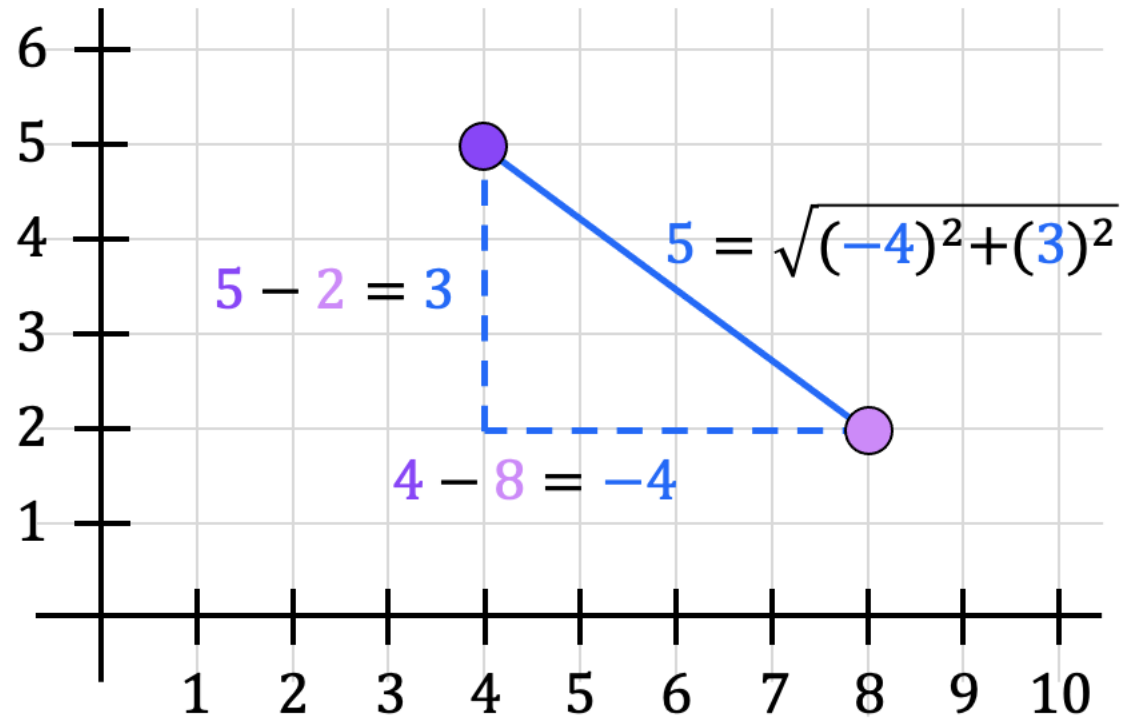**2D:** $distance = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$

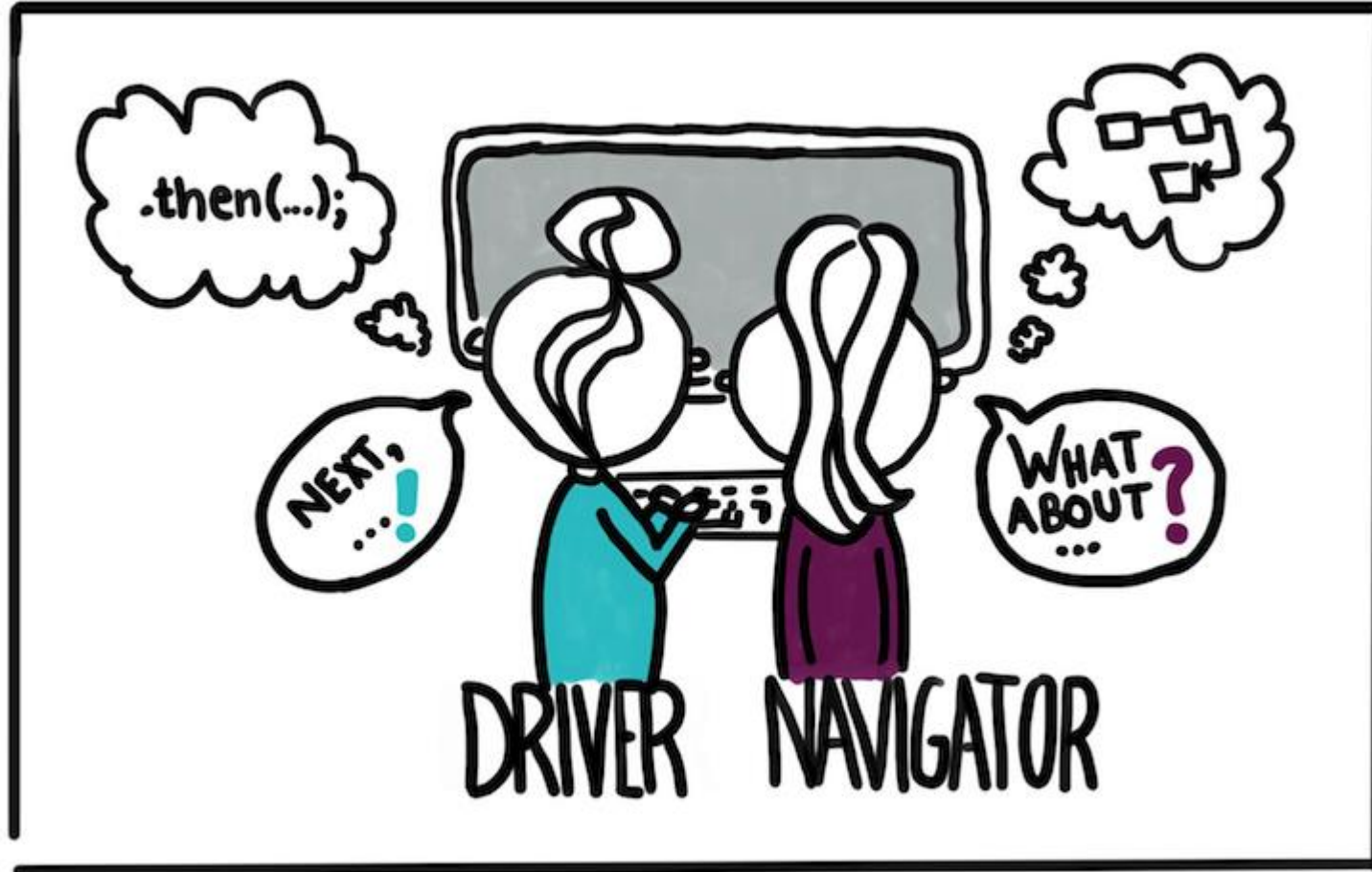**3D:** $distance = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2}$

Distance

$$distance = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$5 = \sqrt{(-4)^2+(3)^2}$
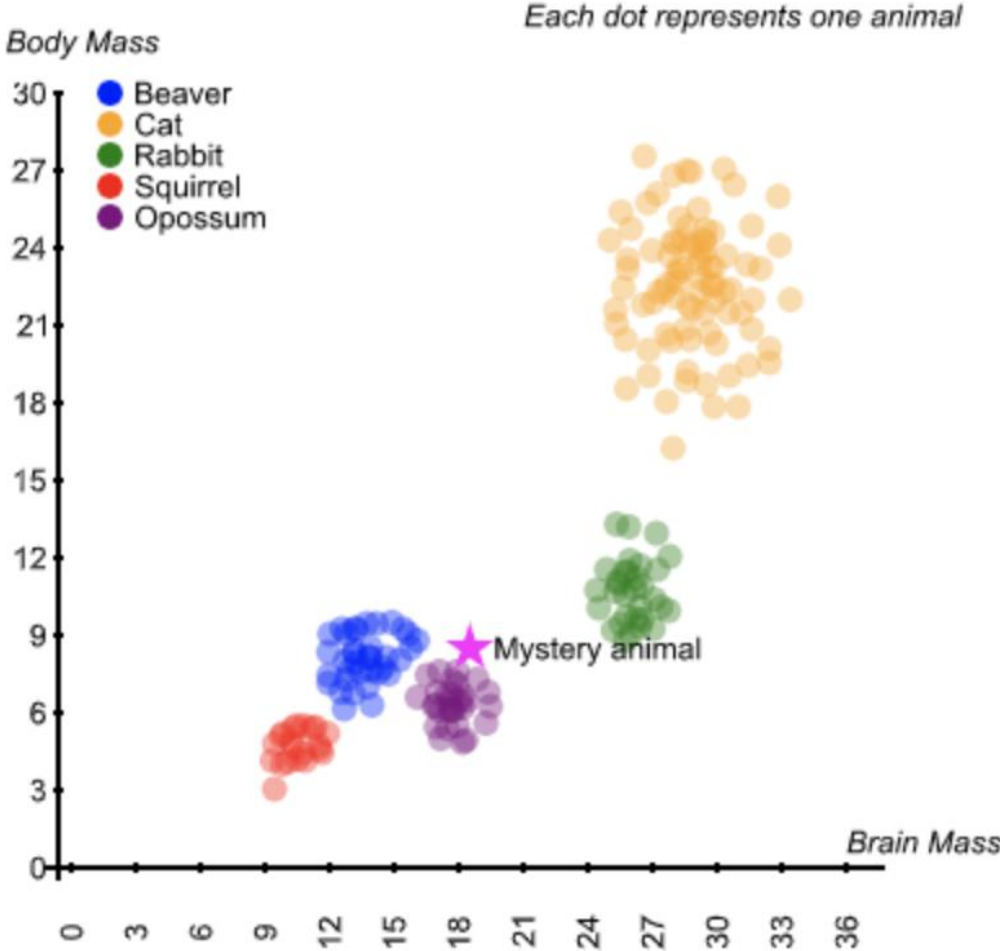
$5 - 2 = 3$

$4 - 8 = -4$

Pair Programming

https://devopedia.org/pair-programming

Exercise 1: Distance

Shared Drive Folder/Lec5_NearestNeighbor

https://drive.google.com/drive/folders/11aAngUK5sifAnK4izULqPC-Y0QnDfbqG

Nearest Neighbor Algorithm

Each dot represents one animal

Exercise 2: Nearest Neighbor

Shared Drive Folder/Lec5_NearestNeighbor

https://drive.google.com/drive/folders/11aAngUK5sifAnK4izULqPC-Y0QnDfbqG

Input and Output?

What is the input and the output for this task?

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Body Mass
- Beaver
- Cat
- Rabbit
- Squirrel
- Opossum

Mystery animal

Brain Mass

Input → Agent [?] → Predicted Output
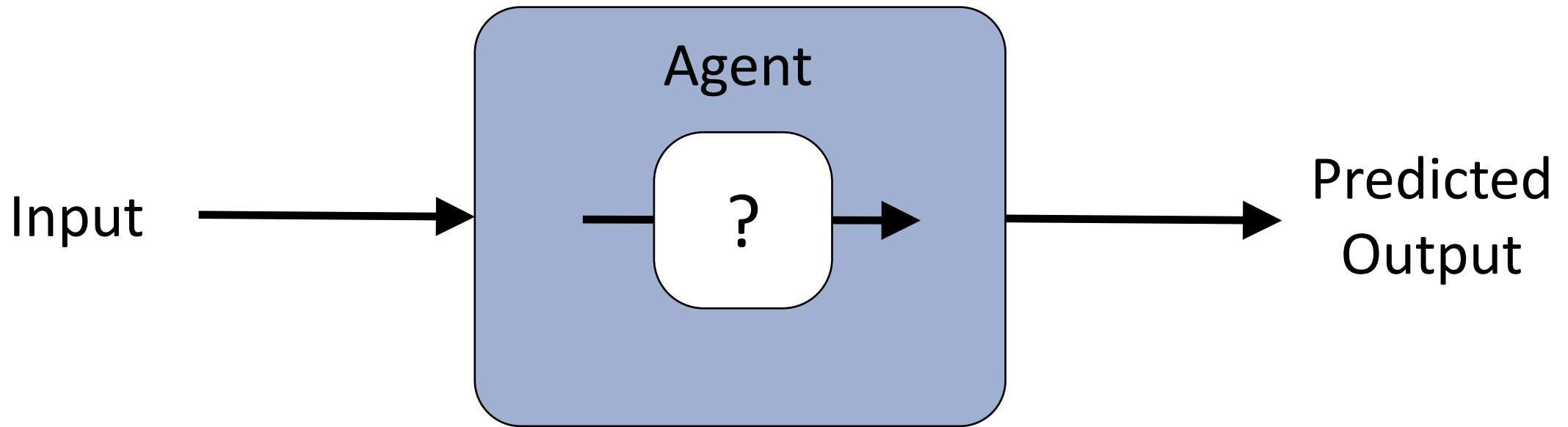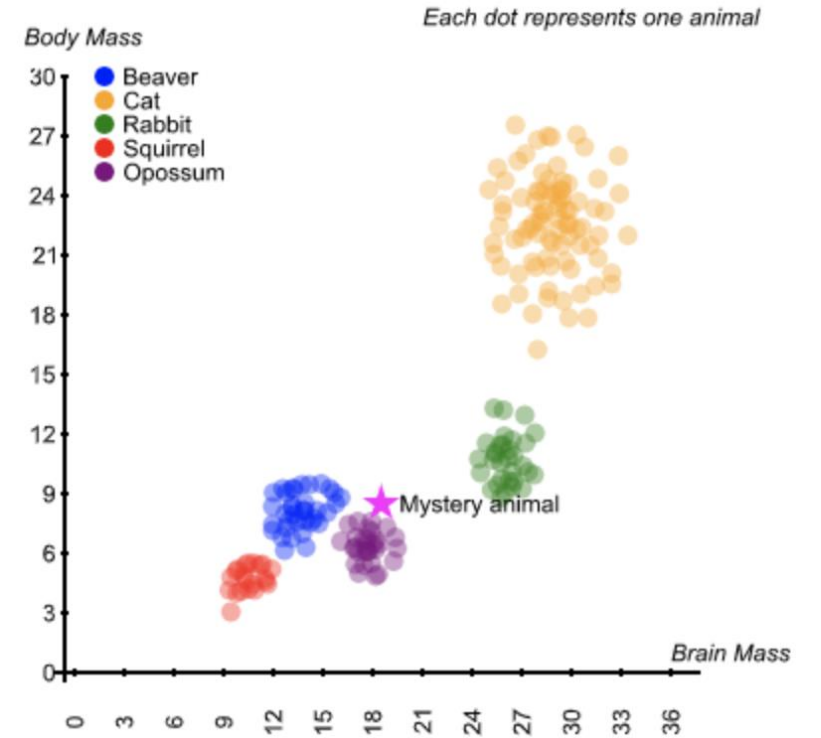
Performance Measure

Classification error rate
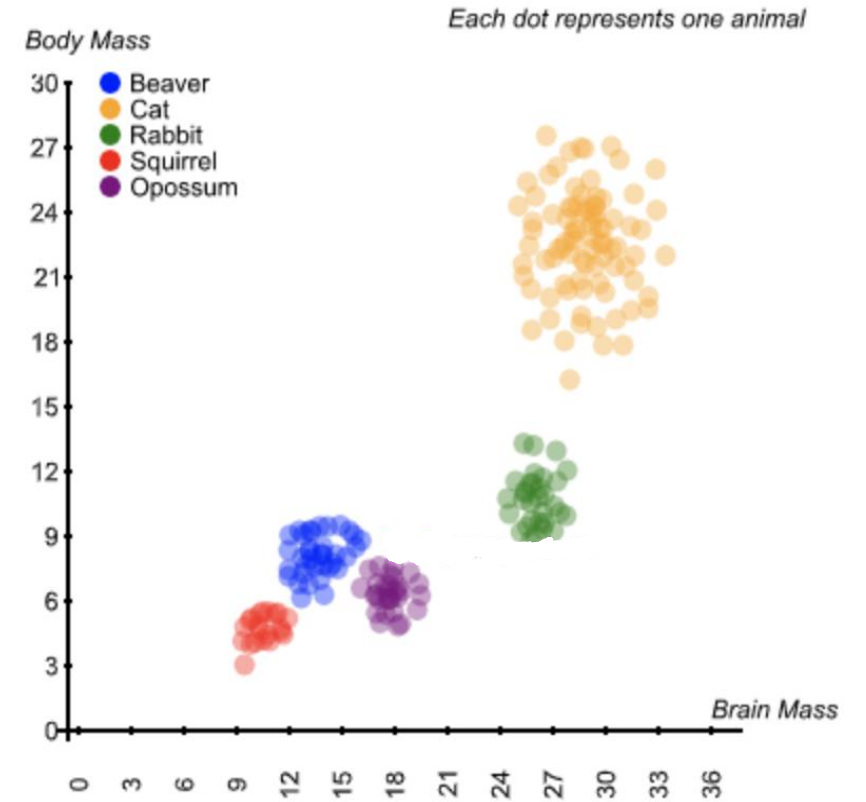
Exercise 3: Error rate

Shared Drive Folder/Lec5_NearestNeighbor

https://drive.google.com/drive/folders/11aAngUK5sifAnK4izULqPC-Y0QnDfbqG