



8.7 Models as text

Learning · Robot club · about 15 min

Name _____

Class _____

Date _____

What this lesson is about

Saving and loading a model with JSON; models trained elsewhere.

- JSON
- A model from somewhere else
- Using it

Questions

6 marks in all

1. What does this program print?

[1 mark]

```
import json
sample = ([16, 16], "wall-ahead")
back = json.loads(json.dumps(sample))
print(back)
print(back == sample)
```

2. What do `json.dumps` and `json.loads` do?

[1 mark]

- ☐ A `dumps` turns data into text; `loads` turns text back into data
- ☐ B `dumps` deletes a model; `loads` restores it
- ☐ C `dumps` saves to a file; `loads` downloads from the internet
- ☐ D Both turn text into data

3. What does this program print?

[1 mark]

```
import json
MODEL = '{"kind": "nearest-neighbour", "samples": [{"x": [16, 16], "label": "wall-ahead"}, {"x": [50, 50], "label": "open"}]}'
model = json.loads(MODEL)
data = [(s["x"], s["label"]) for s in model["samples"]]
print(model["kind"], len(data), data[1][1])
```

4. Why does the saved model include a `kind` field?

[1 mark]

- ☐ A So the program that loads it knows what to do with it
- ☐ B JSON refuses to save without one
- ☐ C It records who made the model
- ☐ D It makes the text shorter

5. How do you get a numpy weights table into a form JSON can write?

[1 mark]

- ☐ A `w1.tolist()`
- ☐ B `json.dumps(w1)` works directly
- ☐ C `str(w1)`
- ☐ D `w1.shape`

6. Which of these can JSON write down as they are?

[1 mark]

Tick every answer that is true.

- ☐ A A list of numbers
- ☐ B A dictionary
- ☐ C None
- ☐ D A numpy array
- ☐ E A tuple, kept as a tuple

The task: a model from text

Load the model in `MODEL`, classify the current view with it, and print `model says: <label>`. Do not drive.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()
import json
MODEL = '{"kind": "nearest-neighbour", "features": "depth grid rows 2 and 3", "samples":
[{"x": [54, 52, 51, 51, 51, 51, 52, 54, 54, 52, 51, 51, 51, 51, 52, 54], "label": "open"},
{"x": [16, 16, 16, 16, 16, 16, 16, 16, 16, 16, 16, 16, 16, 16, 16, 16], "label": "wall-
ahead"}, {"x": [36, 47, 46, 46, 46, 16, 16, 16, 36, 47, 46, 46, 46, 16, 16, 16], "label":
"gap-left"}, {"x": [16, 16, 16, 46, 46, 46, 47, 36, 16, 16, 16, 46, 46, 46, 47, 36],
"label": "gap-right"}]}'
model = json.loads(MODEL)
print(model['kind'], len(model['samples']), 'samples')
```

Plan your program here, then type it in and press Run.



Do it on the robot

www.bugbotlab.com/learn/8-7-models-as-text/

The simulator checks it and tells you when it passes. Nothing to install, no account.

Challenges

1. Save the trained network from lesson 8.4 as JSON with `kind` set to `network`, and write `predict(model, view)` that works for both kinds.
2. Add a `trained_on` field with today's date and print it when the model loads.
3. Store `k` in the model and vote among the `k` nearest samples.