



F12.7 AI, robots and bias

Technology and society · GCSE · OCR J277 1.6.1, AQA 8525 3.8, Edexcel
1CP2 5.2.2 · about 20 min

Name _____

Class _____

Date _____

What this lesson is about

What AI is good for, where it goes wrong, and auditing a training set for bias.

- What AI and machine learning are
- Where they help
- Where they go wrong
- Auditing a training set

Questions

6 marks in all

- What is machine learning? [1 mark]
 - ☐ A A program that finds patterns from examples instead of being given the rules
 - ☐ B A robot that moves by itself
 - ☐ C A faster processor
 - ☐ D A kind of database
 - Why can a face recognition system work worse for some groups? [1 mark]
 - ☐ A Its training data did not represent them well
 - ☐ B Their faces are harder to see
 - ☐ C Cameras are biased by design
 - ☐ D The software is too fast
 - Which is a real difficulty with machine learning decisions? [1 mark]
 - ☐ A It can be hard to explain why a decision was made
 - ☐ B They are always wrong
 - ☐ C They cannot use data
 - ☐ D They need no electricity
 - A self-driving car injures someone. What is the hard question? [1 mark]
 - ☐ A Who is accountable: owner, manufacturer or programmer
 - ☐ B Whether the car was fast
 - ☐ C What colour the car was
 - ☐ D Which fuel it used
 - A training set has 20 samples and 3 are 'night'. What percentage is that? [1 mark]
-

6. What does this program print?

[1 mark]

```
counts = {}
for s in ['day', 'day', 'night']:
    counts[s] = counts.get(s, 0) + 1
print(counts)
```

The task: audit the training set

Count how many samples of each label are in `samples`. Print `<label>: <n> (<share>%)` for each, sorted from the most common to the least, with the share rounded to the nearest whole number. Any label making up less than 15% is under-represented: add `UNDER-REPRESENTED` to its line. At the end print `labels: <n>` and `under-represented: <labels>`, the under-represented labels joined by `,`.

```
# the two lines every program starts with: the commands, then the robot
from bugbot import *
connect()

samples = [
    "day", "day", "day", "day", "day", "day", "day", "day", "day", "day",
    "day", "day", "day", "dusk", "dusk", "night", "night", "night", "indoor", "day",
]
```

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



Do it on the robot

www.bugbotlab.com/learn/f12-7-ai-robots-and-bias/

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

Challenges

1. Add ten more `night` samples. Which labels are still under-represented?
2. Give an example of a decision you would not want a machine to make alone, and say why.
3. A robot is trained only on a clean mat. What happens on a dusty one, and whose fault is that?