

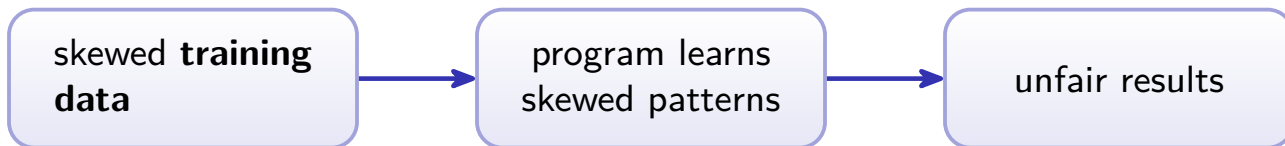
Exercise walk-through

5.3

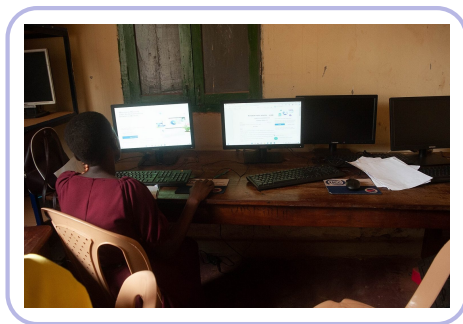
Computing Bias

AP Computer Science Principles

Computing bias



Computing bias is unfairness built into a program, often from unrepresentative data. Testing with **diverse** users reveals it before release.



Public access can reduce the digital divide

Where bias enters a computing system

bias

can be built in, and often unintentionally

through the data

if the training data reflects existing prejudice, the system reproduces it

through the designers

choices about what to measure, and for whom, carry the designers' own assumptions

through who is missing

a system tested only on one group fails on the groups it never saw

the remedy

diverse teams, diverse test data, and auditing outputs rather than trusting intentions

“Unintentional” does not mean harmless. A biased system at scale affects more people than any biased individual could.

Crowdsourcing

Crowdsourcing obtains input, ideas or funding from a **large group of people**, usually online – harnessing the knowledge and effort of many. Mapping projects, **citizen science**, and crowdfunding all work this way.

Strength: diverse, large-scale, shared effort

Challenge: **quality**
control – not everyone is careful

Showing each item to several people and keeping the majority answer protects quality.



Crowdsourcing pools many contributors

Exercises 2.1-2.3

2.1 Define computing bias.

[1]

2.2 State how biased training data causes unfair results.

[1]

2.3 State one way developers can reduce bias.

[1]

Exercises 2.1-2.3

2.1 Define computing bias.

[1]

2.1

- unfairness built into a program, sometimes without the developers realising it
-

2.2 State how biased training data causes unfair results.

[1]

2.2

- the program learns the bias in the data and repeats it in its results
-

2.3 State one way developers can reduce bias.

[1]

2.3

- test with diverse users and data (or review the training data)

Exercises 3.1-3.2

3.1 Computing bias can be built into a program

[1]

☐

A always on purpose

B sometimes without the developers' awareness

C only by users

D never

3.2 Testing with diverse users helps to

[1]

☐

A add bias

B reveal hidden bias

C slow the program

D compress data

Exercises 3.1-3.2

3.1 Computing bias can be built into a program

[1]

- ☐ **A** always on purpose
B sometimes without the developers' awareness
C only by users
D never

3.1 B

- sometimes without the developers' awareness.

3.2 Testing with diverse users helps to

[1]

- ☐ **A** add bias
B reveal hidden bias
C slow the program
D compress data

3.2 B

- reveal hidden bias.

Exercise 3.3 (a)

3.3 A facial-recognition app works poorly for some groups of people.

(a) State a likely cause.

[1]

Exercise 3.3 (a)

3.3 A facial-recognition app works poorly for some groups of people.

(a) State a likely cause.

[1]

(a)

- biased or unrepresentative training data

Exercise 3.3 (b)

3.3 A facial-recognition app works poorly for some groups of people.

(b) State one harm this could do.

[1]

Exercise 3.3 (b)

3.3 A facial-recognition app works poorly for some groups of people.

(b) State one harm this could do.

[1]

(b)

- unfair treatment of the affected groups

Exercise 3.3 (c)

3.3 A facial-recognition app works poorly for some groups of people.

(c) State one way to reduce the bias.

[1]

Exercise 3.3 (c)

3.3 A facial-recognition app works poorly for some groups of people.

(c) State one way to reduce the bias.

[1]

(c)

- test and train with more diverse data