COMP1531

🐶 Software Engineering
3.5 - Testing - Code Coverage

In this lecture

Why?

- We need a mechanism to tell how much our tests actaully test

What?

- Coverage
- Code Coverage
- pycoverage

How do we know if our tests are good?

Coverage

- **Test Coverage**: a measure of how much of the feature set is covered with tests
  - This is often left to human judgement
- **Code coverage**: a measure of how much code is executed during testing
  - This can be computed and quantified

Coverage.py

- Measure code coverage as a percentage of statements (lines) executed
- Can give us a good indication how much of our code is executed by the tests
- … and most importantly highlight what has **not** been executed.

Checking code coverage

- Run Coverage.py for your pytests:

  ```
  coverage run --source=. -m pytest
  ```

- View the coverage report:

  ```
  coverage report
  ```

- Generate HTML to see a breakdown (puts report in htmlcov/)

  ```
  coverage html
  ```

Example: Leap years

```python
def is_leap_year(year):
    if year % 4 != 0:
        return False
    elif year % 100 != 0:
        return True
    elif year % 400 != 0:
        return False
    else:
        return True
```

Example: Year from day

```python
def day_to_year(days):
    '''
    Given a number of days from January 1st 1970, return the year.
    '''
    year = 1970

    while days > 365:
        if is_leap_year(year):
            if days > 366:
                days -= 366
                year += 1
        else:
            days -= 365
            year += 1

    return year
```

Branch coverage checking

- For lines that can potentially jump to more than one other line (e.g. if statements), check how many of the possible branches were taken during execution
- Can be done with the --branch option in Coverage.py
- Sometimes referred to as edge coverage
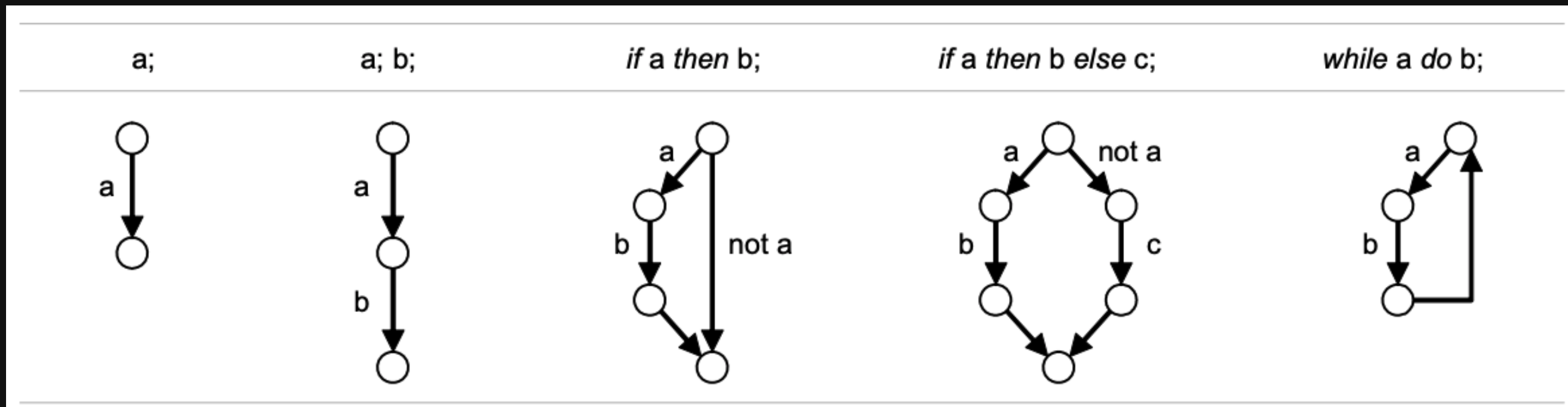
Does code coverage imply
test coverage?

Summary

- Code coverage is useful
- It's more important to look at what's not covered than the coverage percentage
- Branch coverage is a more accurate measurement so you should use it instead of statement coverage
- Like all measurements, it's important to understand what meaning to attach to it

Feedback