Continuous Integration

AI Engineering - Recitation 6

Continuous Integration

- A sequence of stages through which a software system has to go through before it can be deployed.
- Goals:
  - Reduce time take from code-commit to deployment
  - Automate any build activities (or reduce manual effort as much as possible)

A typical CI workflow:

- A code-commit triggers a new pipeline run
- The pipeline executes the configured stages
- A deployable artifact is generated, if all stages pass

Examples of artifacts:
Docker images, JAR files, Library packages

CI Pipeline

- Defined set of stages which run in an automated fashion
- Pipeline stages:
  - Checkout code -> Set up environment -> Build code -> static checks -> Unit tests -> Integration tests -> packing the software -> …
- Machine learning pipelines are simply CI pipelines tailored to suit ML systems
- For machine learning, you may have more stages:
  - Data quality check, offline model evaluation, data collection, data preprocessing, model serialization, telemetry data collection etc.
- CI/CD tools: Jenkins, CircleCI, Github Actions, TravisCI etc.

Demo - Unit Testing with CI Pipelines on CircleCI

- Goals:
  - Understand how unit tests can be written for your software
  - Configure a simple CircleCI pipeline (Useful for M2)

- Why CircleCI-
  - It works pretty well out of the box
  - Free of cost
  - Github integration is seamless
  - … and many more useful features

- For M2, you can use any tool that you want

CI Pipeline Qualities

- Repeatable [consistent results across runs; consecutive runs are independent]
- Fault-tolerant [fail gracefully if any stage fails]
- Correct [performs what is expected of it given some inputs]
- Robust [should be able to handle noise in any inputs the pipeline expects]
- Testable [stages of the pipeline should be independently testable]
- Traceable [should be possible to trace any error to its source quickly]
- Performant [should be possible to move through the pipeline quickly]

CI pipelines should also be tested thoroughly just like you would test any other software