General AI/ML

Unit 4: Productionizing with Docker

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4.2.1

Introduction to Docker

What is Docker?

Understanding Containers: The Building Blocks of Docker

- Imagine a shipping container - it holds everything you need to transport goods safely. A Docker container is similar; it packages your settings into a single unit

- Containers share the underlying operating system, making them lightweight and efficient. Each container runs in its own isolated space, preventing conflicts with other projects

- Containers ensure your AI project runs the same exact way on any machine with Docker installed. This makes collaboration and deployment a breeze!

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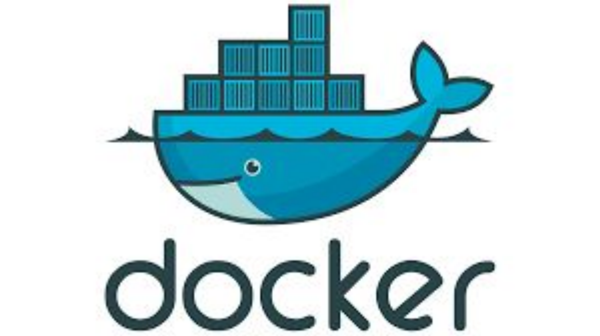
What is Docker?

- Docker is a platform for developing, shipping, and running applications / projects as containers

- By using containers, Docker allows you to package up an application with all parts it needs, such as libraries and other dependencies, and ship it all out as one package



https://docs.docker.com/get-started/

Development Woes Without Docker

- The "Works on My Machine" syndrome: Without containers, project work is prone to breaking on other systems due to differences in setups

- Dependency hell: It's cumbersome to manage conflicting library versions, especially in teams working on multiple projects

- Hardware incompatibility: Your model might train flawlessly on your GPU, but fail to run on other hardware

- Deployment roadblocks: Taking your AI model from the lab to production becomes painful without a standardized packaging format

Benefits of Docker for Machine Learning

- Reproducibility: ML experiments run identically on your laptop, in the cloud, or on a teammate's machine

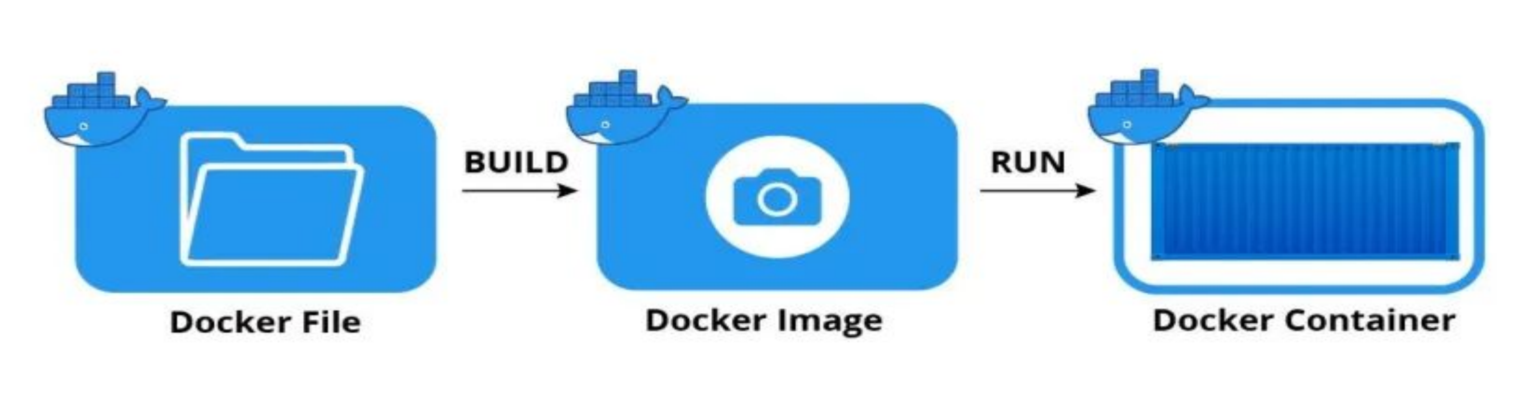
- Ease of collaboration: Docker images can be shared and everyone on the team has the exact setup to build upon your work

- Dependency heaven: Isolate projects and dependencies efficiently

- Cloud deployment: Docker makes deployment on powerful cloud infrastructure incredibly seamless and smooth

- Rapid Experimentation: quick setup and teardown of environments, making it easier to experiment with different ML models and frameworks

Docker Workflow



Dockerfile:

A recipe file with instructions to build a Docker image, like a blueprint for your container's setup.

Docker Image:
A self-contained package that stores the code, libraries, and configuration for your application – think of it as a software snapshot.

Docker Container:

A running instance of a Docker image, like an isolated workspace where your application executes.

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