

Continuous Delivery for Machine Learning

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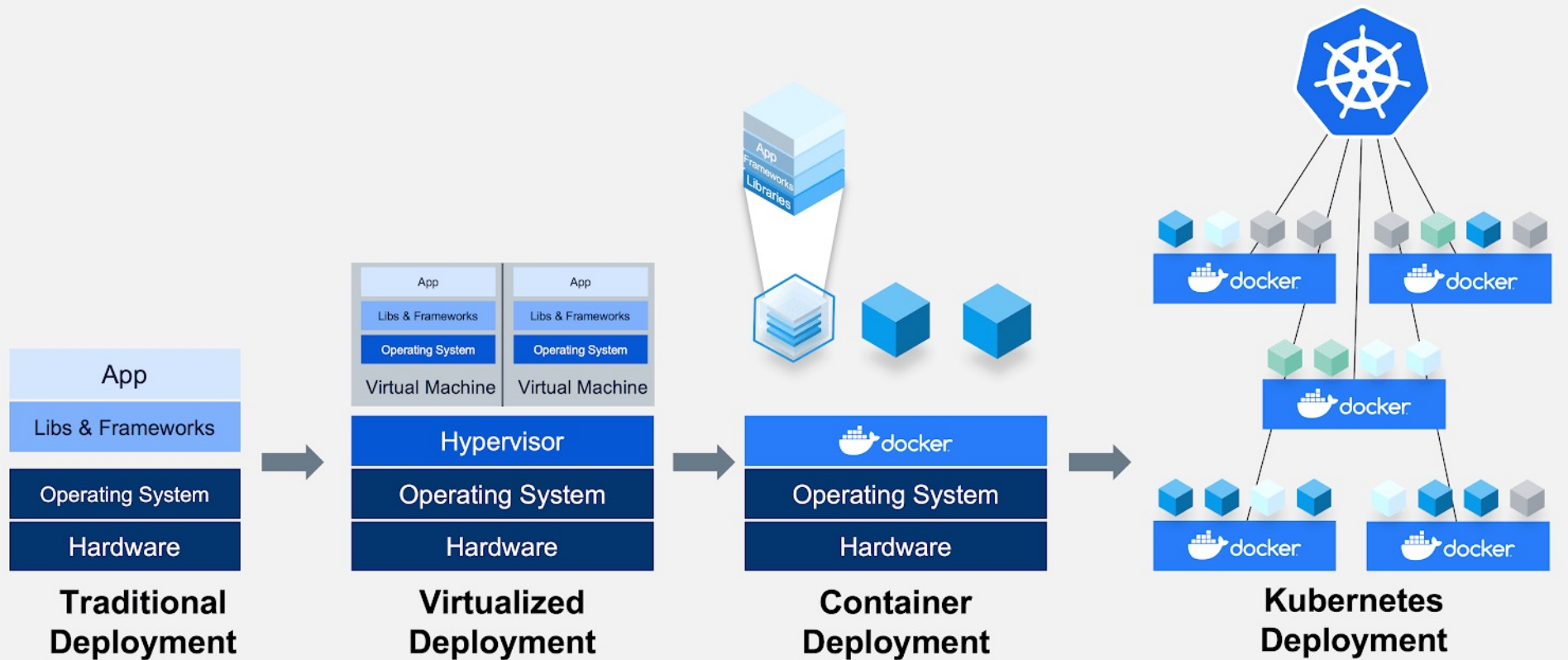
Agenda

- Serving ML Model
- Deployment Pipeline
- Tool Support
- Deployment Options

Serving ML Models

- Model published as data: the model is treated and published independently, but the consuming application will ingest it as data at runtime.
- Embedded model: treat the model artifact as a dependency that is built and packaged within the consuming application.
- Model deployed as a separate service: the model is wrapped in a service that can be deployed independently of the consuming applications.

Container



<https://www.docker.com/blog/top-questions-docker-kubernetes-competitors-or-together/docker-kubernetes-together/>

Continuous Delivery

A close, collaborative working relationship between development and deployment team

Extensive automation of all possible parts of the delivery process

The Addison-Wesley Signature Series

A MARTIN FOWLER SIGNATURE BOOK
Martin

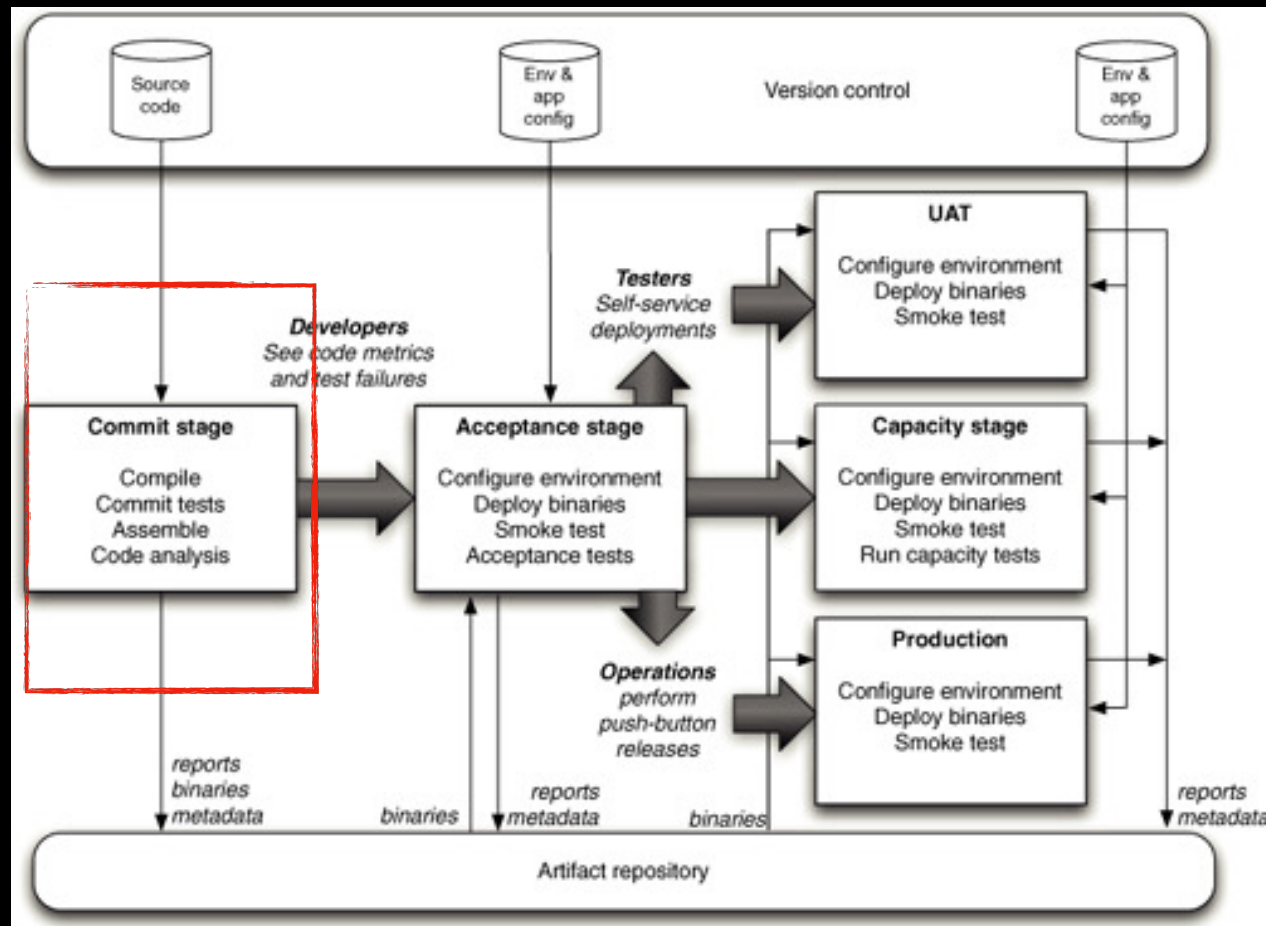
CONTINUOUS DELIVERY

RELIABLE SOFTWARE RELEASES THROUGH BUILD, TEST, AND DEPLOYMENT AUTOMATION

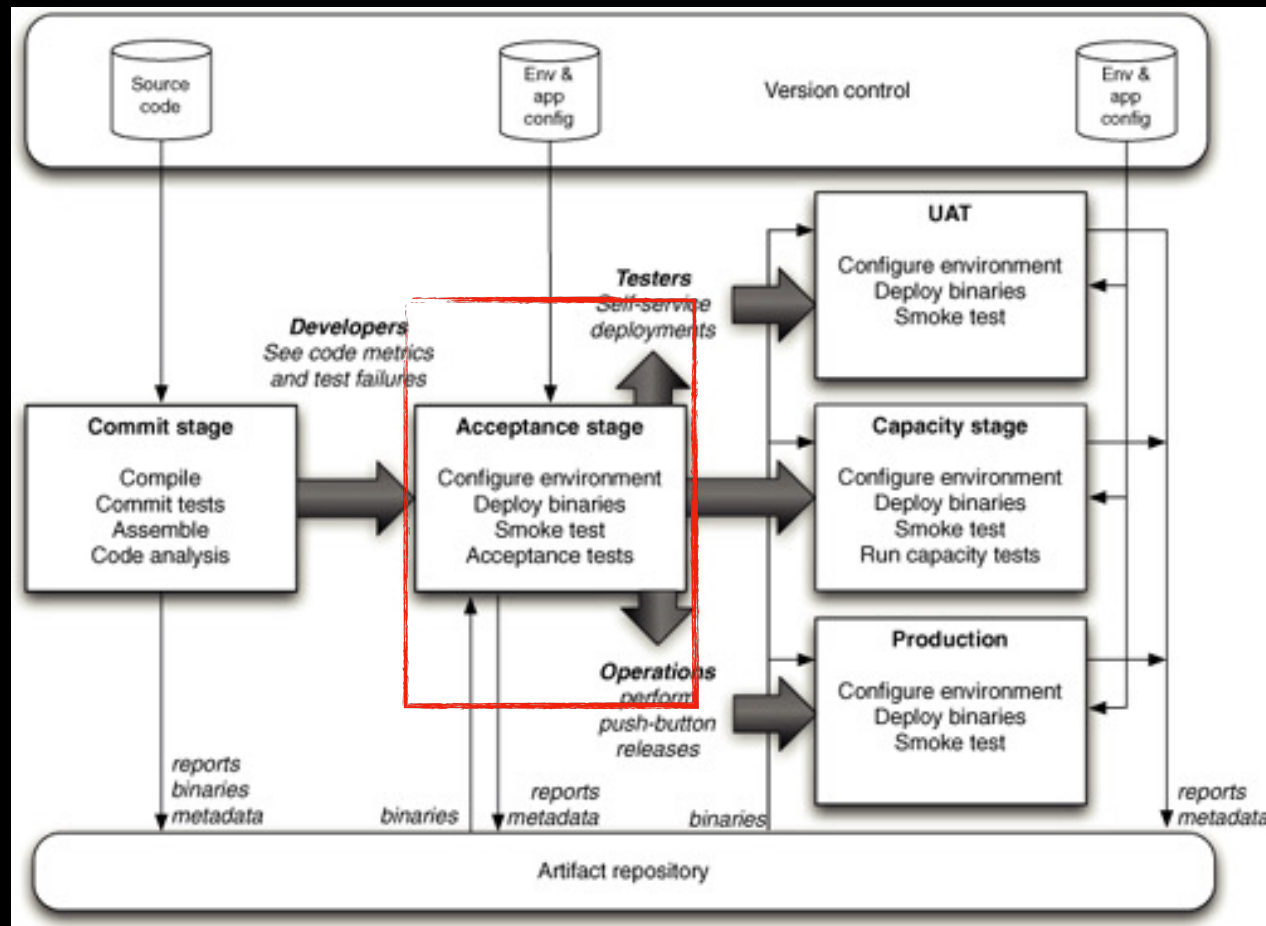
JEZ HUMBLE
DAVID FARLEY



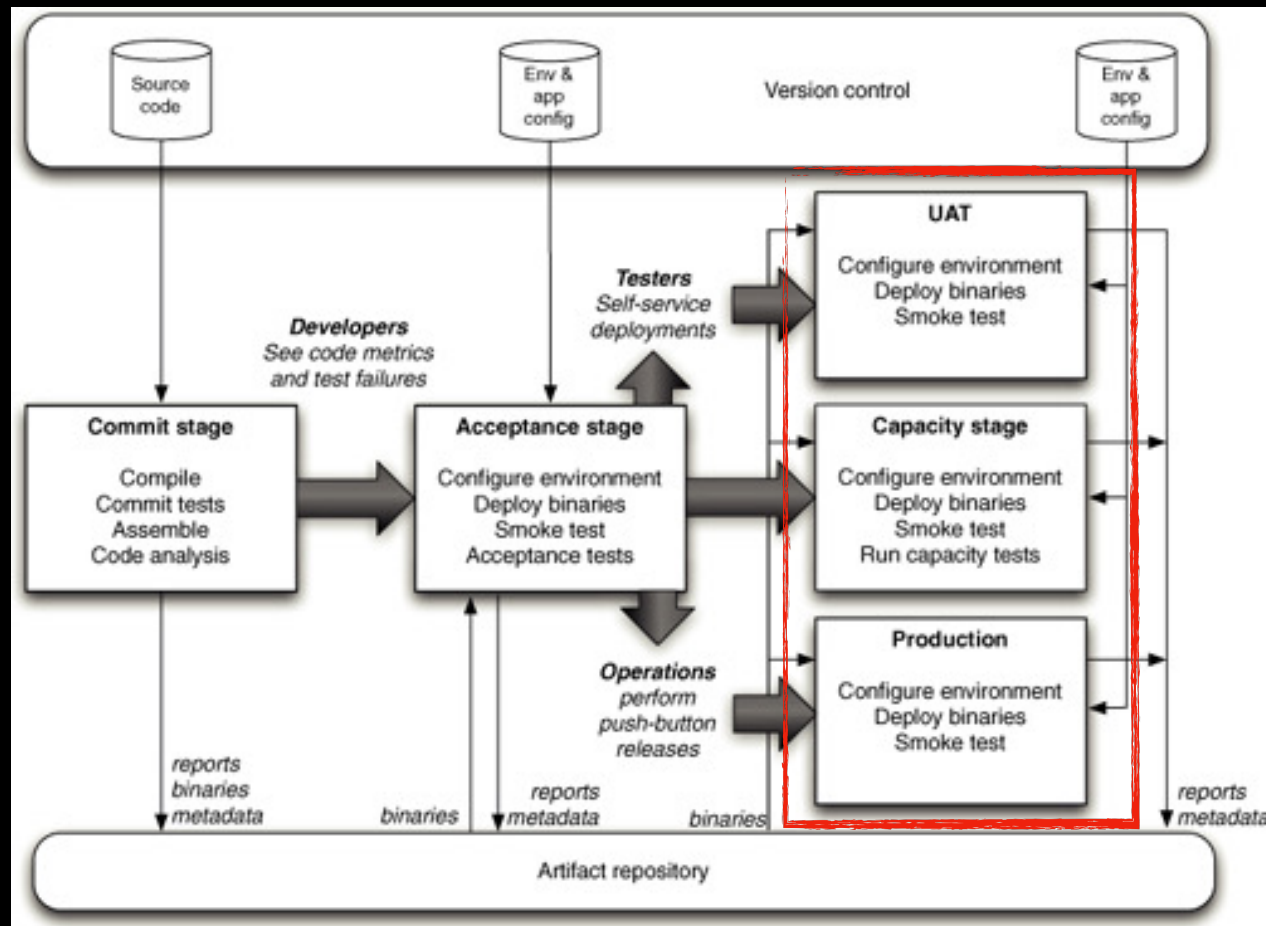
Foreword by Martin Fowler



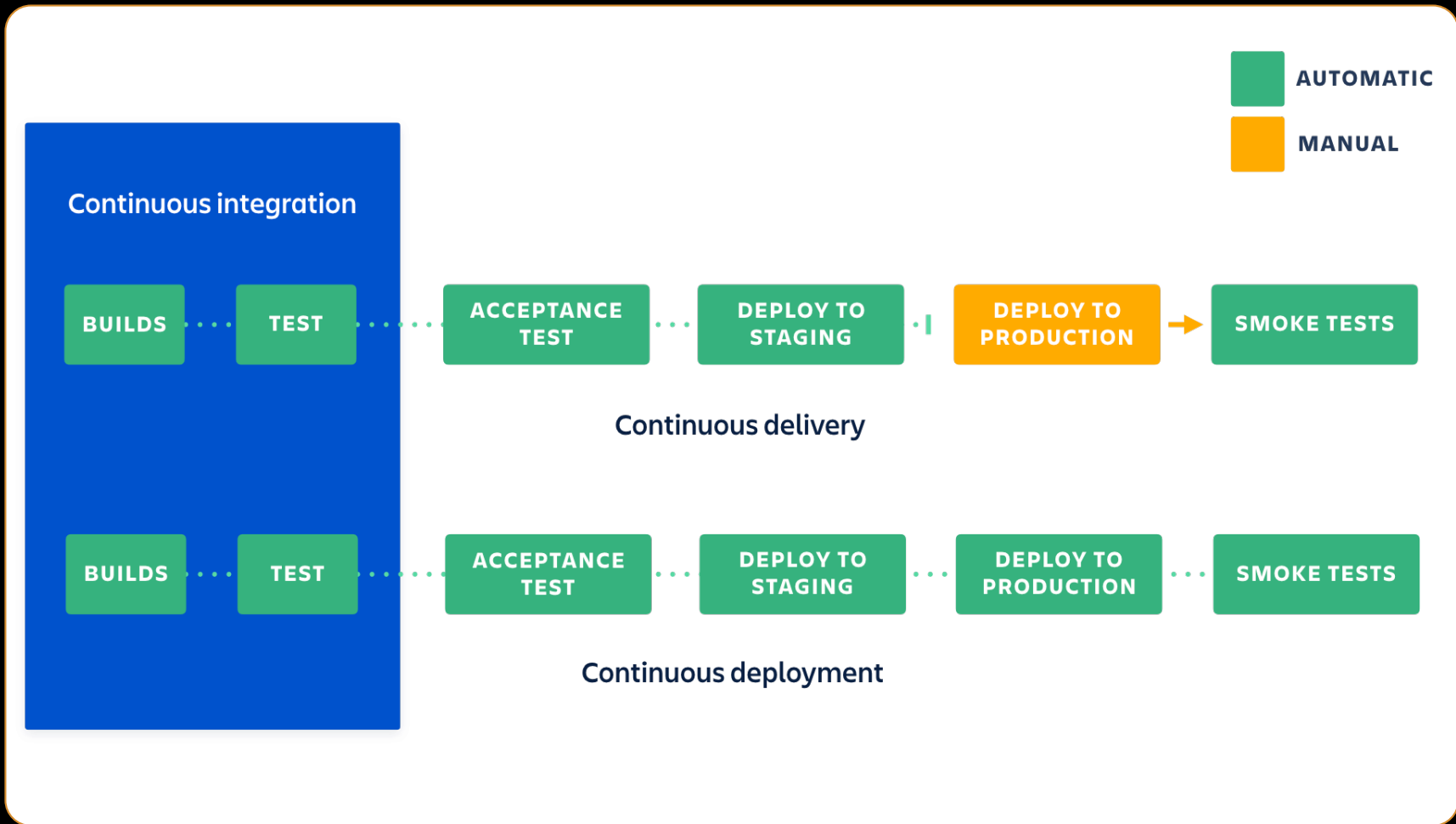
Continuous Delivery Reliable Software Releases through Build, Test, and Deployment Automation by Jez Humble and David Farley



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<https://www.atlassian.com/continuous-delivery/principles/continuous-integration-vs-delivery-vs-deployment>



Where do you store your code?

Pithucket Cloud

Pithucket Server

Pithucket Enterprise

bitwise-jenkins / junit-plugin #1

PipelineChangesTestsArtifacts

Pull Request: PR-7 48s No changes

Commit: 86b2229 a minute ago

Initialize

Build

Report

Jenkins

PipelinesAdministration

Logout

bitwise-jenkins / junit-plugin

ActivityBranchesPull Requests

Status	Run	Commit	Branch	Message	Duration	Completed	
	3	b518058	PR-7	-	4m 51s	a minute ago	
	1	63a7f47	master	-	5s	8 minutes ago	
	1	86b2229	PR-7	-	48s	7 minutes ago	
	6	d3d9a39	blog/blue-ocean-editor	-	1m 52s	12 minutes ago	
	5	d3d9a39	blog/blue-ocean-editor	-	11m 8s	4 hours ago	



```
name: learn-github-actions
on: [push]
jobs:
  check-bats-version:
    runs-on: ubuntu-latest
    steps:
```

Event
on: [push]

Job: check-bats-version

Step 1

Checkout repository
- uses: actions/checkout@v2

Step 2

Install node
- uses: actions/setup-node@v2

Install -g bats

Summary

Jobs

✓ check-bats-version

check-bats-version
succeeded 8 minutes ago in 9s

Search logs

- > ✓ Set up job 3s
- > ✓ Run actions/checkout@v2 1s
- > ✓ Run actions/setup-node@v1 2s
- > ✓ Run npm install -g bats 2s
- ✓ Run bats -v 0s
 - 1 ▶ Run bats -v
 - 4 Bats 1.2.1
- > ✓ Post Run actions/checkout@v2 1s
- > ✓ Complete job 0s

<https://docs.github.com/en/actions/learn-github-actions/understanding-github-actions#viewing-the-jobs-activity>

Update train.py



hamelsmu wants to m

Conversation



hamels

- Inc
- Hy



hamels

/run-fu



github

ML W

The fol

- har
- har

Check

55 lines (48 sloc) | 2.22 KB

Raw

Blame



```
1 name: ChatOps
2 on: [issue_comment]
3
```

98 lines (88 sloc) | 4.27 KB

Raw





Blame



```
1 name: ML Workflow Via Actions
2 on:
3   pull_request:
4     types: [labeled]
5
6 jobs:
7
8   ml-workflow:
9     if: github.actor == 'pr-chatops[bot]'
10    runs-on: ubuntu-latest
11    steps:
12
13      - name: Copy Repository Contents
14        uses: actions/checkout@master
15
16      - name: Trigger on PR Label
17        id: label
18        run: python action_files/validate_payload.py
19        env:
20          TRIGGER_LABEL_NAME: "Full Test Pending"
21
22      - name: Publish CPU Image to DockerHub
23        if: steps.label.outputs.TRIGGERED == 'true'
24        run: |
25          cd $GITHUB_WORKSPACE
26          echo ${PASSWORD} | docker login -u $USERNAME --password-stdin
27          BASE_NAME="$USERNAME/ml-cicd"
28          IMAGE_NAME="$BASE_NAME:$GITHUB_SHA"
29          docker pull $BASE_NAME || true
30          docker build --cache-from $BASE_NAME -t $IMAGE_NAME -t $BASE_NAME -f docker/Dockerfile .
31          docker push $IMAGE_NAME
32          docker push $BASE_NAME
```

Update train.py #34

 hamelsmu wants to merge 1 commit into `master` from `demo-mlops-2`




 Conversation 4  Commits 1  Checks 2  Files changed 1



hamelsmu commented on Oct 14, 2019

Collaborator  ...

- Increased the size of embeddings from 50 to 85
- Hypothesis: this makes the models better


 4  4  1  2  2  3

 Update train.py

Verified ✓ 5287272



hamelsmu commented on Oct 14, 2019

Collaborator Author  ...

/run-full-test

 pr-chatops bot added the `Full Test Pending` label on Oct 14, 2019



github-actions bot commented on Oct 14, 2019

 ...

ML Workflow For SHA 5287272 has been instantiated.

The following Docker images were built and tagged with the SHA:

- [hamelsmu/ml-cicd](#)
- [hamelsmu/ml-cicd-gpu](#)

Check run `Argo-Workflow` created, with status pending completion of the workflow.

<https://github.com/machine-learning-apps/actions-ml-cicd/pull/34>
<https://youtu.be/LI50l3fsoYs>

Deployment Options

- Multiple models
- Shadow models
- Competing models

On Next :

Intro to Human-AI Interaction