



# Machine Learning for CI

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[https://github.com/afrittoli/ciml\\_talk](https://github.com/afrittoli/ciml_talk)



# CI at Scale

- ▶ Continuous Integration
- ▶ Continuous Log Data
- ▶ Lot of data, little time
- ▶ Triaging failures?
- ▶ AI to the rescue!

## The OpenStack use case

- ▶ Integration testing in a VM
- ▶ System logs, application logs
- ▶ TBD pic of dstat data
- ▶ Dstat data
- ▶ Not only OpenStack

## Collecting data

- ▶ TBD Automation in collecting data
- ▶ Object storage / Openwhisk

## Infrastructure for training

- ▶ Sharing data, experiments and results
- ▶ Helm deployment
- ▶ Ffdl <- s3 input
- ▶ Experiment / dataset in Cloudant / via OpenWhisk API
- ▶ TBD build a diagram for the training pipeline

## Infrastructure for prediction

- ▶ MQTT - near real time
- ▶ Trained model on storage
- ▶ Prediction in storage
- ▶ OpenWhisk trigger -> comment on Gerrit/Github
- ▶ Build a diagram for the NRT pipeline

## Data Selection

- ▶ What is dstat data
- ▶ Experiment Reproducibility
- ▶ Dataset selection
  - ▶ Feature selection
  - ▶ Sampling selection

## Data Normalization

- ▶ Unrolling
- ▶ Normalizing:  $(x - \text{mean}) / (\text{xmax} - \text{mmin})$
- ▶ Graphs of normal and normalized features

## Building the dataset

- ▶ Split in training, dev, test
- ▶ Store normalized data on s3
- ▶ Input function for training
- ▶ Input function for evaluation

# SVM?

- ▶ Starting with SVM
- ▶ Why yes, why not

## DNN - Single Class

- ▶ Varying feature selection
- ▶ TBD Graph of accuracy with different features
- ▶ TBD Graph of accuracy with different sampling

## DNN - Single Class

- ▶ Varying data sampling
- ▶ Looking for Configurations
- ▶ TBD Graph of accuracy with different sampling

## DNN - Changing test job

- ▶ Train with a CI Job
- ▶ Evaluating with another CI Job (as well)

## DNN - Multi Class

- ▶ Detecting the Cloud Provider
- ▶ Growing back number of features
- ▶ Reducing down-sampling

## DNN - Multi Class

- ▶ Playing with the network topology

## DNN - Multi Class

- ▶ Reducing the number of classes
- ▶ What does that mean
- ▶ Why did it work

## DNN - Changing test job

- ▶ Train with a CI Job
- ▶ Evaluating with another CI Job (as well)

# Conclusions

- ▶ Summary on DNN single class
- ▶ Summary on DNN multi class
- ▶ Collect data
- ▶ Know your data
- ▶ Work with cloud tools

## Future Work

- ▶ Complete setup of the pipeline
- ▶ Human curated dataset for supervised training
- ▶ Making our life easier
- ▶ Integrate with real life CI system
- ▶ Explore job portability
- ▶ Tune optimization for quick convergence

Thank you!  
Questions?