

# 2024 QCAM Machine Learning Workshop


# Binder Session

- Go to: [https://github.com/ucgmsim/qc\\_ml\\_workshop\\_2024](https://github.com/ucgmsim/qc_ml_workshop_2024)
- Click Binder Icon -> Wait for session to start


LICENSE	Initial commit	2 months ago
README.md	Minor update	2 months ago
environment.yml	Fix environment	last week
man_decision_tree.py	Switched to weather dataset, lots of rewrite, fixed manual...	5 minutes ago
ml_nb_code.py	Switched to weather dataset, lots of rewrite, fixed manual...	5 minutes ago
ml_notebook.ipynb	Switched to weather dataset, lots of rewrite, fixed manual...	5 minutes ago
notebook_code.py	Switched to weather dataset, lots of rewrite, fixed manual...	5 minutes ago
support_notebook.ipynb	Added support notebook. Minor mods.	last week

README

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## Repository for the QuakeCore Annual Meeting ML Workshop

  
Starting repository: ucgmsim/qc\_ml\_workshop\_2024/HEAD  
New to Binder? Check out the [Binder Documentation](#) for more information

Build logs

jupyter nbviewer

JUPYTER FAQ </> 

qc\_ml\_workshop\_2024 / ml\_notebook.ipynb

### QC Machine Learning Workshop Notebook

[Github Repository](#)

Content

# Workshop Plan

- Introduction (~5 minutes)
- Jupyter Notebook (~1.5 hours)
- Break (~20-30 minutes)
- Hands-on (~1 hour)
  - Problem Setup
  - Data Preparation
  - Model Fitting
  - Model Evaluation

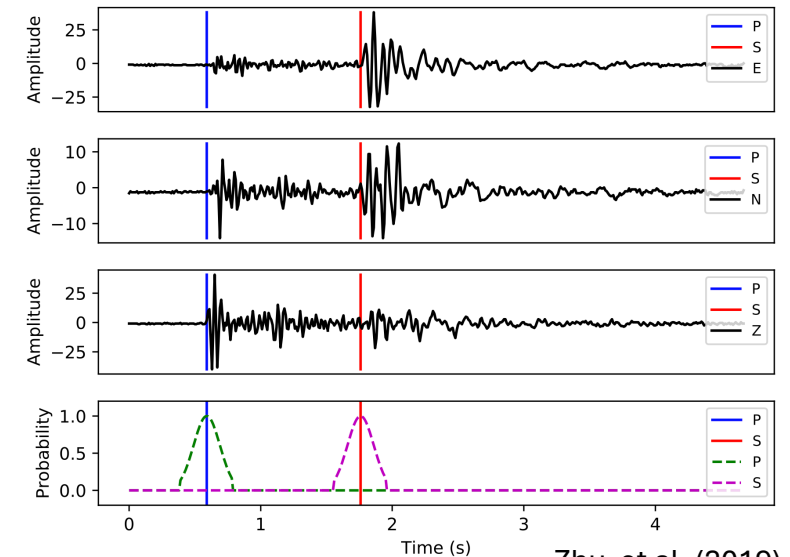
# Why Machine Learning?

- Ability to develop complex models from data
  - Potential to improve on traditional methods
  - Allows for automation of tasks
  - Applicable to new complex problems



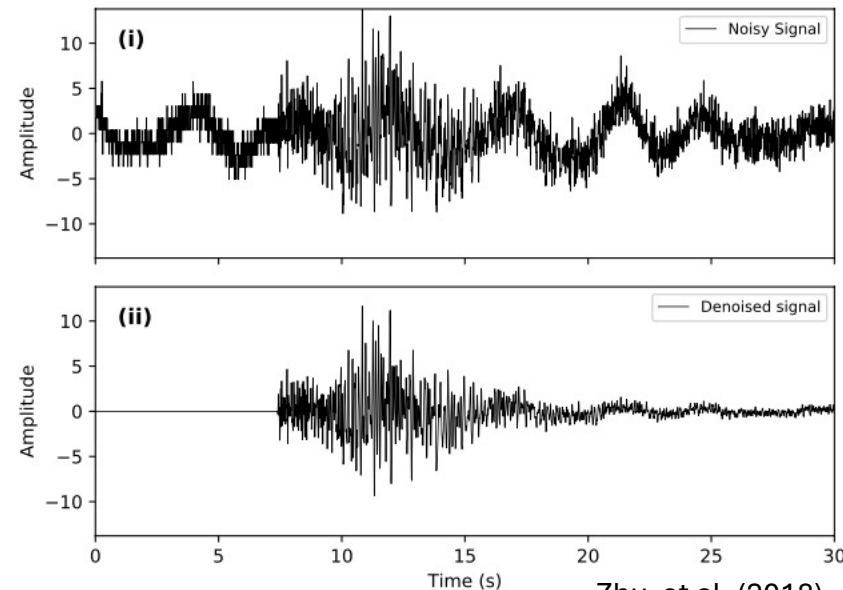
Surface Crack Detection

## P- and S-wave picking



Zhu et al. (2019)

## Denoising

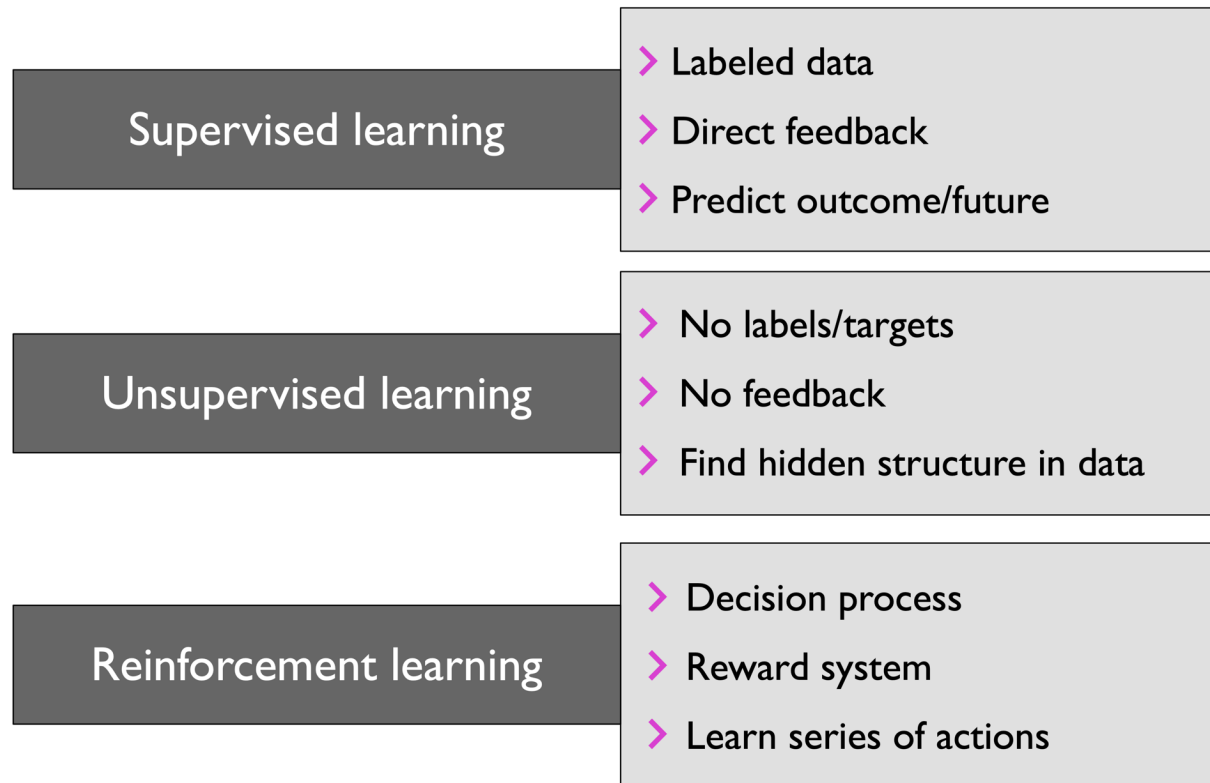


Zhu et al. (2018)

# Limitations of ML

- Require large amounts of high-quality data (garbage-in, garbage-out)
- Often difficult to interpret
- Models learn biases present in the training data
- Generally, models only interpolate

# Overview – Types of ML



# Supervised ML Process

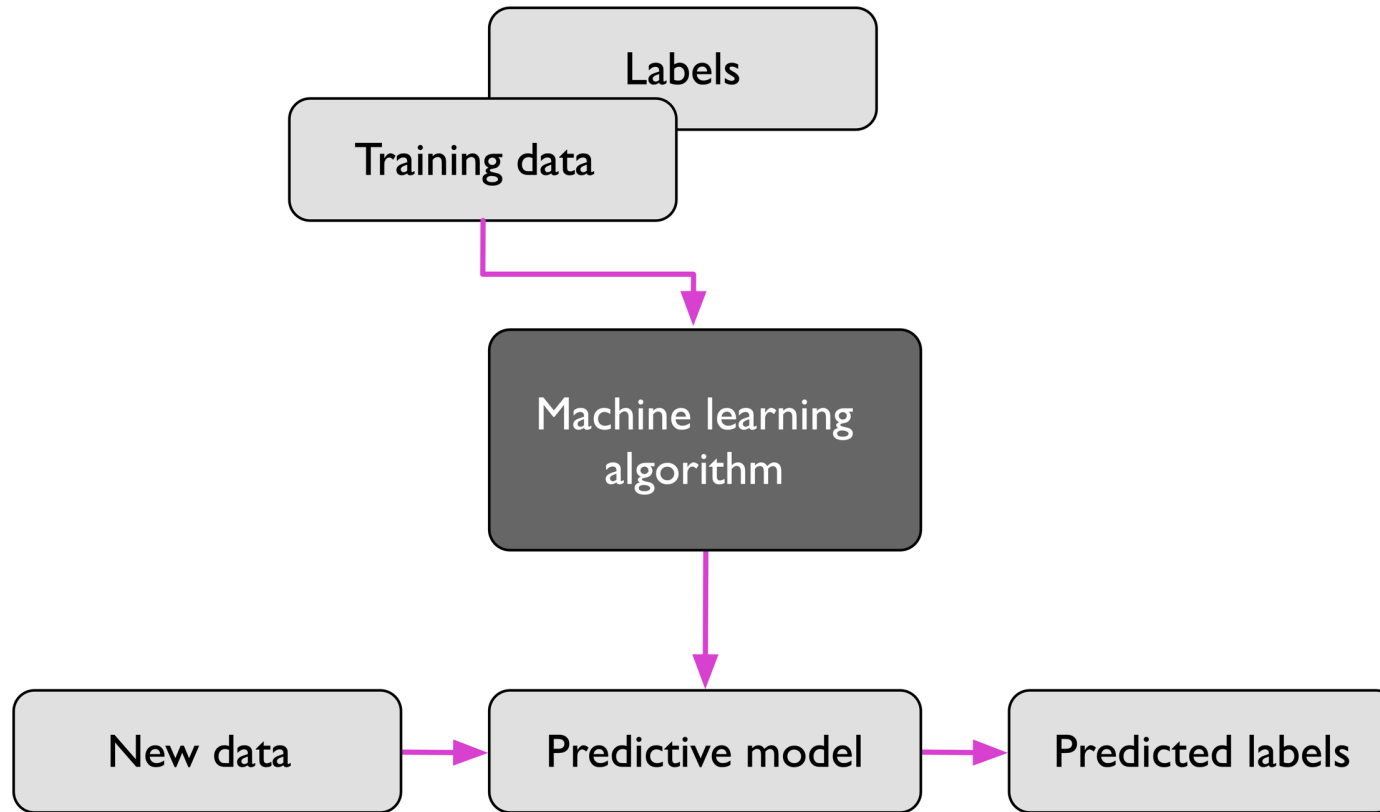


Figure: Raschka (2022)

# Classification vs Regression

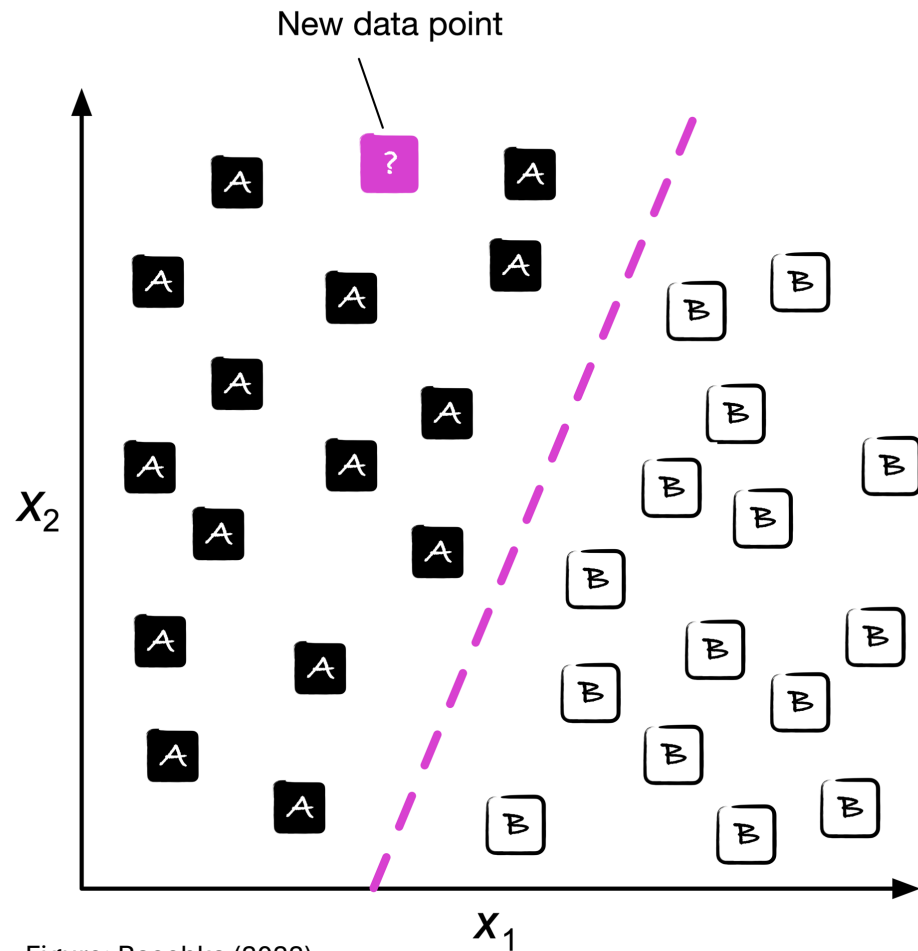


Figure: Raschka (2022)

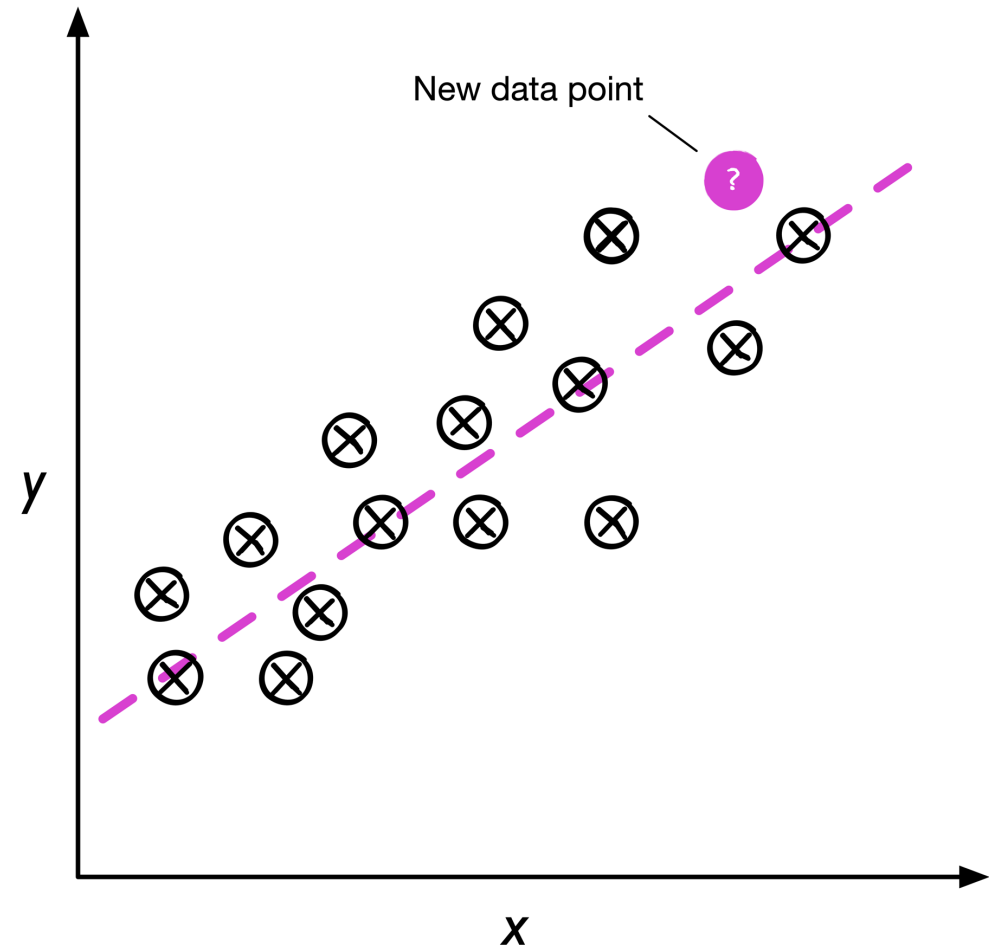


Figure: Raschka (2022)