ML2 vs ML++ - Use Cases

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August 2025

1 Introduction

You will see three use cases that have to be implemented using the given software version: ML-Quadrat or ML++. For each use case you should keep track of the following:

- The Time
- Amount of Encountered Errors

2 Use Case: Stress Watch

A tech company developed a smart watch that gauges the stress level of a person during physical activity.

- **Dataset:**
  - Humidity - Double
  - Temperature - Double
  - Step count - Integer
  - Stress Level - Categorical: normal, medium, high
- **Devices:**
  - **Stress Watch:** Measures humidity, temperature and step count of the user.
  - **Server:** Makes predictions and warns Stress Watch.
- **Data Flow:**
  - The watch will send its measures to the server.
  - The server will consolidate this data and produce a prediction of how stressed the user is.
  - The server will send the prediction back to the watch, notifying the user.

- **Machine Learning:**
  - Task: Classification
  - Features: humidity, temperature, step count, stress level
  - Target Features: stress level
  - Recommended Model: Logistic Regression
  - Plots/Metrics: At least use 2 model evaluation metrics (textual or graphical), and 1 pre-processing plot

3 Use Case: Moist Meter

A large-scale agricultural farm aims to optimize water usage through smart irrigation. To do this, the farm deploys a soil moisture prediction system powered by IoT sensors and machine learning.

- **Dataset:**
  - **Data:**
    - Humidity - Double
    - Atmospheric Temperature - Double
    - Soil Temperature - Double
    - Dew Point - Double
    - Soil Moisture - Double
  - Atmospheric data: humidity, atmospheric temperature
  - Soil Data: soil temperature, dew point
- **IoT Devices:**
  - **Atmospheric Sensor:** Measures atmospheric, this will measure the humidity and atmospheric temperature.
  - **Soil Sensor:** Measures soil-related data, this will measure the soil temperature and dew point.
  - **Server:** Makes predictions and notifies how much moisture is currently in the ground
- **Data Flow:**
  - Both devices transmit their readings to a central server.
  - The server will consolidate this data and produce a prediction of how moist the soil will be.
- **Machine Learning:**
  - Task: regression

- Features: humidity, atmospheric temperature, soil temperature, moist meter
- Target Features: moist meter
- Recommended Model: Linear Regression
- Plots/Metrics: At least use 2 model evaluation metrics (textual or graphical), and 1 pre-processing plot

4 Use Case: Server Crash Prediction

A shipping company tracks telemetric data from multiple servers, with this data they can predict whether or not a server will crash.

- **Dataset:**
  - cpu-user - Double
  - cpu-system - Double
  - cpu-wait - Double
  - disk-read - Double
  - disk-write - Double
  - mem-used - Double
  - swap-used - Double
  - net-eth0-rx - Double
  - net-eth0-tx - Double
  - net-eth1-rx - Double
  - net-eth1-tx - Double
  - sch-threads - Double
  - build-status - Categorical: RUNNING / NOTRUNNING
- **IoT Devices:**
  - **CMS:** requests telemetric data from server, requests prediction
  - **Server:** sends telemetric data.
  - **OutagePrediction:** receives telemetric data and predicts outage.
- **Data Flow:**
  - The CMS requests parameters from the server
  - The Server sends the data to CMS
  - CMS sends the data to OutagePredictor
  - OutagePredictor predicts whether or not the server will have an outage or not

- **Machine Learning:**
  - Task: Classification
  - Features: cpu-user,cpu-system,cpu-wait,disk-read,disk-write,mem-used,swap-used,net-eth0-rx,net-eth0-tx,net-eth1-rx,net-eth1-tx,sch-threads,build-status
  - Target Features: build-status
  - Recommended Model: Logistic Regression
  - Plots/Metrics: At least use 2 model evaluation metrics (textual or graphical), and 1 pre-processing plot