WALC 2023
Applied AI

Motion Classification, Anomaly Detection & Hands-On

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UNIFEI - Federal University of Itajuba, Brazil
TinyML4D Academic Network Co-Chair

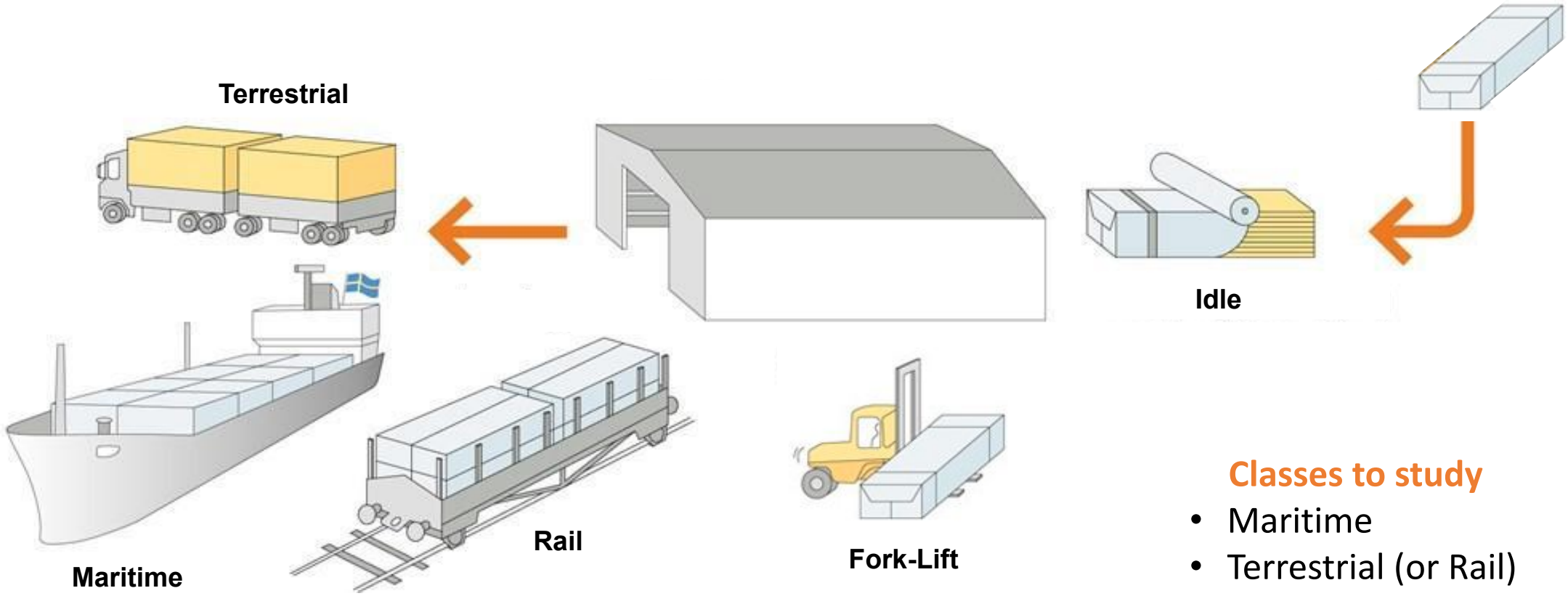
Vision

Sound

Vibration

Motion Classification

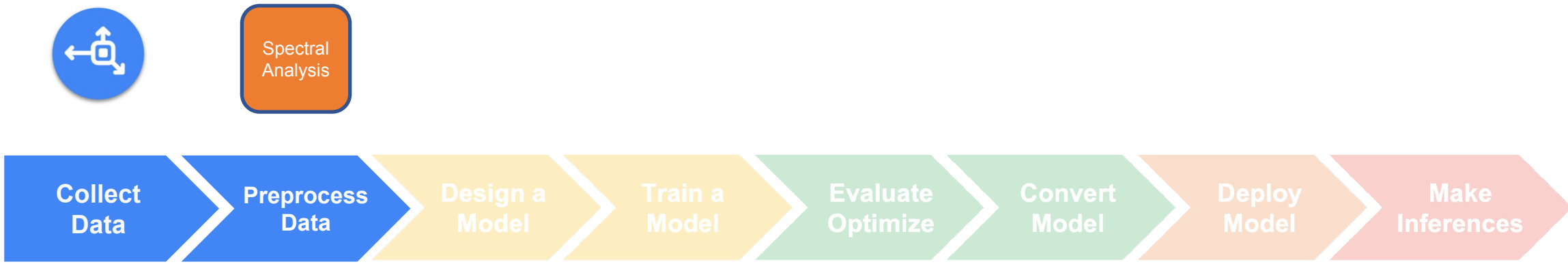
Case Study: Mechanical Stresses in Transport



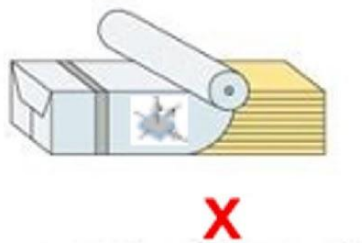
Classes to study

- Maritime
- Terrestrial (or Rail)
- Lift
- Idle

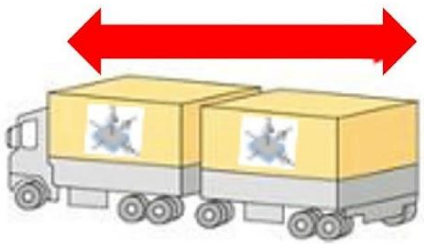
Data Pre-Processing



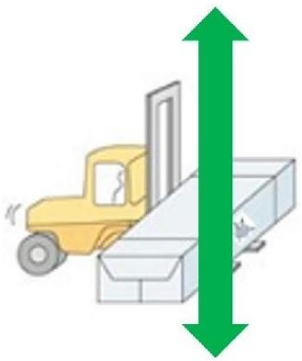
Collect Data



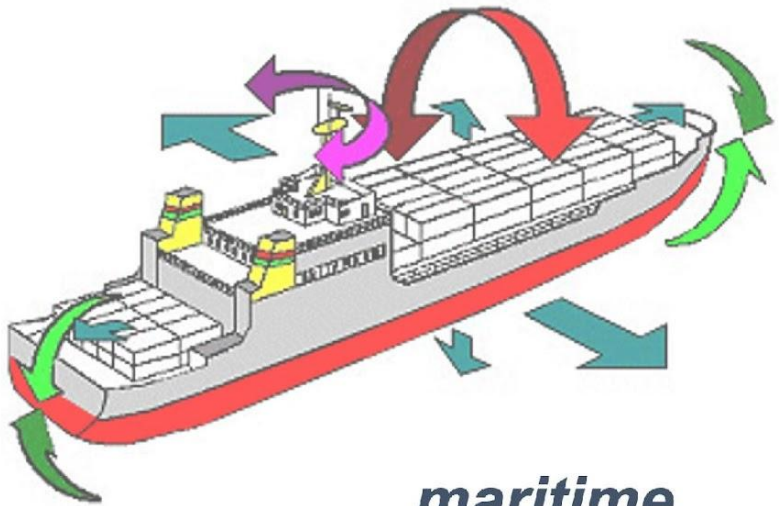
Idle



terrestrial
(x-axis)



lift
(z-axis)



maritime
(x,y,z-axis)

300 Raw Features

- Raw Data from sensor

Manual Feature Extraction

Spectral Analysis

Features

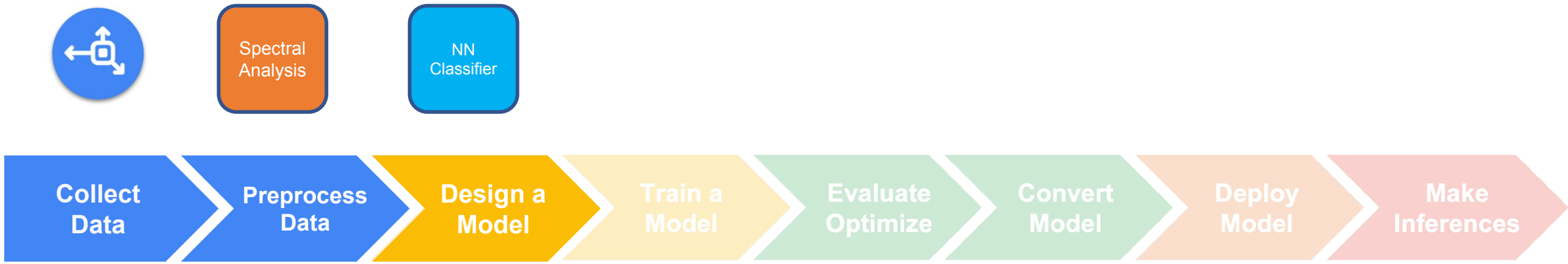
- RMS
- SKEW
- KURT
- FFT
- PSD

NN Classifier

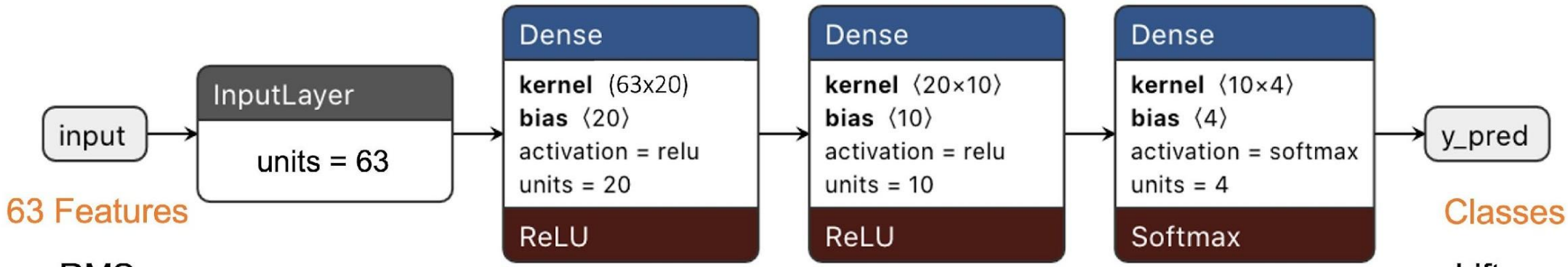
Classes

- Lift
- Terrestrial
- Maritime
- Idle

Model Design (NN Classifier)



NN Classifier



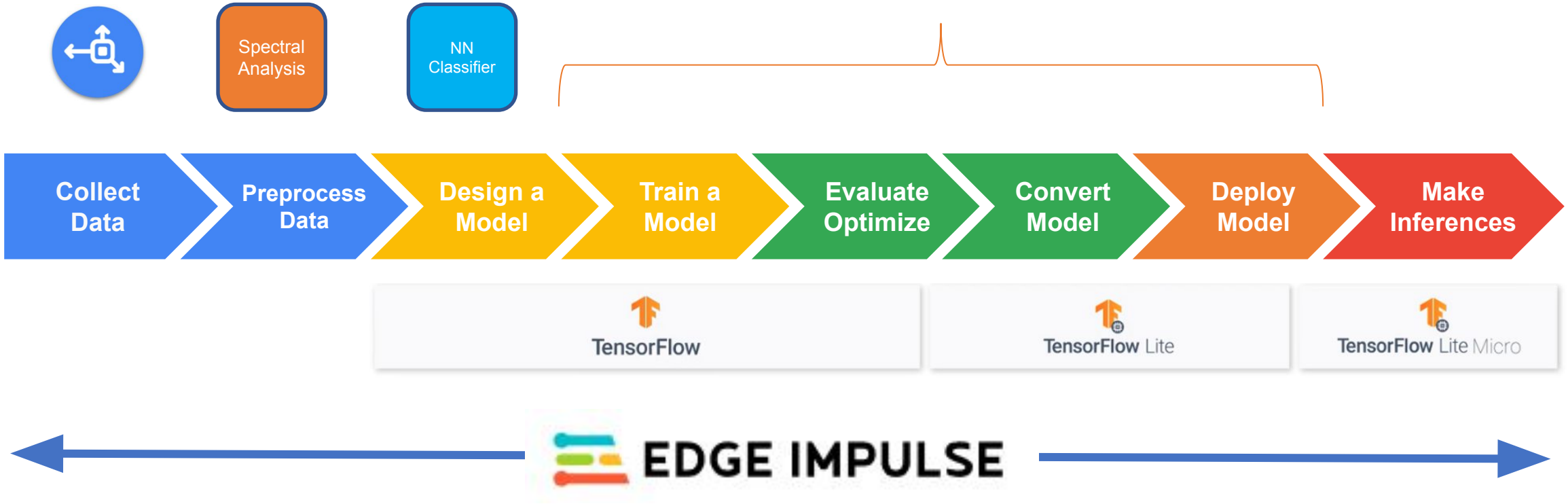
63 Features

- RMS
- SKEW
- KURT
- FFT
- PSD

Classes

- Lift
- Terrestrial
- Maritime
- Idle

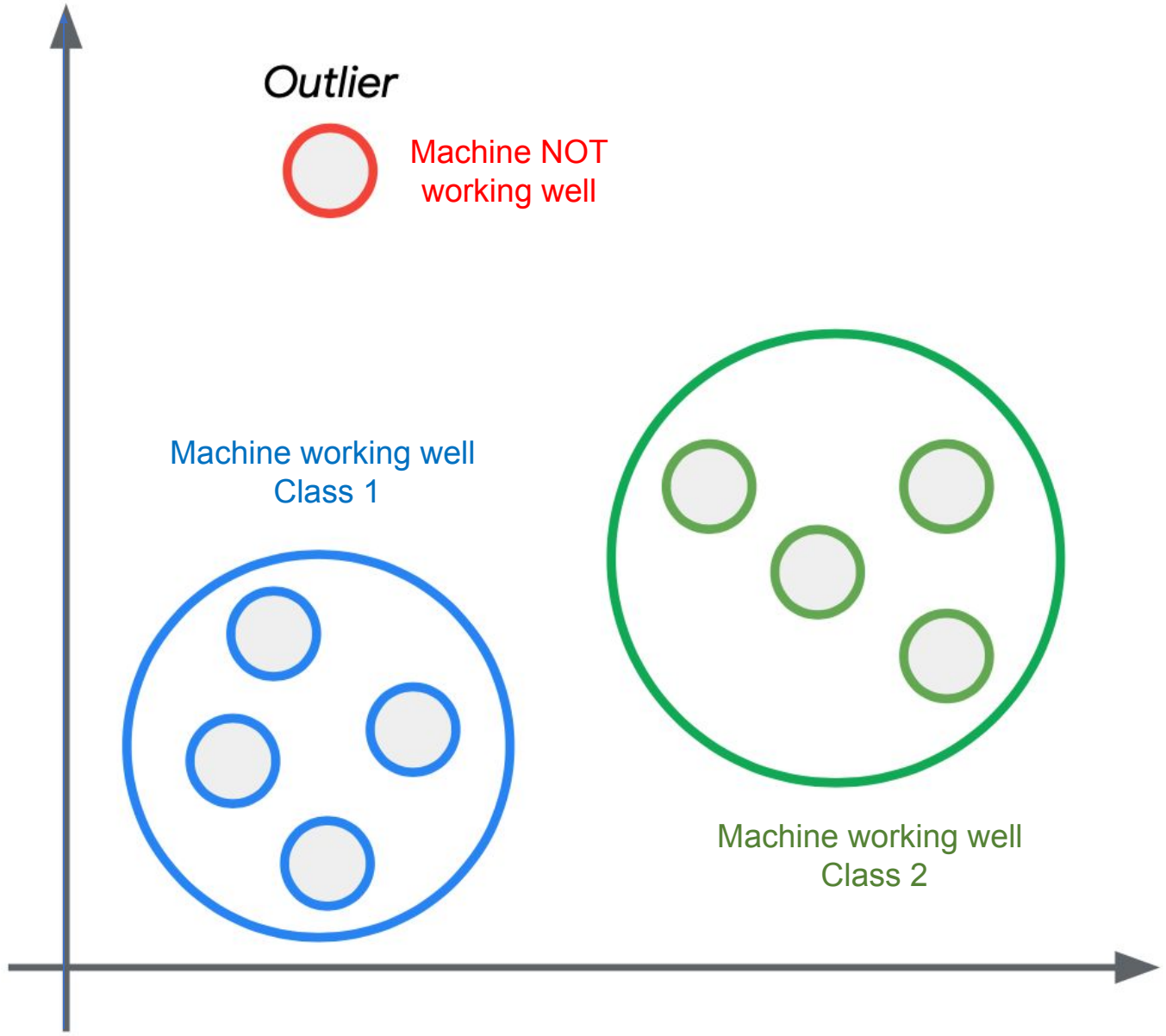
Train, Evaluate, Convert, Deploy the Model

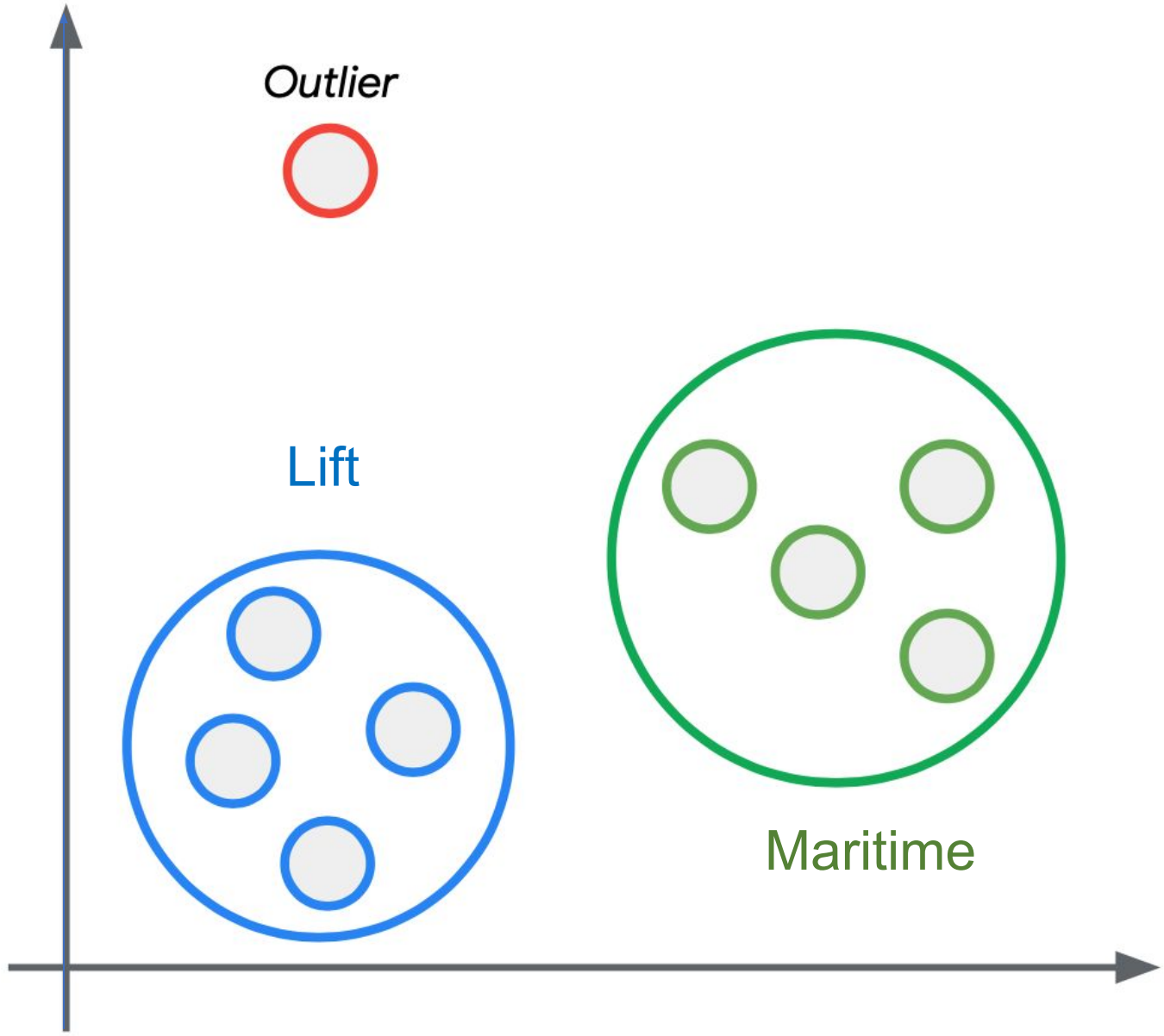


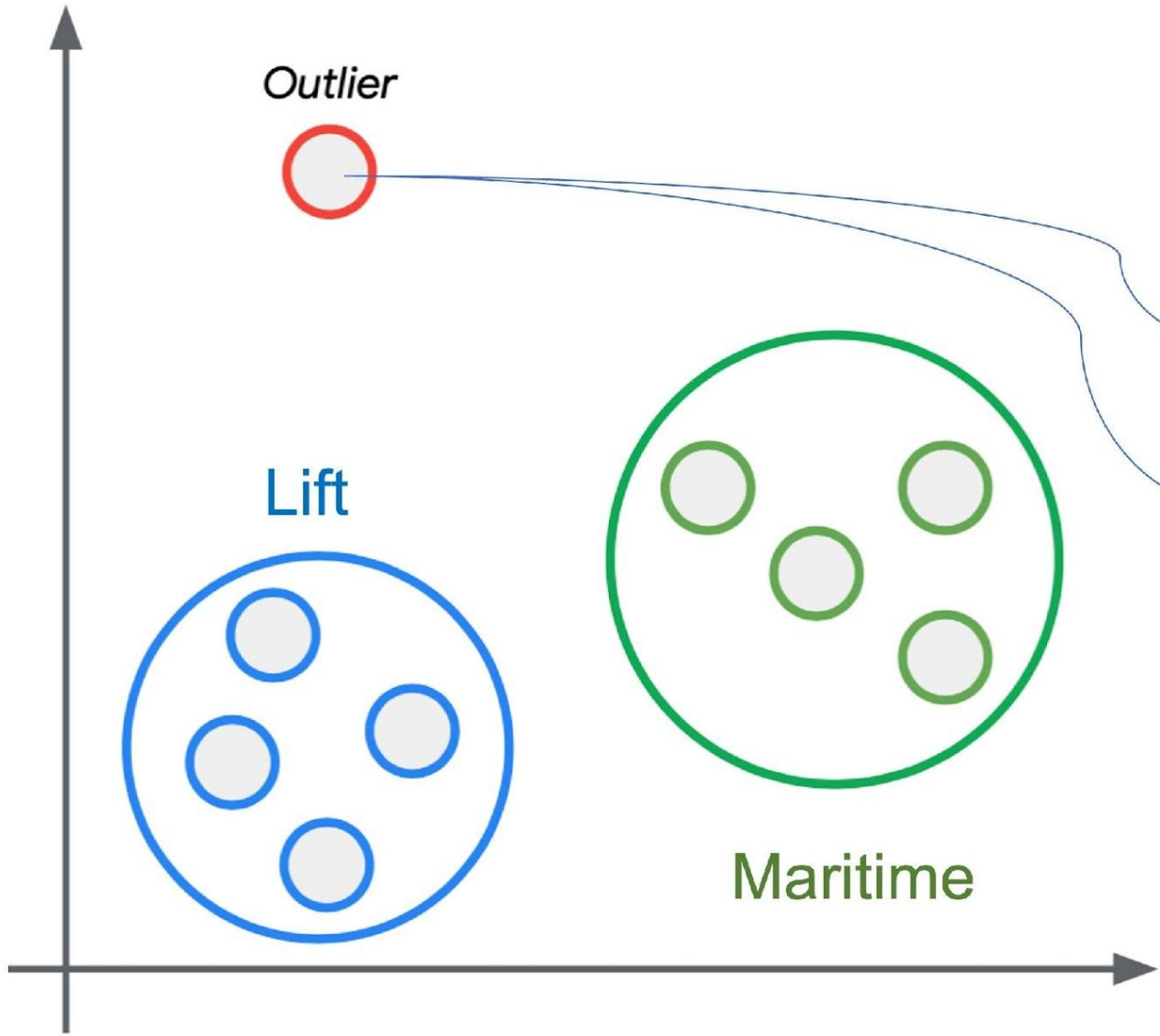
Motion Classification
Hands-On

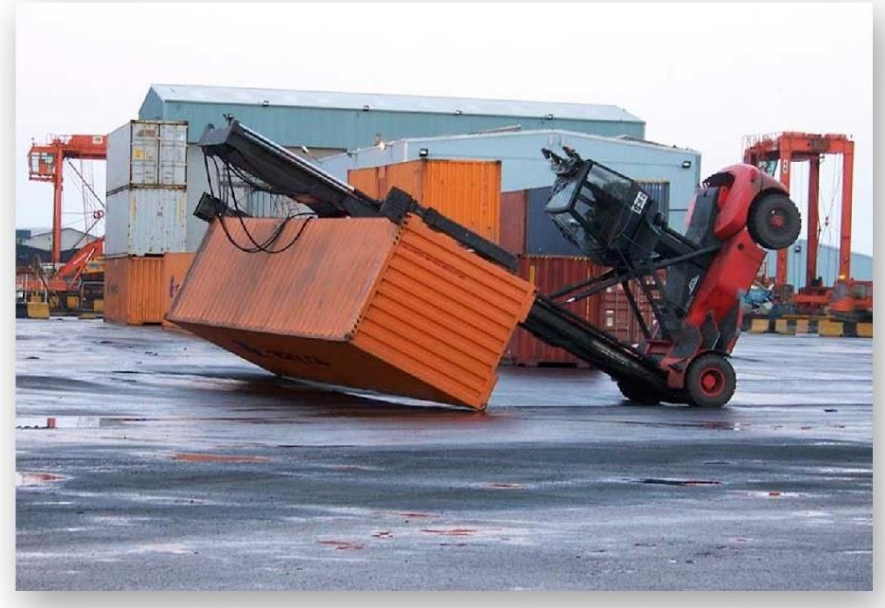
https://studio.edgeimpulse.com/public/302078/latest

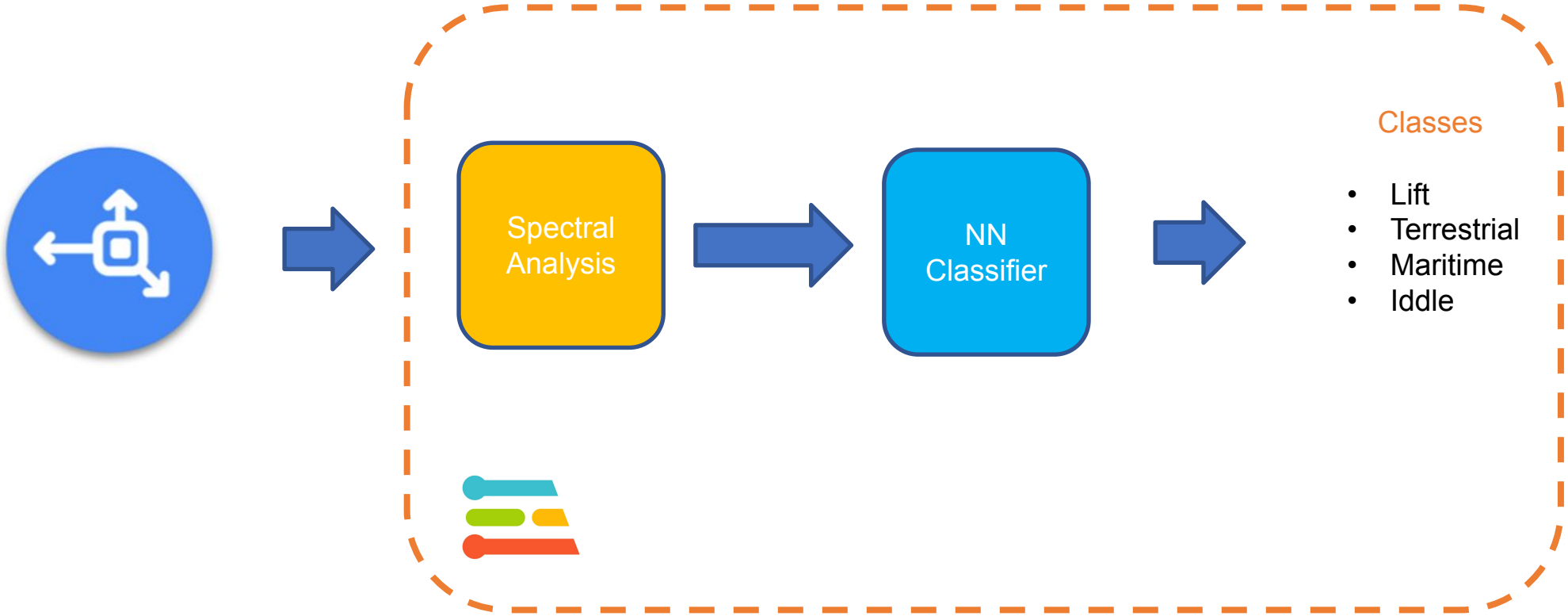
Anomaly Detection Hands-On

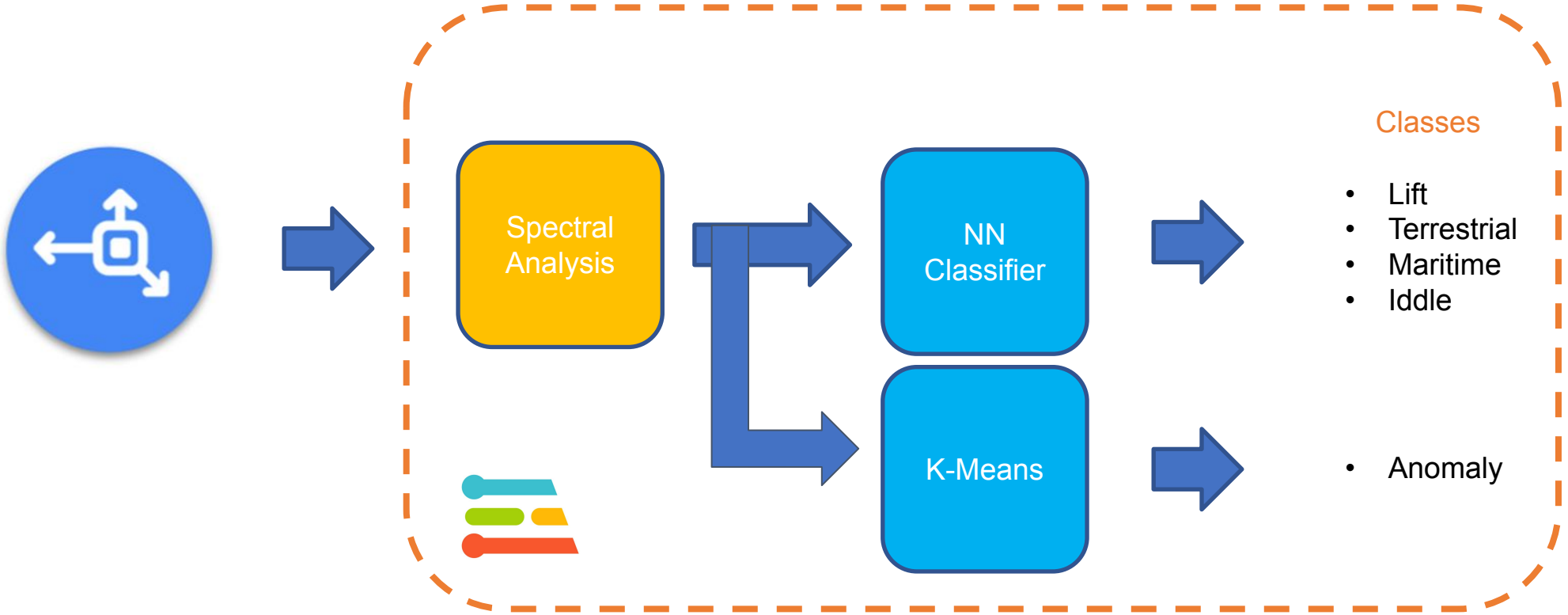

Outlier
Machine NOT working well
Machine working well Class 1
Machine working well Class 2


Outlier
Lift
Maritime


Outlier
Lift
Maritime




Spectral Analysis
NN Classifier
Classes
Lift
Terrestrial
Maritime
Iddle


Spectral Analysis
NN Classifier
K-Means
Classes
Lift
Terrestrial
Maritime
Iddle
Anomaly

Thanks

WALC 2023
Guayaquil, Ecuador
13 al 17 de Noviembre
26°
Taller sobre
Tecnologías de Redes Internet
para América Latina y el Caribe
Fundación
EsLaRed
Organización General