UNIVERSITÀ DEGLI STUDI DI TRIESTE

Class 1: Introduction to the course, to MLOps and Agile AI

Master Course:

Data-driven Systems Engineering (ML Operations)

440MI and 305SM

UNIVERSITÀ DEGLI STUDI DI TRIESTE

Who am I?

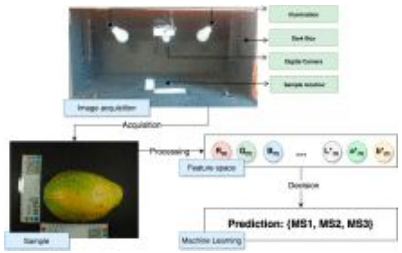
MACHINE LEARNING LAB

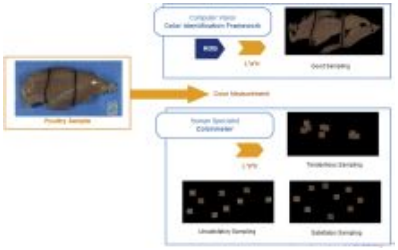
Prof. Sylvio Barbon Junior
Brazilian, born in São Paulo
2012 - 2021, University of Londrina (UEL)

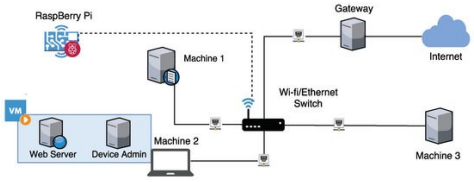
Research Interests:

- Machine Learning
- Explainable AI
- Process Mining

Contact:
sylvio.barbonjunior@units.it







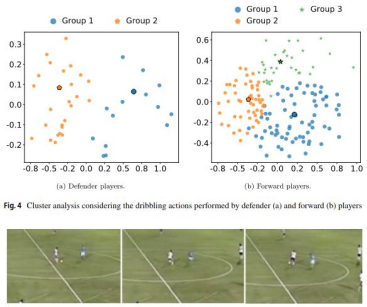


Fig. 4 Cluster analysis considering the dribbling actions performed by defender (a) and forward (b) players

UNIVERSITÀ DEGLI STUDI DI TRIESTE

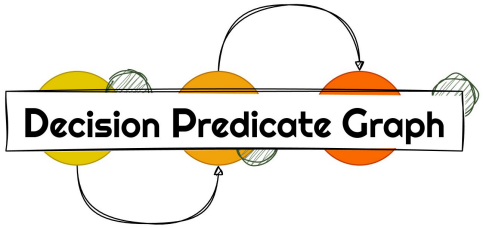
Machine Learning Lab

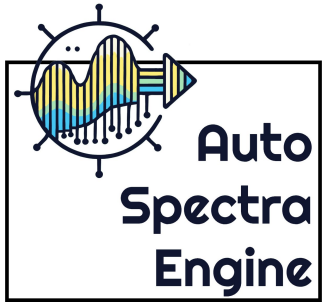
Azin Moradbeikie
Researcher

José Vinícius (JV) Ribeiro
Visiting Researcher (PhD UEL)
XAI in Spectral Data

Master Students:

Lorenzo Giaccari(UNITS),
Edoardo Cortolezzis (UNITS),
Ines El Gataa (UNITS),
Eron Pereira (UEL, Brasil)





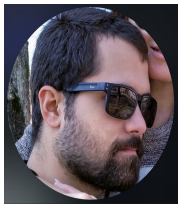
UNIVERSITÀ DEGLI STUDI DI TRIESTE

Machine Learning Lab

Matheus Camilo
PhD
Automated Machine Learning

Andrea Sodomaco
PhD
eXplainable Artificial Intelligence

Leonardo Arrighi
PhD
eXplainable Artificial Intelligence



Rafael Figueira Gonçalves
PhD
eXplainable Artificial Intelligence

Malina Grigore
PhD
Process Mining

Master Students: Lorenzo Giaccari(UNITS), Edoardo Cortolezzis (UNITS), Ines El Gataa (UNITS), Eron Pereira (UEL, Brasil)

Sylvio Barbon Junior - sylvio.barbonjunior@units.it

Agenda

1. Our course
2. What is MLOps?
3. Why MLOps is needed
4. ML lifecycle vs Software lifecycle
5. Agile principles for ML
6. Python refresher (pandas, scikit-learn)
7. Case study & discussion

Our Course

01

Python

. Python Setup
. Python Basics
. Python Object Oriented
. Python Libraries
. Python for Machine Learning

02

What and Why to study Software and Information System Design?

. What and Why focus on MLOps?
. People and Rules
. Feature and Concepts
. Monitoring
. Governance

03

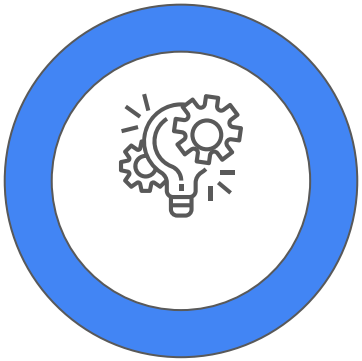
Focusing on the Problem

. Data Representation
. Problem Representation
. Machine Learning Models
. ML Design patterns

04

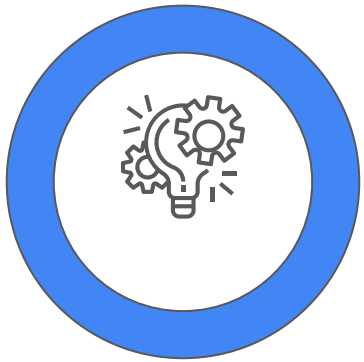
Practical Projects

. Project
. Implementation
. Seminars



Goal

- Know the **principles** and **techniques** of the **design** and implementation of an Information System;
- Acquire the **ability to design an information system**, use independently the techniques and tools learned;
- Represent and display the knowledge learned using **Machine Learning principles**;
- Interpret and **independently learn** the evolution of methodologies and apply new techniques and design tools;

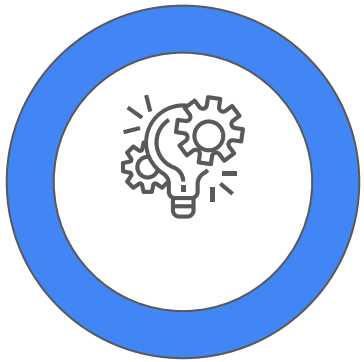


Communication and Repository

1) Microsoft Teams: **zqgh28p**

   CD2025 440MI DATA-DRIVEN SYSTEMS ENGINEERING

2) E-mail: sylvio.barbonjunior@units.it;



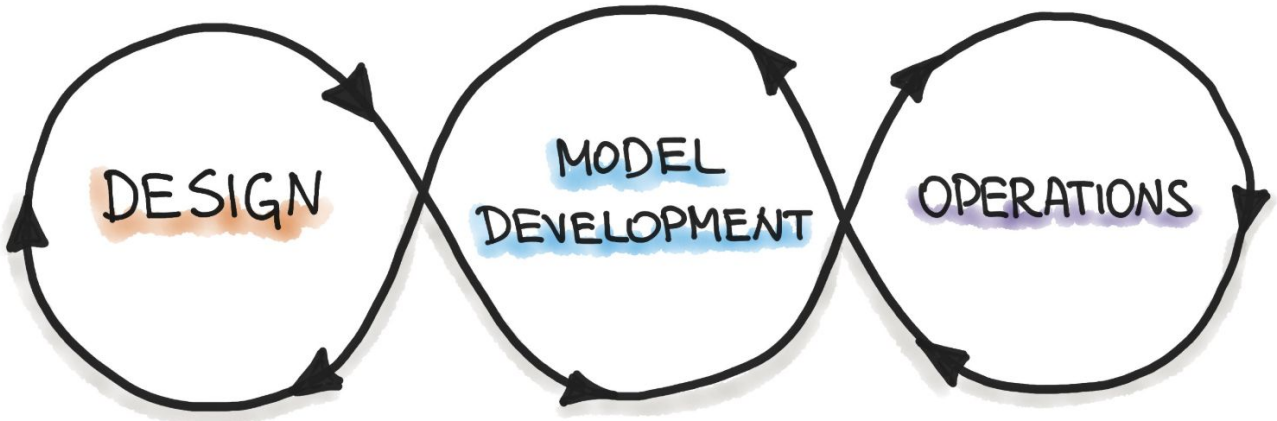
Exam

The exam consists of an oral discussion and documental evaluation regarding a project prepared individually by the student. The project can follow one of the following modalities:

1) Model and Data Exploration;
2) System Architecture Design;

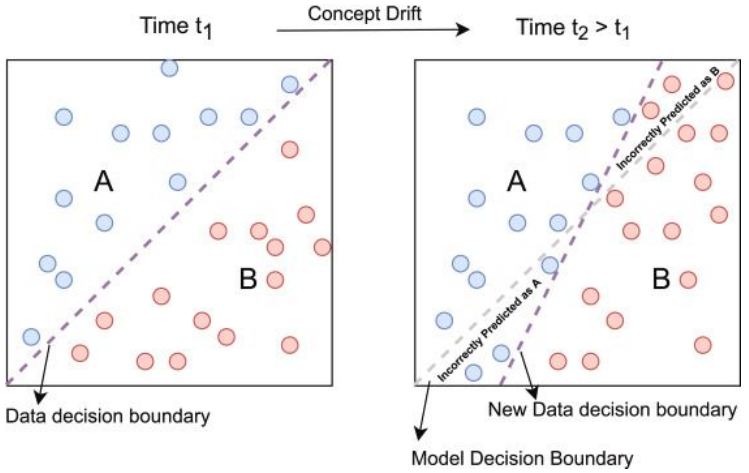
What is MLOps?

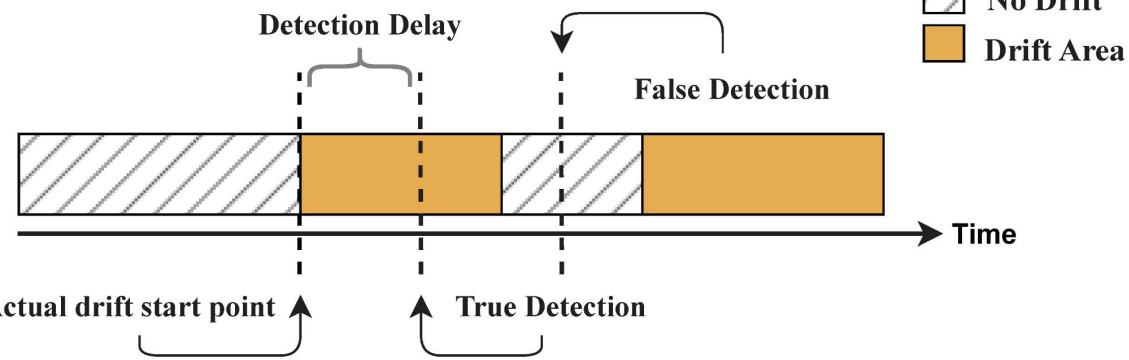
- MLOps = Machine Learning + DevOps
- Practices to deploy, monitor, and maintain ML models in production
- Focuses on collaboration between data scientists, ML engineers, and operations
- Goal: Reliable and scalable AI systems



Why MLOps is Needed

- ML models degrade over time (data drift, concept drift)
- Traditional DevOps not enough for ML systems
- Need to handle:
  - Data versioning;
  - Model retraining;
  - Experiment tracking;
  - Monitoring.





ML Lifecycle vs Software Lifecycle

- Traditional Software:

  Code → Build → Test → Deploy → Maintain

- Machine Learning:

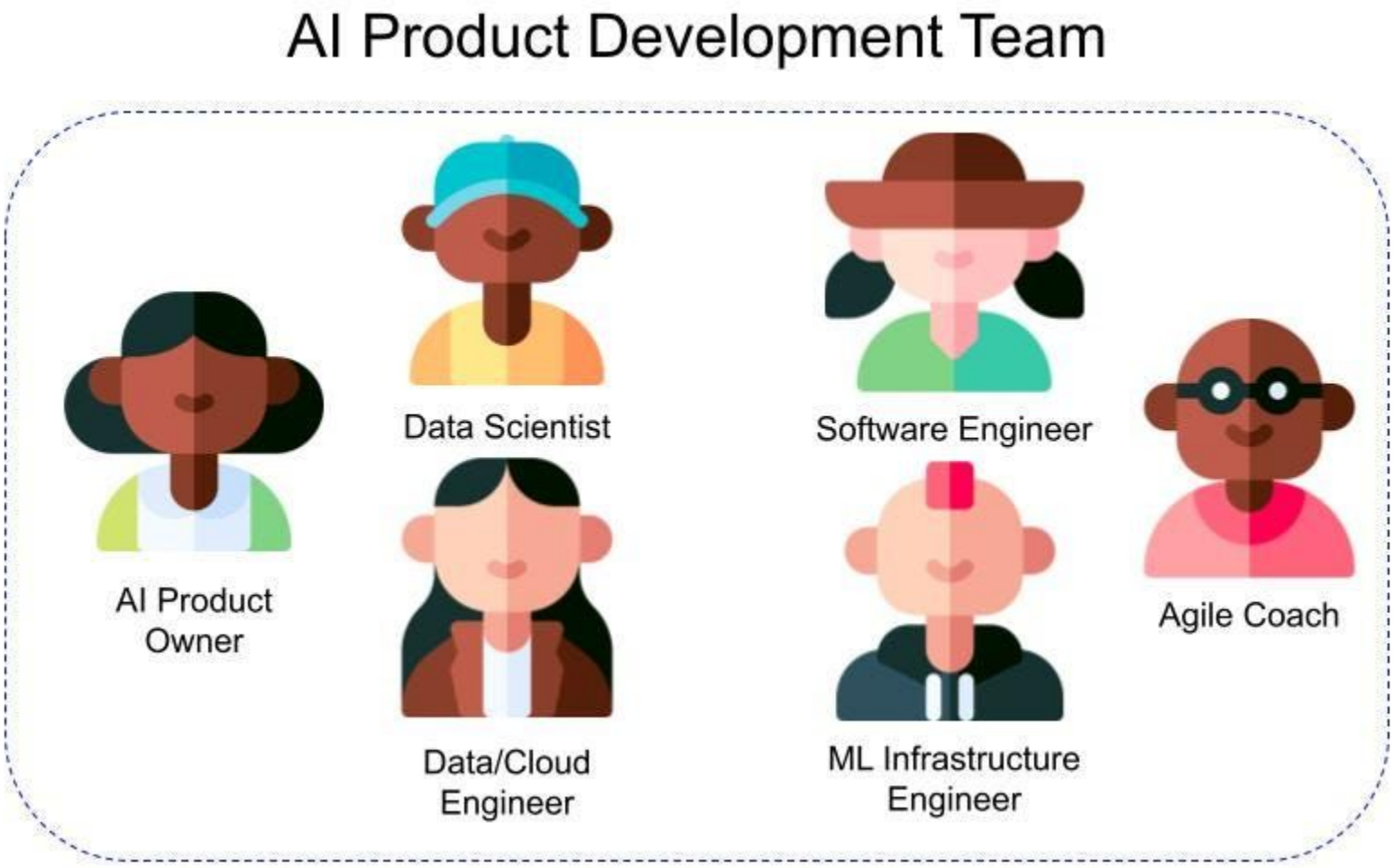
  Data → Train → Evaluate → Deploy → Monitor → Retrain

- Key difference:
  - Continuous dependence on data quality & availability

Agile Principles for ML

- Iterative delivery of ML models
- Cross-functional squads:
  - data scientists;
  - engineers;
  - product owners.
- User stories for ML features
- Continuous feedback from stakeholders
- Example:

  'As a manager, I want a model to classify support tickets.'


AI Product Development Team
AI Product Owner
Data Scientist
Data/Cloud Engineer
Software Engineer
ML Infrastructure Engineer
Agile Coach

Case Study

Example: Predicting customer churn

- Business goal: Reduce customer loss
- Agile story: 'As a marketing manager, I want to predict churn so I can retain customers.'
- MLOps practices:
  - Version data
  - Train and evaluate model
  - Deploy as API
  - Monitor drift
  - Retrain when needed

Key Takeaways

- MLOps = DevOps for ML systems
- Essential for production-ready AI
- Agile principles help deliver ML iteratively
- ML systems = continuous cycle
  - data → train → deploy → monitor → retrain

Career pathway seminars

for Computer Engineering students

Quando?

24/9 15-17

Dove?

Aula B, 2p, C2

Seminari di orientamento in itinere

per gli studenti di Computer Engineering

Efe Elbek
Product Design Director (coffee machine)

Sergio Benedetti
Head of People Operations
Stefano Furlan
Software Developer

Register here

Dipartimento di
Ingegneria
e Architettura

UNIVERSITÀ
DEGLI STUDI
DI TRIESTE

Tasks:

- **Install Python;**
- **Reading Chapter 3 – "Start using Python" ;**