KAZAKH-BRITISH TECHNICAL UNIVERSITY

Introduction to Machine Learning

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How to get ~~attendance~~ participation points?

- You can get 1 point each week for uploading your lab work in teams, or participating/presenting your work in practical class.
- Maximum of 10 points over 14 weeks.
- **Attendance doesn't give point**.

Attendance and absence

- Attendance is made at the beginning or the end of the lecture.
- If you are late, enter in silence.
- If you leave the room, **do not ask for my permission** and be silent.

Exams

- Mid-term : mix of MCQ, open questions, and problem to solve.
- End-term : group project (2-4 students per group). With a 20mn defense.
- Final : Same as mid-term. Will cover the entire program.

Obvious but necessary rules

If I did a mistake in correcting your exam, I'll fix it, but :

- I will not give extra points to students who beg for them during the last week.
- I will not give extra tasks. You should grab points from main assignments and exams.

I'm always open to answer requests in teams but :

- Be at least a little polite.
- Don't send me 10 times the same message if I don't answer.
- If you have personal issues to justify your 31% absence, don't try to make me feel guilty to fix it.

Objectives

The objective of this course is to provide students with the fundamental knowledge and skills which will enhance their competence in the field of the modern data science and machine learning.

Outcomes

At the end of the course, students must be able to :

- Describe different problems from machine learning domain.
- Solve mathematical problems that form the foundation of ML algorithm.
- Select and implement basic machine learning models and evaluate their performance.
- Be well-prepared to delve deeper into more advanced machine learning concepts, algorithms, and applications.

What is Machine Learning?

Machine learning is a branch of AI focused on building computer systems that learn from data to make predictions.
A field at the crossroads of three disciplines:

- Mathematics (Linear algebra, Calculus & optimization)
- Statistics
- Computer science

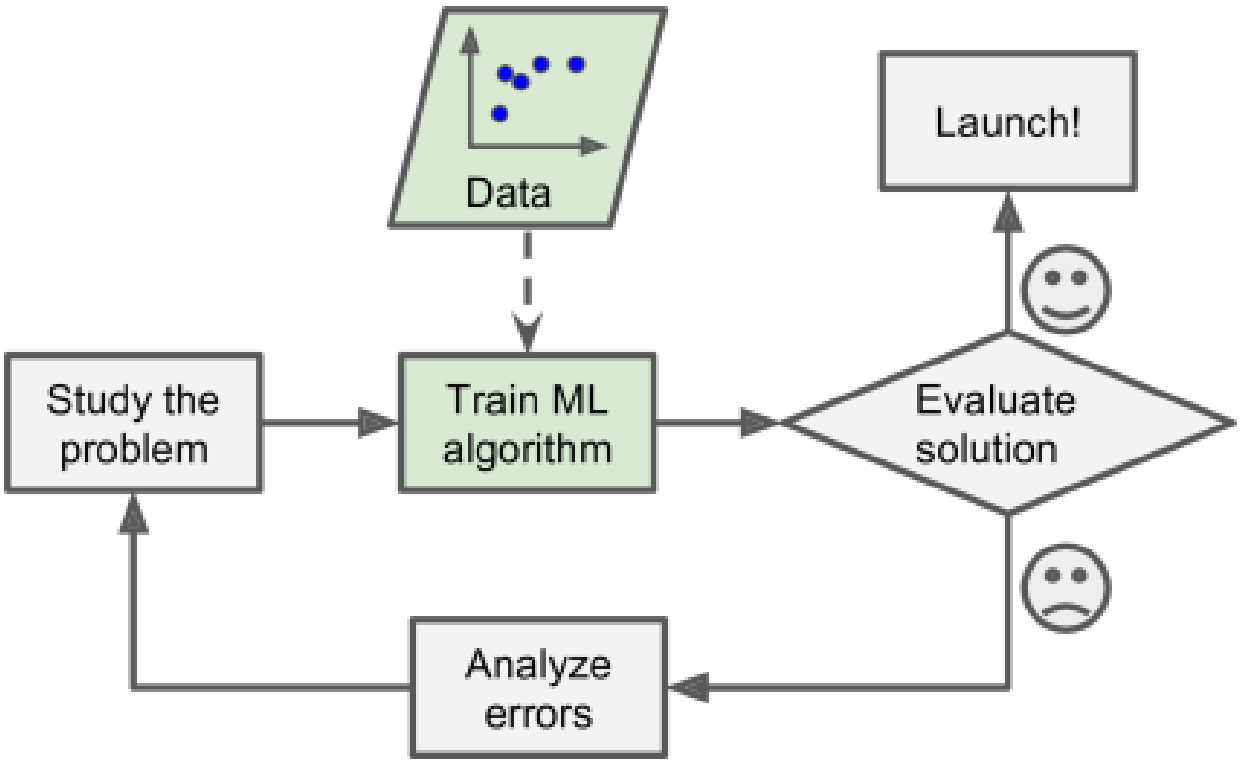
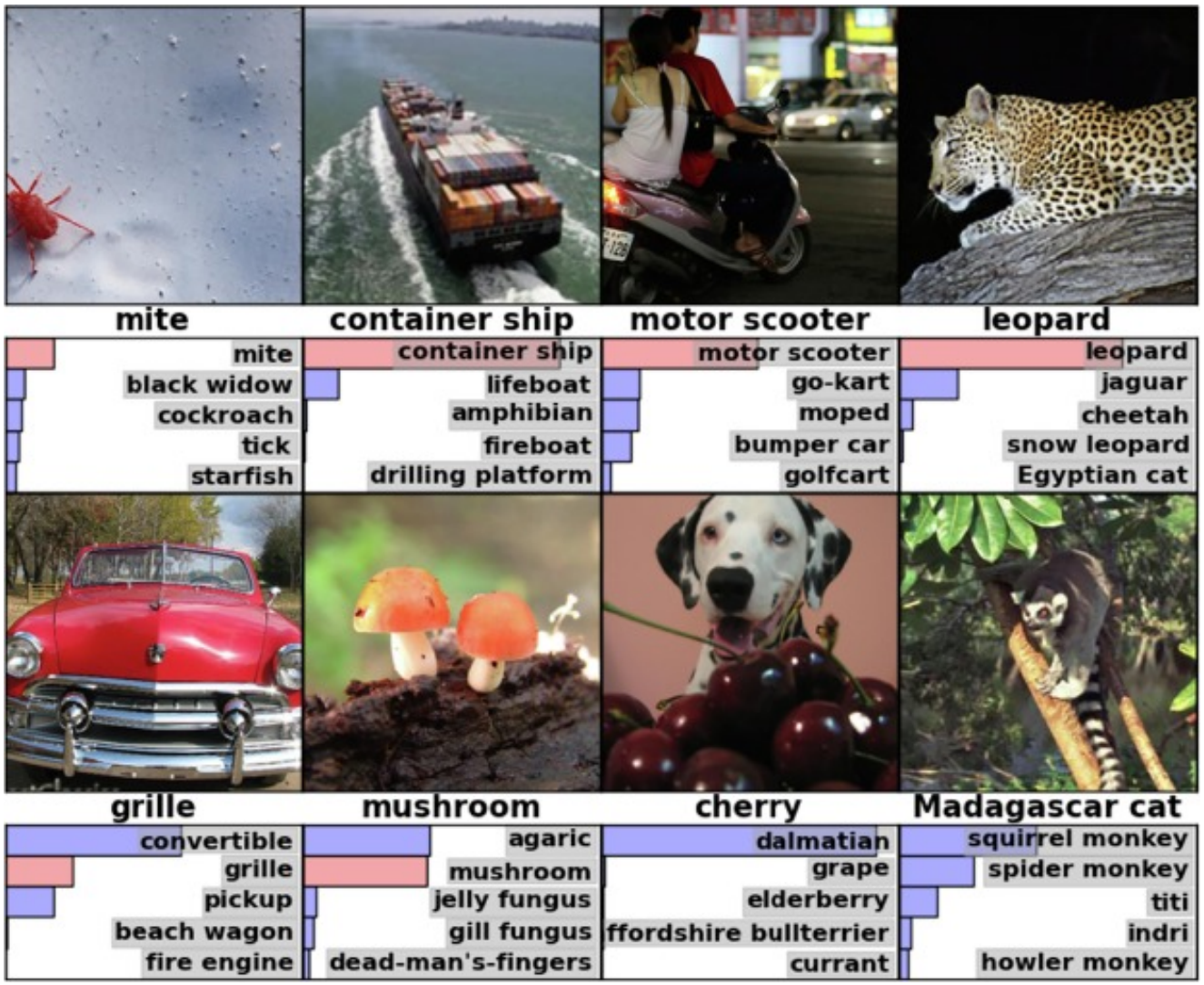
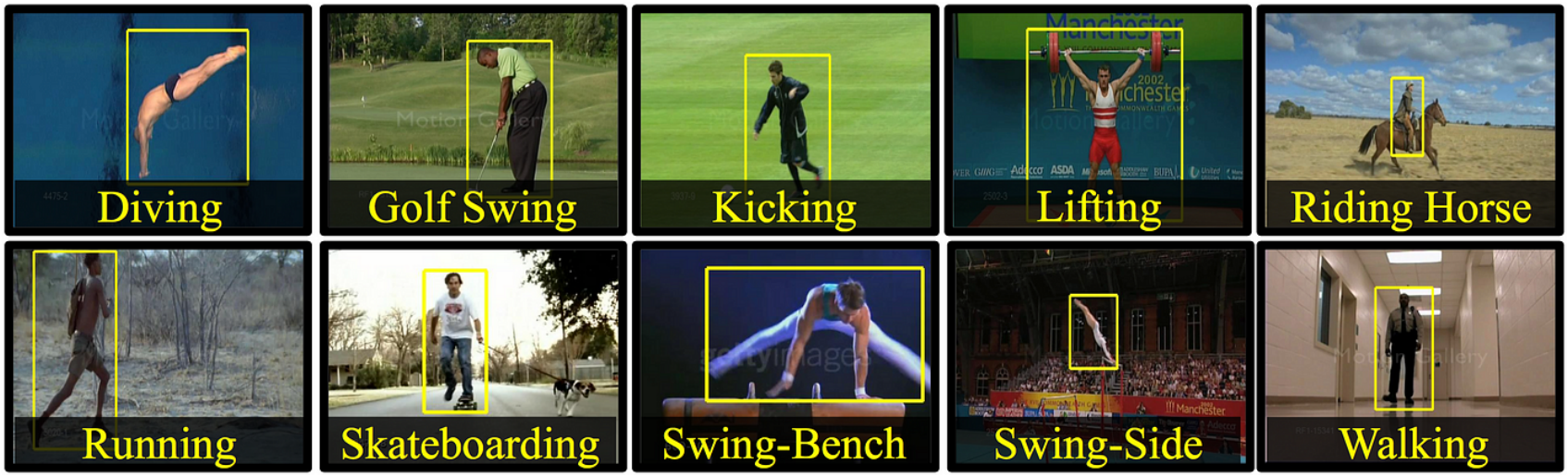

Data
Launch!
Study the problem
Train ML algorithm
Evaluate solution
Analyze errors

Image classification



Object detection

Action recognition



Fraud detection

Car prices predictions

$24435.00

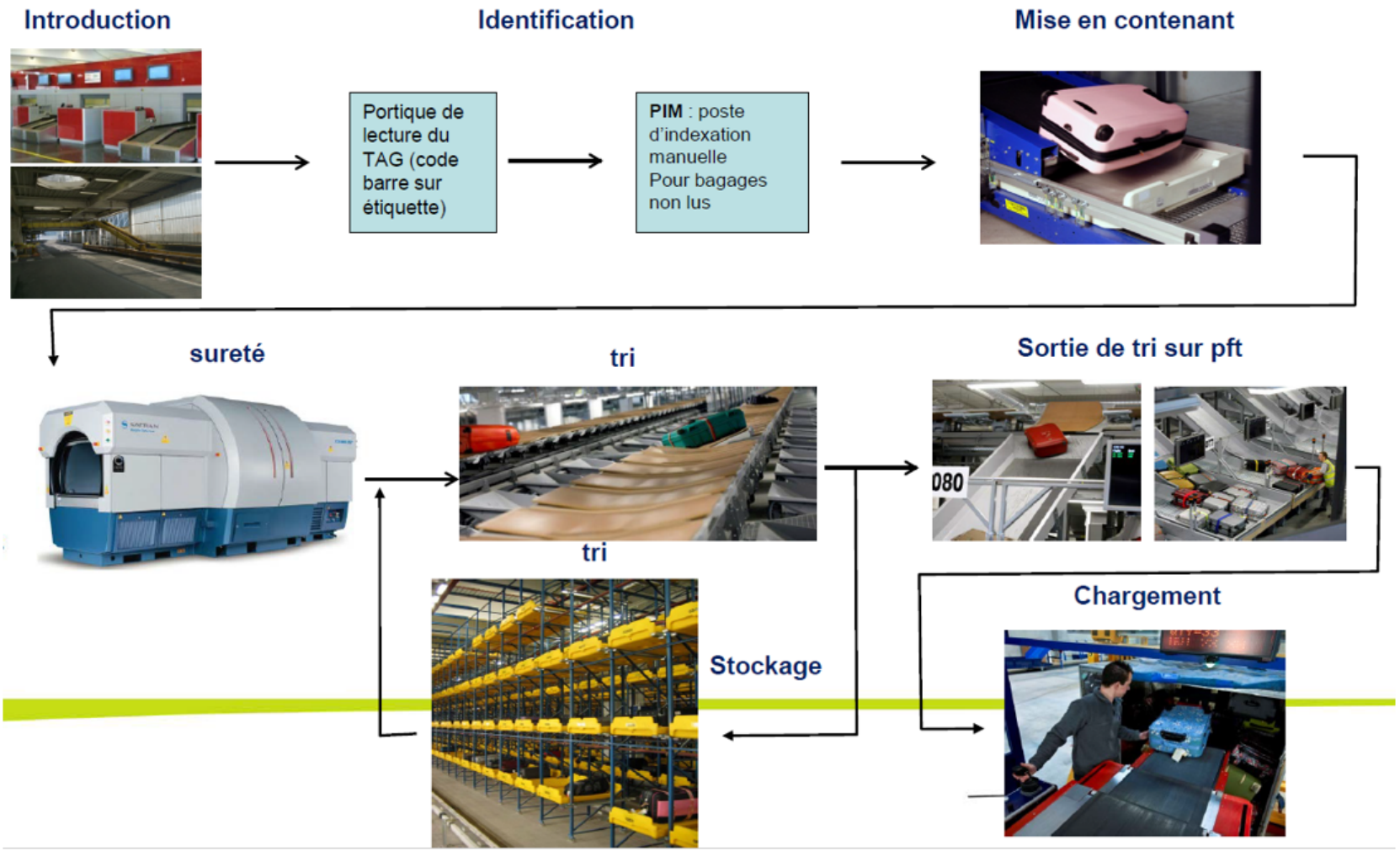
$36527.00

$18810.00

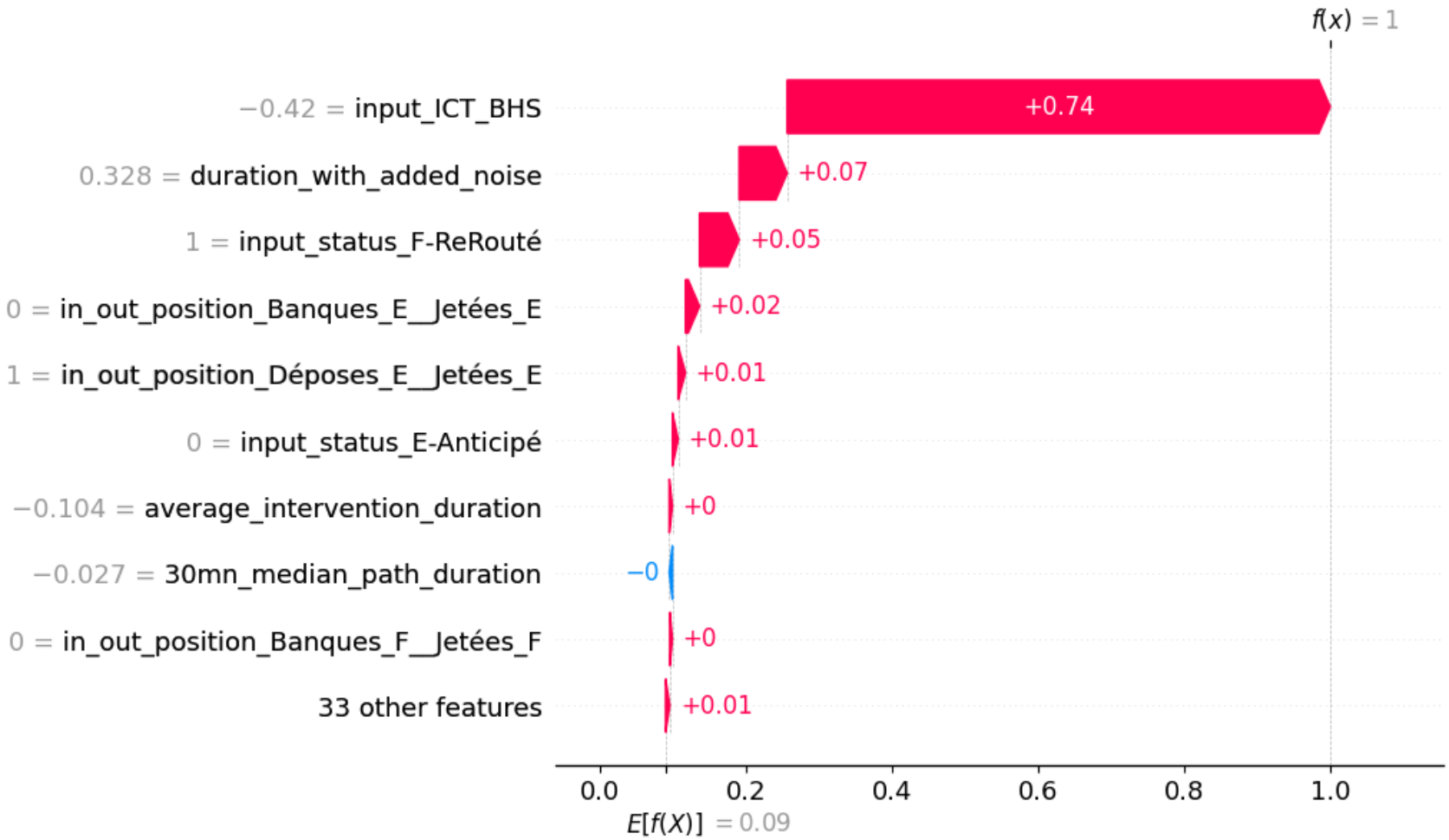
$26095.00

$5810.00

Mishandled baggage prediction



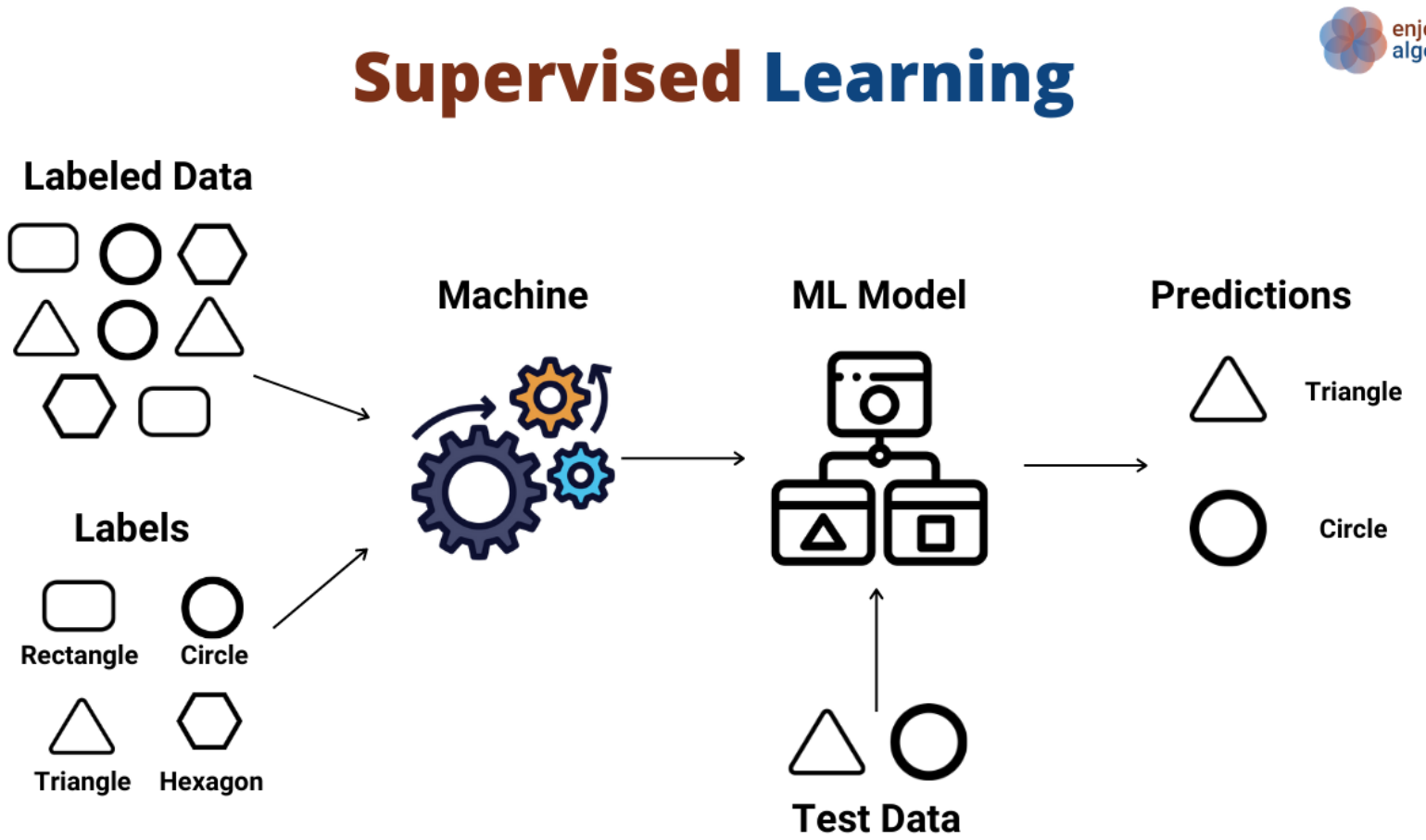
Mishandled baggage prediction



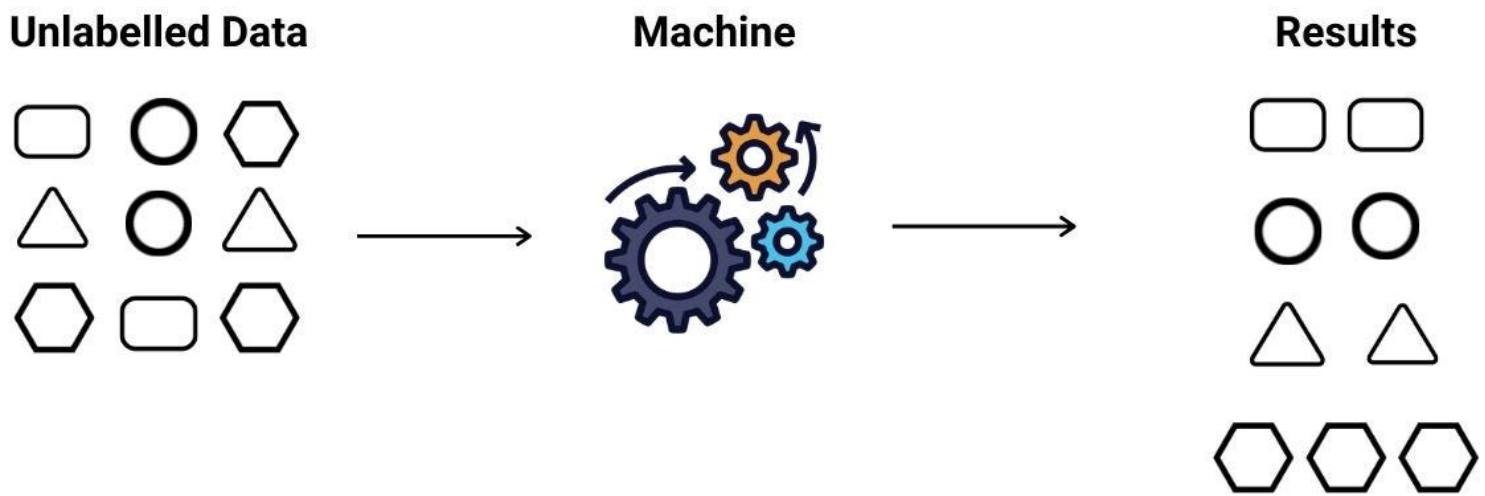
Two ML families

Usually, machine learning is divided in two categories :

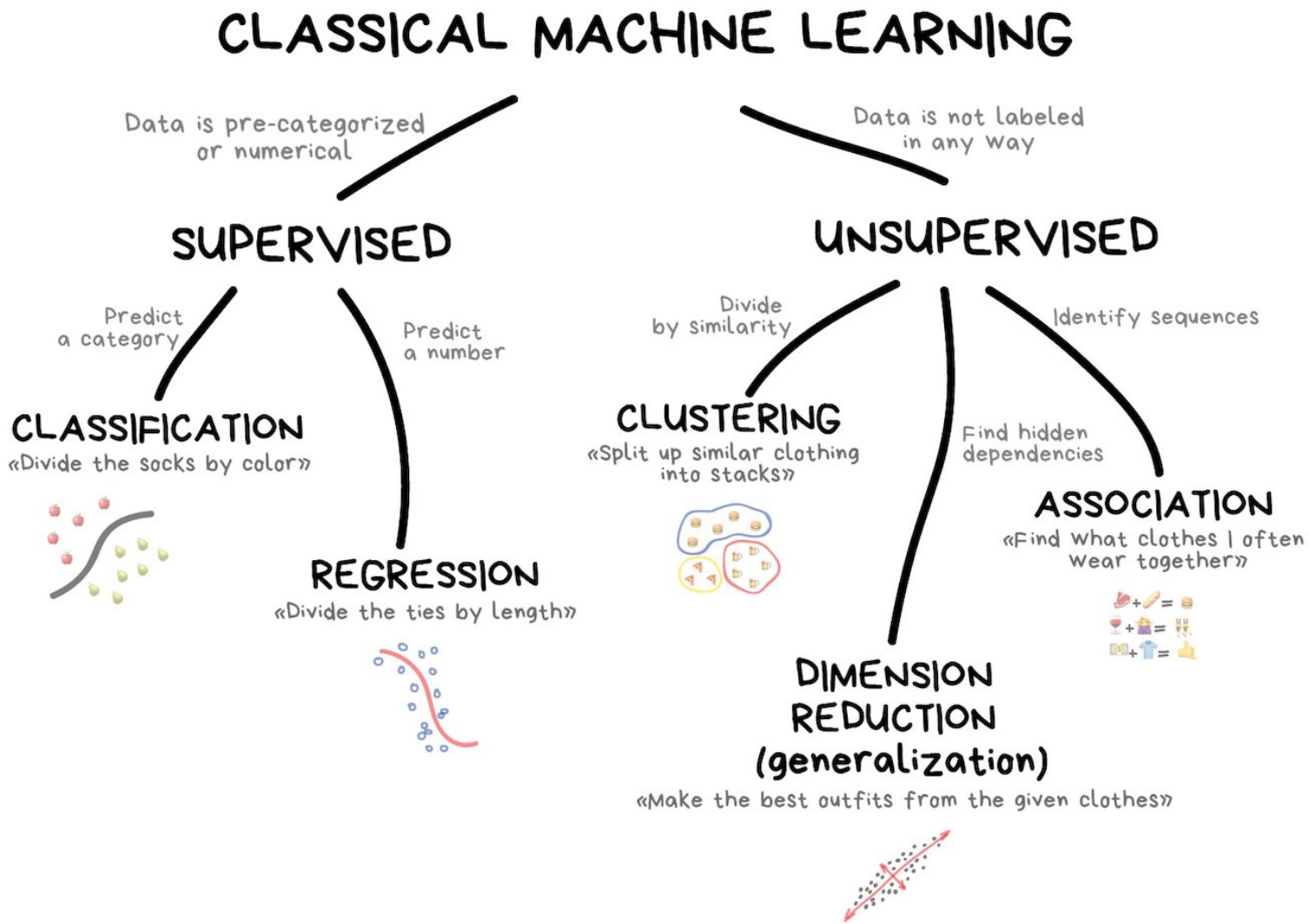
- the predictive or supervised learning approach.
- the descriptive or unsupervised learning approach.


Supervised Learning
enjoy algorithms
Labeled Data
Machine
ML Model
Predictions
Triangle
Circle
Labels
Rectangle
Circle
Triangle
Hexagon
Test Data

Unsupervised Learning



Types of ML


CLASSICAL MACHINE LEARNING
Data is pre-categorized or numerical
Data is not labeled in any way
SUPERVISED
UNSUPERVISED
Predict a category
Predict a number
Divide by similarity
Identify sequences
CLASSIFICATION
«Divide the socks by color»
REGRESSION
«Divide the ties by length»
CLUSTERING
«Split up similar clothing into stacks»
Find hidden dependencies
ASSOCIATION
«Find what clothes I often wear together»
DIMENSION REDUCTION (generalization)
«Make the best outfits from the given clothes»

Thank you for your attention