Apprentissage Statistique Automatique II

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TP - Part 1

Project - Food item classification for automated retail sorting

A large food retailer wants to automate its warehouse sorting system. Workers currently receive mixed boxes of food items (fruit, vegetables, packaged foods), and misplacing an item in the wrong category causes:

- Operational costs (wrong stock levels)
- Delays in distribution
- Waste (perishable items stored in wrong conditions)

To reduce errors and speed up logistics, the company wants to build an image-based classifier that assigns a food item to the correct category as soon as a photo is taken on a conveyor belt.

Students are hired as data scientists to create the first prototype.

Goal: Train a Deep learning model that takes an image of a food item and predicts its correct category

Resources: Here are some useful dataset to reach your goal

- Fruits 360 dataset from `Kaggle`
- Fruits and Vegetables Classification from `Kaggle`
- Food-101 from `Kaggle`

First session: Problem setup & baseline models

1. Explore the dataset and perform basic data analysis (class distribution, sample visualization, etc.).
2. Prepare and preprocess images (normalization, resizing, data augmentation).
3. Train a simple CNN model from scratch to obtain a first baseline.
4. Apply transfer learning using a pre-trained model (e.g., MobileNetV2 or ResNet18) and fine-tune on the dataset.
5. Evaluate both models (accuracy, loss curves, confusion matrix) and identify frequent misclassifications.
6. Conduct a small hyperparameter search (learning rate, batch size, augmentation strength).