

# Artificial Intelligence & Photonics for Agroindustries

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Monday, 12 December 2022, 15:00-17:00 CET EPIC Online Technology Meeting on Photonics for Food and Beverages

### GreenTropism in a nutshell

MINNING CO

- Incorporated in 2014
- 15 FTE
- 6 patent families
- Offices in Paris (Data Sciences) and Rouen (Laboratory)
- R&D focused on Automation of Chemometrics and Artificial Intelligence applied to Spectroscopy
- Products are software and software components either for Hardware manufacturers or Technology users.



# Why Spectroscopy for Agro-industries and why AI for Spectroscopy?

- Why Spectroscopy for Agro-industries?
  - Non-destructive multiparametric analysis
  - Unequalled speed for data acquisition
  - Suitable for matter state: solid, powder, liquid, gas, (plasma)
  - According to the spectral range and technology:
    - Little to no sample preparations
    - Acces to molecular or atomic composition
    - Spot analysis or imagery
  - Can be used off-line, at-line, on-line
  - Suitable for raw matter analysis, production monitoring, end-product quality,...
    - Why AI for Spectroscopy?
      - Enabler of the multiparametric analysis
      - Automation of chemometrics: more complete, accurate and robust data analysis
      - Volume of data to deal with (especially in HSI)
      - Fleet management & Predictive maintenance
      - Data-fusion with additional sensors (T°C, pH, conductivity,...)



# **Example: Kaïssa training and deployment**



#### TRAINING

- After outlier detection and data split in your database, you still have 200 samples for your training:
  - Assumption: three algorithms to use and/or combine: SNV, Savitzky–Golay smoothing/derivative, (E)MSC
  - Level I: 200k potential combinations
  - Level II: 4.10<sup>9</sup>

Sample

- Level III: 8.10<sup>13</sup> (computed in a question of minutes)
- (4.10<sup>11</sup> stars in the Milky Way)



#### DEPLOYMENT







### Successful use cases and ongoing deployments (excerpts)

- Before processing:
  - Leaves analysis directly on the plants for harvest optimization
  - Raw matter analysis at reception deck for compliancy with standard
  - Contamination detection (microplastics, unwanted seeds, allergens,...)
  - Water, Fat, Proteins quantifications,...
- During processing / between processing events
  - Ingredients check for error avoidance
  - Process steps monitoring (mixing, fermentation,...)
  - CIP efficiency analysis and optimization
- At the end of process steps
  - Quality check and comparison to standard
  - Product stability
    - Main Industries: Dairy industries, Cereals, Meat, Soft drinks, Alcoholic fermentation,...



## FOR MORE INFO :



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