

# Florent FOREST

PhD candidate in Computer Science | ISAE-Supaero Engineer (MSc)  
Data Science & Machine Learning | Aerospace Engineering

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## EDUCATION

- 2021** **PhD in Computer Science (Machine Learning), UNIVERSITÉ SORBONNE PARIS NORD, Paris area, France**
- 2018** 3rd year PhD student at LIPN (Paris-North Computer Science lab), A3 team (Machine learning). My research interests are :
  - > Unsupervised learning (clustering, self-organized models, visualization, deep learning)
  - > Big Data and distributed computing (map-reduce)
  - > Scalable machine learning algorithms
  - > Industry applications in aerospace on aircraft engine flight data (time series)
- 2017** **Supaero Engineering Diploma (MSc), ISAE-SUPAERO ENGINEERING SCHOOL, Toulouse, France**
- 2013** Graduated in 2017. Specialization in **Data & Decision Sciences** and **Space Systems Engineering**
  - > Machine learning, Statistics
  - > Data mining and visualization
  - > Databases (SQL/NoSQL), Big Data
  - > Reinforcement learning
  - > Optimization & Operations Research
  - > Programming (C, Java, Python, R, Scala)
  - > Project management
  - > Signal processing
  - > Applied mathematics
  - > Numerical methods
  - > Continuum mechanics
  - > Statistical and Quantum physics
  - > Aerodynamics, Flight & Space mechanics
  - > Languages
 Project works : industry group project with Liebherr Aerospace, Hackathons, MOOCs, Kaggle...
- 2016** **Erasmus semester, TU BERLIN, Berlin, Germany**
- 2015** Master Luft- und Raumfahrttechnik (aerospace engineering).
  - > Satellite & Rocket architectures
  - > Space Propulsion
  - > Fluid mechanics, Electronics
  - > Project management (mission design)
- 2013** **Preparatory classes, LYCÉE JANSON-DE-SAILLY, Paris, France**
- 2011** Intense preparation for the French top engineering schools in Mathematics, Physics, Engineering and Computer science.
- 2011** **Baccalauréat S, LYCÉE MARIE LAURENCIN, Mennecy, France**
- 2008** equiv. A-levels with highest honors.

## WORK EXPERIENCE

- 2021** **Data Scientist, SAFRAN AIRCRAFT ENGINES, Paris area, France**
- 2018** Industry research contract. My role is to enable large-scale analytics of data generated by civil aircraft engines during flights, to develop scalable engine health monitoring algorithms, and apply research to industry use cases.
  - > Designed a generic Big Data processing pipeline for flight data analytics on the production cluster
  - > End-to-end implementation of health monitoring methodologies based on unsupervised learning
  - > Development and deployment of visualization apps
  - > Support engineers on distributed computing technologies
 Data science Machine learning Aerospace Hadoop Hive Spark Scala Python MongoDB
- October 2017** **Intern, AIRBUS — CENTRAL RESEARCH & TECHNOLOGY, Toulouse, France**
- April 2017** I studied and applied various Artificial Intelligence methods to extract information from unstructured technical documents (text, images).
  - > Deep learning (computer vision, natural language processing), chatbot
  - > Design and development of a web application for data annotation and prediction
  - > Reading research articles
 Deep learning Python Keras TensorFlow Rasa NLU HTML/CSS Javascript Polymer MongoDB API REST
- August 2016** **Intern, CNES (FRENCH SPACE CENTER), Toulouse, France**
- March 2016** Implementation and validation of a Manual Thrust mode in an AOCS (Attitude and Orbit Control System) simulator, in order to analyze end-of-life experiments on the CoRoT satellite (PROTEUS family).
 Space mechanics Signal processing Matlab Simulink

- June 2015** | **Intern, IRAP (RESEARCH INSTITUTE IN ASTROPHYSICS AND PLANETOLOGY, Toulouse, France)**  
**February 2015** | Contributed to developing an open-source scientific library enabling astrophysicists to perform statistical analysis of gamma ray data measured by telescopes.  
 Astrophysics C++ Python Git
- July 2014** | **Intern, ONERA (FRENCH AEROSPACE LAB), Toulouse, France**  
 Development of real-time software and deployment on Linux embedded systems.  
 Embedded systems C Linux

## LANGUAGES

|         |           |
|---------|-----------|
| French  | ● ● ● ● ● |
| German  | ● ● ● ● ● |
| English | ● ● ● ● ● |
| Spanish | ● ● ○ ○ ○ |
| Chinese | ● ○ ○ ○ ○ |

## SKILLS

|                                   |   |
|-----------------------------------|---|
| <b>Programming</b>                | Scala, Python, C, C++, Web (HTML, CSS, Javascript)  |
| <b>Tools &amp; Frameworks</b>     | Hadoop, Spark, Keras, PyTorch, scikit-learn, pandas |
| <b>Databases</b>                  | SQL, Hive, MongoDB                                  |
| <b>Collaborative &amp; DevOps</b> | Git, Docker, Artifactory/Nexus                      |
| <b>OS</b>                         | GNU/Linux, Windows                                  |

## PUBLICATIONS

[florentfo.rest/publications](https://florentfo.rest/publications)

- A GENERIC AND SCALABLE PIPELINE FOR LARGE-SCALE ANALYTICS OF CONTINUOUS AIRCRAFT ENGINE DATA** 2018  
*IEEE International Conference on Big Data 2018*  
 Generic Big Data pipeline to analyze operational flight data for large-scale health monitoring on a Hadoop cluster. Application to the cartography of the health state of a fleet of aircraft engines.
- DEEP EMBEDDED SOM : JOINT REPRESENTATION LEARNING AND SELF-ORGANIZATION** 2019  
*ESANN 2019* [github.com/FlorentF9/DESOM](https://github.com/FlorentF9/DESOM)  
 A deep self-organized clustering algorithm combining the Self-Organizing Map (SOM) and representation learning via an autoencoder neural network in a joint optimization procedure.
- DEEP ARCHITECTURES FOR JOINT CLUSTERING AND VISUALIZATION WITH SELF-ORGANIZING MAPS** 2019  
*PAKDD 2019, Workshop on Learning Representations for Data Clustering*  
 Study on the DESOM model and introduction of several possible variants for structured data (e.g. images, sequences).
- LARGE-SCALE VIBRATION MONITORING OF AIRCRAFT ENGINES FROM OPERATIONAL DATA USING SELF-ORGANIZED MODELS** 2020  
*Annual Conference of the PHM Society 2020*  
 Methodology for large-scale vibration monitoring on operating civil aircraft engines, based on unsupervised learning algorithms and a flight recorder database.
- SELECTING THE NUMBER OF CLUSTERS K WITH A STABILITY TRADE-OFF : AN INTERNAL VALIDATION CRITERION.** 2020  
[arxiv.org/abs/2006.08530](https://arxiv.org/abs/2006.08530) [github.com/FlorentF9/skstab](https://github.com/FlorentF9/skstab)  
 A novel principle for model selection in clustering based on cluster stability analysis, with competitive results supported by extensive benchmarks and hyperparameter studies.
- AN INVARIANCE-GUIDED STABILITY CRITERION FOR TIME SERIES CLUSTERING VALIDATION.** 2021  
*International Conference on Pattern Recognition (ICPR) 2021*  
 Extension of a stability-based validation for time series clustering, based on invariant data transformations to guide the perturbation process used to estimate stability.
- COMPUTER ENVIRONMENT SYSTEM FOR MONITORING AIRCRAFT ENGINES** 2020  
 FR Patent FR3089501 (extended worldwide)

## REFEREES

**Dr. Jérôme Lacaille**  
*Emeritus expert, SAFRAN GROUP*  
 @ jerome.lacaille@sfrangroup.com

**Dr. Mustapha Lebbah**  
*Associate professor, UNIVERSITÉ SORBONNE PARIS NORD*  
 @ mustapha.lebbah@lipn.univ-paris13.fr