Florent **Forest**

Data & Machine Learning Scientist | Postdoctoral Researcher
PhD in Computer Science | ISAE-Supaero Engineer (MSc)

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Education

2021 **PhD in Computer Science (Machine Learning), Université Sorbonne Paris Nord, Paris area, France**
2018 PhD at LIPN lab (CNRS UMR 7030), A3 team (Machine learning). Research topics :

- Unsupervised learning (clustering, deep learning, self-organizing map models, visualization…)
- Scalable machine learning algorithms
- Big Data processing and distributed computing (map-reduce)
- Industry applications in aerospace on aircraft engine flight data (time series)

2017 **Supaero Engineering Diploma (MSc), ISAE-Supaero, 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)
- Signal processing
- Applied mathematics & Numerical methods
- Physics, Continuum mechanics
- Aerodynamics, Flight & Space mechanics
- Languages
- Project management

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 Preparation in Mathematics, Physics and Computer science for the top French engineering schools.

2011 **Baccalauréat S, Lycée Marie Laurencin, Mennecy, France**
2008 equiv. A-levels with highest honors.

Work Experience

Today – April 2021 **Postdoctoral Researcher, EPFL (École Polytechnique Fédérale de Lausanne), Lausanne, Switzerland**
Building data analysis and software tools for Innosuisse project "Worm-on-chip" with Nagi Bioscience SA.

Data Scientist & Software Engineer, Nagi Bioscience, Lausanne, Switzerland

- Built an end-to-end automated data analysis pipeline (AWS), increasing throughput and efficiency
- Deep learning for microscope image analysis (object detection and segmentation)
- Extracting relevant features from images and videos, collaborating with biologists
- Front-end and back-end development, databases, APIs
- Embedded software development for robotics/optics/fluidics control

Machine learning | Cloud | AWS | PyTorch | Spark | Node.js | Vue.js | Electron | Docker | Python | Javascript

March 2021 – January 2018 **Data Scientist, Safran Aircraft Engines, Paris area, France**
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 | Keras | PyTorch | Python | MongoDB

October 2017 – April 2017
Intern, Airbus — Central Research & Technology, Toulouse, France
I studied and applied various Artificial Intelligence methods to extract and query information from unstructured technical documents (scanned PDF, text, images) for cognitive assistant applications.
- Deep learning (computer vision, natural language processing), chatbot
- Design and development of a Polymer web application for data annotation and prediction
- Reading research articles

Deep learning | Python | Keras | TensorFlow | spaCy | Rasa NLU | HTML/CSS | Javascript | Polymer | MongoDB | REST

August 2016 – March 2016
Intern, CNES (French Space Center), Toulouse, France
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 – February 2015
Intern, IRAP (Research Institute in Astrophysics and Planetology, Toulouse, France
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

Programming	Scala, Python, R, Java, C, C++, Caml, Shell, Web (front-end/back-end)
Tools & Frameworks	Hadoop, Spark, PyTorch, Keras, TensorFlow, scikit-learn, pandas…
Databases	SQL, Hive, Athena, Postgres, MongoDB
Collaborative & DevOps	Git, CI/CD, Docker, Artifactory/Nexus
Cloud	AWS (S3, EC2, SageMaker, Lambda, RDS, Athena, SFN…)
OS	GNU/Linux, Windows
ML Applications	Computer Vision, Natural Language Processing, Time Series (sensor signals), Audio/Speech processing
Industries	Aerospace, Life sciences/Biotechnologies

Publications

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

Deep Embedded SOM : Joint Representation Learning and Self-Organization 2019
ESANN 2019 github.com/FlorentF9/DESOM

Deep Architectures for Joint Clustering and Visualization with Self-Organizing Maps 2019
PAKDD 2019, Workshop on Learning Representations for Data Clustering

Large-scale Vibration Monitoring of Aircraft Engines from Operational Data using Self-organized Models 2020
Annual Conference of the PHM Society 2020

Selecting the Number of Clusters K with a Stability Trade-off : an Internal Validation Criterion. 2020
arxiv.org/abs/2006.08530 github.com/FlorentF9/skstab

An Invariance-Guided Stability Criterion for Time Series Clustering Validation. 2021
International Conference on Pattern Recognition (ICPR) 2021

Deep embedded self-organizing maps for joint representation learning and topology-preserving clustering. 2021
Neural Computing and Applications

Computer environment system for monitoring aircraft engines 2020
FR Patent FR3089501 / US Patent 17/299,249

Referees

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