Florent DUFOUR

Graduate student from tri-national program in life science, data science, and bioinformatics
With experience in medical research and digital health technologies

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PROFILE

I have spent eight years of study in the field of life science and developed a particular interest in new technology during my superior education. I graduated from a unique tri-national program where I studied biotechnology and data science, in parallel with which, I enrolled in a master's degree in bioinformatics to deepen my knowledge in computational biology. I stand at the crossroad between biological and digital sciences. I have contributed to European research projects and participated in the redaction of published articles. I am eager to evolve as a researcher by doing a Ph.D.

EDUCATION

M.Sc., Bioinformatics .... **2016 − 2018**
Faculty of health and life science, Strasbourg   *With honours*
Multi-disciplinary program that provides transversal knowledge in the field of computational biology. *Topics: High throughput data processing, digital imaging, data base management, system biology, structural biology. . .*

Engineering degree, Biotechnology and data science .... **2015 − 2018**
École Supérieure de Biotechnologie de Strasbourg   *With honours*
Lectures in Strasbourg (France), Freiburg (Germany), and Basel (Switzerland) taught in English and German. International students. *Topics: Life science, biotechnology, data processing, biophysics, statistics, mathematics, cell/molecular biology. . .*
– Students representative at the university board
– Chief communication officier at the student organization NGB
– Member of the media club, video maker for student events

Preparatory class for French superior schools .... **2013 − 2015**
Lycée Jean Rostand, Technology and biology, Strasbourg 2nd *national rank*
Highly selective syllabus to prepare and select students before accessing French superior schools. *Topics: Life science, mathematics, algorithmics (python), physics, chemistry, biochemistry, microbiology. . .*
– Students representative
– Member of the organization team for the christmas gala

RESEARCH EXPERIENCE

Researcher in digital health and confidential computing ...... **Since 2020**
Leibniz Supercomputing Centre, Big Data and AI, DigiMed, München
Develop an ethically and legally compliant, highly secure, and sustainable cloud workbench for biomedical data.
– Build an end-to-end encrypted high performance cloud platform from the ground up
– Fine tune storage and compute resources for machine learning tasks with heterogenous biomedical datasets (images, multi-omic etc.)
– Coordinate with the legal team to develop a framework that meets regulatory requirements
– Coordinate with partner clinics and research institutes on data migration, processing, and scaling
– Migrate and develop new pipelines and workflows

Researcher in data privacy and blockchain technology ...... 2019 – 2020
Université de Lorraine, Digital division, DUNE/éole, Nancy
Complete my experience in data science with real world problematics of data privacy and self sovereignty on a large scale ($\approx$ 60,000 individuals).
– Full-stack development of a cloud based solution for storing GDPR compliant data with Spring Boot & Docker
– Building a blockchain infrastructure to certify their authencity and integrity with Python & Hyperledger
– Communication about the project during meetings, conferences, and workshops to both knowledgeable and novice audiences
– Communication with 5 partner universities to promote and deploy the solution

Master internship in high throughput computing 2018
National Centre for Scientific Research, LSMBO, Strasbourg
Complete my experience in data science with software engineering and high throughput computing.
– Develement of a PoC software in Java, capable of automating the data interpretation of large MS^3 spectra data sets
– Development of a fully-fledged human facing interface with spectral representation and interaction
– Mediator between the 3 participating institutes
– Development of a statistic validation method with ECE Illinois collaborators

Intern in medical research, artificial organs .... Summer 2017
National Institute for Health and Medical Research, PROTiP, Strasbourg
Opportunity to further explore the field of medical research and image processing for the Europan project Immodgel.
– Confocal microscopy and automated image processing of large data sets with ImageJ
– High throughput data analysis of cellular parameters with python
– Successful design of a novel poly(dopamine) nanoparticle exhibiting angiogenic and anti-microbial capabilities for implants coating
– Participated in the redaction of an article on poly(arginine) particles

Intern in medical research, chronic pain .... Summer 2016
Freie Universität Berlin, Dendropharm GmbH, Berlin
First experience with medical and pharmaceutical research in an highly active spin-off of the university in the field of drug delivery.
– Data processing and risk assessment for chronic pain and illness
– Organic synthesis, purification, and quality control of polymeric nanocarriers
– Formalization and translation of Standard Operating Procedures
– Communication and lab meeting in English and German
– All in ISO 9001 & GMP controlled environments

RESEARCH
INTERESTS

Life science: Digital Health, Data science, Computational Biology, Bioethics, Heart Disease.
Computer science: Machine Learning, Confidential Computing, Cloud Computing, High Performance Computing, Containerisation, Wearables, IoT.

CONTRIBUTIONS

Scientific publications
[1] Launay, K., Amalian, J.-A., Laurent, E., Oswald, L., Ouahabi, A.A., Burel, A., Dufour, F., Carapito, C., Clément, J.-L., Lutz, J.-F., et al. (2020). **Precise**

alkoxyamine-design enables automated tandem mass spectrometry sequencing of digital poly(phosphodiester)s.** Angewandte Chemie International Edition.

[2] Laurent, E., Amalian, J.-A., Parmentier, M., Oswald, L., Al Ouahabi, A., Dufour, F., Launay, K., Clément, J.-L., Gigmes, D., Delsuc, M.-A., et al. (2020). **High-Capacity Digital Polymers: Storing Images in Single Molecules.** Macromolecules.

[3] Knopf-Marques, H., Barthes, J., Lachaal, S., Mutschler, A., Muller, C., Dufour, F., Rabineau, M., Courtial, E.-J., Bystroňová, J., Marquette, C., et al. (2019). **Multifunctional polymeric implant coatings based on gelatin, hyaluronic acid derivative and chain length-controlled poly(arginine).** Materials Science and Engineering: C 104, 109898.

[4] Cavallo, G., Poyer, S., Amalian, J.-A., Dufour, F., Burel, A., Carapito, C., Charles, L., and Lutz, J.-F. (2018). **Cleavable binary dyads: simplifying data extraction and increasing storage density in digital polymers.** Angewandte Chemie.

Patents

– *(To come): Development of a novel algorithm and statistic validation approach for the automation of MS^3 data interpretation*

Talks

– May 2020 (cancelled, covid-19), Nancy: Pint of Science - Cryptocurrencies, darkweb and data privacy
– June 2019 (700 seats), Nancy: Digital day - Blockchain, education, and ecological concerns

Associations

– Chief Communication Officier: New Generation of Biotechnologists
– Mediator between France and Germany: Young European Biotech Network
– Event manager: Pint of Science 2020

TEACHING

– **Introduction to Container Technology & Application to AI:** Theory and practice on containers, High Performance Computing, Artificial Intelligence and Reproducible Science at the Leibniz Supercomputing Centre (Munich, Germany)
– **Facilitator in bioethics:** Surpervising think tanks and workshops related to ethics and engineering. *e.g. New concerns raised by artifical intelligence and automated learning, Data acquisition: Whose property?, Open Access and the current model of scientific publishing, Individual right to death...*
– **Tutoring:** Preparing students for scientific Baccalauréat graduation: principally mathematics, statistics, and physics
– **Scientific workshops:** During summer camps with teenagers: raft crafting, volcano modelling, skyrocket designing, molecular gastronomy...

HONOURS & AWARDS

– **2017: Top 100 talented students of Europe (Salzburg):** Organized by Roche Continents; science, art and innovation. It takes place in Austria and celebrates the Salzburg music festival.
– **2015: Second national rank Polytech challenge (Paris):** Competitive national challenge for preparatory class students. Two phases of examination to access superior schools.
– **2013: Top 5 high school students of France in biology, Concours Général des Lycées (Nancy):** Created in 1744, the Concours Général is the most prestigious academic competition for French high school students.

COMPUTER
SKILLS

- **Languages:** Java, Python, bash, JavaScript, Groovy, Swift
- **Technologies:** Jupyter, Numpy, Pandas, Matplotlib, R, Processing, Docker, Hyperledger, SpringBoot, JavaFX, Maven, JUnit, SQL
- **Platforms:** GNU/UNIX, macOS, aws ec2
- **Graphics:** LaTeX, marpit.js, Lightroom, Photoshop, Illustrator, Final Cut Pro X

LINGUISTIC
SKILLS

- **French:** Mother tongue
- **English:** Fluent
- **German:** Conversational
- **Portuguese:** Notions

REFERENCES

Available upon request

PICTURE

Available upon request

HOBBIES

Audio Visual:
- Generative art: Processing, p5.js, vectorial drawing and interpolation, typography. Experiments with neural networks. See dufour.xyz/LAB
- Photography: Digital but mostly film (including medium format and polaroids). Oldest camera in collection: Agfa Box 44 from the 30's
- Short film making: With a group of friends. We have a web series and participate in amateur festivals with original productions, fantastic and humoristic

Well being:
- Nutrition and slow food: With friends & family, green enthusiast
- Sport: Jogging & natation (earn multiple medals from local competitions)

Adventure:
- Hitch hiking, road tripping, and motor bike touring: Canada, Australia, Iceland, and Eastern Europe among others
- Hiking and moutain climbing