FAIROmics

FAIRification of multi-**Omics** data to link databases and create knowledge graphs for plant-based fermented foods

MSCA-DN-2022 Joint-Doctorates

Apply for your PhD in the FAIROmics project - FAIRification of multiOmics data to link databases and create knowledge graphs for fermented foods.

Job description

Title: DC13, PhD fellowship in explainable machine learning techniques to support the design of plant-based fermented food products – Development of a serious game to support the design of plant-based fermented food products.
Researcher profile: Doctoral candidate.
Research field: Computer science, Applied mathematics.
Type of contract: Temporary.
Job status: Full-time.
Duration: 36 months.
Application deadline: 25/08/2024 23:59 - Europe/Brussels.
Envisaged job starting date: October 2024.
How to apply: submit your application form through this link.

Hiring organisation and offer posting contact details

Organisation: Paderborn University.
Number of positions available: 1.
Country: Germany.
Address: : Warburgerstrasse 100, 33098 Paderborn.

Please note that this PhD position will lead to the award of a **double diploma** after the completion of a stay in each of these organisations: The **Paderborn University** and the **French National Institute for Agriculture, Food, and Environment - INRAE** (PhD title delivered by the **Université Paris-Saclay**).

Offer description

In brief:

We are looking for a Doctoral Candidate (DC) to join our project at multiple sites in the EU with a master's degree in computer science, applied mathematics or similar interested in the use of knowledge representation in food sciences.

FAIROmics project:

The FAIROmics initiative, an interdisciplinary research programme, will gather universities, research centres and private companies to enable the FAIRification of omics data and databases interoperability and develop knowledge graphs for data-driven decision-making to rationally design microbial

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communities for imparting desirable characteristics to plant-based fermented foods in the context of open science and its regulations. The FAIROmics training programme aims to develop doctoral candidates' skills at the interface between artificial intelligence, life sciences, humanities, and social sciences.

Scientific context:

Plant-based dairy and meat alternatives have grown in popularity in recent years for various reasons, including sustainability and health benefits, as well as lifestyle trends and dietary restrictions. However, plant-based food products can be nutritionally unbalanced, and their flavour profiles may limit their acceptance by consumers. Microorganisms have been used in making food products for millennia. However, the diversity of microbial communities driving plant-based fermentations, as well as their key genetic and phenotypic traits and potential synergies among community members, remain poorly characterised. Many data exist, but they are spread into different literature (scientific and grey) or, in the best case, in different databases. However, they are not always reusable because they are difficult to find and access and because databases are not systematically interoperable.

Objectives:

DC13 will collect, integrate and fuse knowledge about plant-based fermented food necessary to design, implement and evaluate a serious game on plant-based food synthesis. The knowledge to harmonise will cover several areas: technical (raw material used, microbial consortia, formulation, processing…), consumer (sensory and hedonic properties, expectations…), environmental (impact on climate change, resource use, ecosystems…) and more widely sustainability (e.g. stakeholder expectations for social aspects and prices for economic aspects). A representative case study will be chosen (e.g. plant-based fermented food products produced by DC1). Data will be collected from previous projects, scientific literature and relevant open databases (especially for technical data). The analysis of all the collected data will allow (i) the quantification of the causal relations between the different dimensions of the studied system and (ii) the identification of barriers and drivers to design the formulation and process of plant-based fermented food. This analysis will be formalised as a knowledge graph which serve as data to create a prototype of a serious game which supports the design of plant-based fermented food products, with a stakeholder approach.

Expected results:

- Formalised knowledge about plant-based fermented products including consumer, social and environmental data.
- The development of a prototype of a serious game to support the design of plant-based fermented food products.

Location and planned secondment:

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The PhD student will be located **at Paderborn University**, Germany, for **20 months**. The secondment will be done **at INRAE (Joint Research Unit SayFood)**, Palaiseau, France, under the supervision of Dr. Caroline Pénicaud for a **16-month period**.

Enrolment in Doctoral degree:

1st-degree awarding organisation: University of Paderborn, Germany, https://www.uni-paderborn.de/en/
2nd-degree awarding organisation: University of Paris-Saclay (UPSaclay), France, https://www.universite-paris-saclay.fr/en

Required skills/qualifications

- Qualification in computer science, applied mathematics, or similar.
- Interest in food sciences, especially in consumer and environmental sciences.
- Interest in serious games.
- Excellent relationship and communication skills.
- Excellent organisational skills.
- Networking and communication skills in a multicultural and multidisciplinary environment.
- Willingness to travel abroad for the purpose of research, training and dissemination.

Eligibility criteria

- **Any nationality**
- **Doctoral Candidate (DC):** The applicant must not have been awarded a doctoral degree.
- **Mobility rule:** The DC must not have resided or carried out main activity (work, studies, etc.) in the country of their host organisation for more than 12 months* in the three years immediately prior to the date of selection in the same appointing international organisation.

  * EXCLUDED: short stays such as holidays, compulsory national services such as mandatory military service and procedures for obtaining refugee status under the General Convention.

- **Language:** Applicants must demonstrate fluent reading, writing and speaking abilities in English (B2).

Supervisors team

- **UPB team**: You will work with the Data Science group at Paderborn University. The group focuses on knowledge representation and machine learning at scale. It is particularly interested in models with rich semantics, e.g., RDF knowledge graphs. You will be supervised by Prof. Dr. Axel Ngonga

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(head of group) and Dr. Mohamed Sherif (head of the knowledge integration and fusion unit), both knowledge graph specialists.

- **INRAE team:** You will be based at the SayFood JRU (Paris-Saclay Food and Bioproduct Engineering Joint Research unit), which aims to contribute to product-process innovation by integrating upstream production constraints, consumer needs and expectations, and environmental issues. You will be supervised by **Caroline Pénicaud** (INRAE research scientist in food ecodesign), **Anne Saint-Eve** (Professor at AgroParisTech in sensory and consumer science), and **Lucy Espinosa** (INRAE research scientist in sensory engineering).

Host institutions description

- The DICE team at Paderborn University is one of the leading research groups on knowledge graphs worldwide. The group has received over 30 research prizes at top-ranking venues for its advancements in knowledge research in subfields such as knowledge integration, benchmarking, link discovery and machine learning.

- The secondment will take place at **INRAE** and more specifically into the **SayFood Joint Research Unit**. INRAE is Europe's top agricultural research institute and the world's number two centre for the agricultural sciences. Its scientists are working towards solutions for society's major challenges. Our research topics are the physicial, biochemical and microbiological processes that govern the food and non-food transformations of bioproducts.

We offer

- A comprehensive, interactive and international training programme covering the broader aspects and interface between life science, data science, artificial intelligence and humanities and social sciences, as well as transferable skills.
- An enthusiastic team of professionals to co-operate with.
- Personal Career Development Plan (PDCP) to prepare young researchers for their future careers Each DC will undergo individual training at individual institutes according to the PCDP description.
- An attractive compensation package in accordance with the MSCA-DN programme regulations for doctoral candidates. The exact salary will be confirmed and will be based on a living allowance of 3400€/month* (correction factor to be applied per country) + mobility allowance of 600€/month. Additionally, researchers may also qualify for a family allowance** of 660€/month, depending on the family situation. Taxation and social (including pension) contribution deductions based on national and company regulations will apply.

*monthly gross salary.
**family = be married/be in a relationship with equivalent status to a marriage recognised by the

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legislation of the country or region where it was formalised/have dependent children who are being maintained by the researcher.

Selection process

The selection process is based on the merits of providing equal opportunity and will be in agreement with the European Code of Conduct for the Recruitment of Researchers.

1. **Candidates** apply for a position using the **online application form** (accessible here).
2. The **FAIROmics Project Manager provides a first screen** of the written applications to **check the eligibility** of the candidate and forwards the eligible applications to the DC supervisors.
3. The **DC supervisors** will select the **best candidates based on CV, academic records, recommendation and motivation letters and adequate skill set.** To better assess the best candidate, the shortlisted candidates might be asked to write an abstract of provided scientific documents relevant to the research subject.
4. The selected applicants will be **interviewed through an online meeting by the Selection Committee** (two main supervisors and two representatives of a beneficiary or associated partner, with at least one person external to the DC's project).
5. The **best candidates will be chosen by the main supervisors**. The European Project Manager will communicate the successful candidates to the Consortium and Partners.

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