

3 year PhD or Post-Doc position: Using deep learning to assess and to exploit structural relationships in massive multivariate longitudinal dairy cow related "big data"

Scientific context: Knowing relationships between variables is in many multi-variate situations of extreme importance. Currently in animal production we observe a massive influx of animal related data (e.g., from Precision Livestock Farming's sensors) that is also very often repeated over time, therefore has to be considered in a longitudinal context. But not only "volume" characterizes this data but at least also "variety", "velocity" and "veracity". Except velocity this project will address all these other issues through a novel and innovative strategy to assess and to exploit structural relationships in massive multivariate longitudinal dairy cow related "big data". Current classic mixed model based modeling and (co)variance component estimation methods hit serious limitations in this type of situations. In this project we will merge these traditional methods with deep learning approaches linked to pattern recognition and similar strategies to assess structural relationships. Research will be put in the context of animal breeding and dairy cattle selection and exploited to make the results useful in the context of genomic selection for better dairy products from healthier cows producing in an environmental friendly manner.

Host laboratory: Successful candidate will join an international team (members of the Numerical Genetic Genomics and Modeling Group, other researchers from Gembloux Agro-Bio Tech and including collaborators at the Walloon Center for Agricultural Research – CRA-W, in total ~10 person) recognized internationally for its research to address functional traits (e.g., based on milk mid-infrared (MIR) spectrometry), longitudinal multi-variate modeling and for having developed a large network of national (Walloon Breeding Association – awé) and international collaborations in these fields (USA, Canada, Brazil, China, Australia and Europe).

Responsibilities: Successful candidate will be either a PhD student or a Post-Doc. The Post-Doc will be expected to contribute to the development, the writing and the submission of regional, national and international research projects in the research topic: *Using deep learning to assess and to exploit structural relationships in massive multivariate longitudinal dairy cow related "big data"*. Therefore the main responsibility of the selected researcher will be to focus his/her work on the use and the improvement of statistical methods useful to analyze massive multivariate longitudinal dairy cow related "big data". Data will include, but will not be limited to, novel sensor and milk infrared based phenotypic data.

Skills: Post-Doc level candidates must hold a recent PhD in agricultural or related sciences (less than 4 years) and have a strong background in computing, statistics, chemometrics, engineering, data analysis and, if possible (animal) breeding, genetics and genomics. PhD level candidates are requested to hold an MSc in these fields, agriculture, veterinary or biological sciences. Expertise in computer programming skills will be highly appreciated, training in genetics and genomics provided (doctoral training for PhD). We look for scientist with very good communication and writing skills and teamwork ability to interact within and outside the research team. Applicants are expected to be mobile as important parts of this research will be done outside of Belgium in collaborating research groups (USA, Canada, Brazil, China, Australia and Europe). Curiosity, rigor and autonomy are also key assets.

Location: University of Liège - GxABT (Gembloux) campus in Belgium (35 min by train from Brussels)

Duration: Position open, currently financed are 36 months can be extended pending extra funding¹.

Contact and application²: Please send your CV, two reference letters and a letter of motivation to Prof. Nicolas Gengler (nicolas.gengler@uliege.be) ASAP as the position is currently open. **As this position has to be filled ASAP**, candidates having already the required authorizations to work in Belgium will be preferred. Feel free to ask any additional information at the same e-mail address.

¹ Highly motivated PhD students and Post-Doctoral researchers can submit FNRS (or FRIA) grant applications during the duration of their employment period in order to enter a (permanent) scientific career in Belgium (more details on <http://www.fnrs.be/en/>).

² With submission of your application, you accept the processing of your applicant data in terms of data-protection law.