Postdoc position

Artificial intelligence solution for animal welfare assessment

Keywords : *Animal welfare assessment, Machine Learning, Hybrid expert system, behaviour measurement, IoT*

Partners : **LISTIC** at Univ. Savoie Mont Blanc, **Novo Senso**

To apply : Send CV + cover letter + publication list to Eric BENOIT : eric.benoit@univ-smb.fr

Duration : 1 year followed by the possibility to join Novo Senso as Chief Innovation Officer

Salary : 1980 €/month

Location : Annecy (LISTIC)
trips to the partner organic farm in Arbusigny (20 min from LISTIC).

Management : Eric Benoit & Stéphane Perrin (LISTIC), Julien Cornouiller (NOVO SENSO)

Context

The LISTIC is a computer laboratory specialized in information fusion. It is working on a project of recognition of dairy cow behaviours in partnership with Novo Senso.

Novo Senso is a start-up created in July 2019 which aims to design and sell intelligent solutions for monitoring and caring for farm animals, while helping farmers to optimize their activities.

We offer a Post-doc position to develop and implement in partnership with Novo Senso an algorithm for cow behaviour recognition based on the indirect analysis of cow movements. The targeted behaviours are :

- **Heat detection and calving**
- **Anticipating health problems.**
- **Animal welfare assessment.**

The issue at stake is to be able to propose a decision support system in the context of cattle farming. A breeder is able to assess the state of health of cattle by observing them. The idea is to be able to carry out this analysis automatically through a connected object: the collar. Indeed, the visual analysis is based on the observation of the cattle's movement. It is therefore possible to carry out this analysis using sensors located in this collar associated with artificial intelligence processing.

The interests are multiple. The determination of heat periods is an important indicator for the farmer and enables him to optimize the chances of successful insemination; as the optimal time window is about ten hours, the automation of this detection is critical. On the other hand, an animal with health problems behaves differently; detecting these changes early allows for more effective action and, if possible, alternative medicine. Finally, since the animal's behaviour is measured continuously, it is possible to assess its well-being by a factual measurement, opening up prospects for certification in this field.

The solution is based on accelerometer-type smart sensors placed in a connected collar and able to pre-process raw measurements in order to give sequences of elementary cow movements.

The expected solution is based on artificial intelligence techniques including not only machine learning methods (data mining, clustering, deep learning) but also expertise capture. The scientific challenge is to mix in a unique solution the farmer expertise and the recent machine learning approaches in order to interpret the cow behaviours.

Mission details:

- After a preliminary analysis of the data and a literature review on behaviour recognition by machine learning methods, a first selection of relevant methods will be made.
- In parallel, The farmer expertize based on the behaviour observation will be captured.
- Then, the study will be extended to the comparison of the different methods on the available data set and the definition of an hybrid solution mixing expertise capture and machine learning approaches.
- Finally, the selected algorithm will be implemented in the cloud, in cooperation with the designers of the object.

The LISTIC provides scientific support in the field of machine learning, IoT and more specifically behaviour recognition. Novo Senso provides all the human and material resources available.

Required Qualifications:

- Recent PhD with experience in Computer Science, Statistics, Data Science or a related quantitative field.
- Excellent knowledge in Machine Learning, including not only deep learning but also usual classification methods.
- Excellent programming skills
- Innovative spirit and team player skills

Desired Qualifications:

- Experience with PyTorch and Numpy/Scipy will be appreciated.
- Good verbal and written communication and presentation skills necessary to author technical and scientific reports, publications.

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