Der Wissenschaftsfonds.

Job Announcement for 5 Fully-funded Positions as PhD Student Researchers in Austria

We are very happy to announce an exciting new research and training program for PhD students: Human-centric Artificial Intelligence (HCAI). HCAI will start on April 1, 2022.

The HCAI program will fund a total of five PhD student researchers for up to 4 years. Employment will be for 30 hours/week, according to the regulations of the funding body, i.e., the Austrian Science Fund (FWF). To fill these open positions, we are seeking highly motivated students with a background in Artificial Intelligence, Human-computer Interaction, Machine Learning, Information Visualization, Information Retrieval, and/or Recommender Systems, holding a Master's degree (or equivalent). The students will be employed either at the Johannes Kepler University (JKU) Linz or the University of Applied Sciences, Upper Austria (FH OÖ), Hagenberg Campus. Selected students will be given the unique opportunity to work on exciting and timely topics, at the intersection of basic and applied research, thanks to the close collaboration between the universities.

The HCAI program will elaborate methods for creating transparent and trustworthy AI technology that (1) serves humans, (2) supports human-AI interaction, (3) avoids discrimination of individuals and groups, (4) can explain its reasoning, and (5) is evaluated from a human perspective in addition to a purely accuracy-based quantification. Corresponding project results will have a substantial societal impact by increasing trust in and credibility of AI technology.

The specific PhD research topics targeted in the HCAI project are:

PhD 1: Overcoming the Dichotomy of Deep Learning vs. Symbolic AI
Contact: Ulrich Bodenhofer <Ulrich.Bodenhofer@fh-hagenberg.at>
This PhD project aims at devising new concepts that bridge two fundamentally different paradigms in AI: symbolic AI and deep learning. The thesis will first focus on a comparative analysis of existing approaches and explore the reasons why so far none of them has proved useful for a wide range of applications. Starting from this systematic investigation, we attempt to provide an alternative that is both simple and powerful. Existing approaches include (1) representations of symbolic knowledge by means of neural systems and (2) symbolic AI contributing an explanation component to black-box systems. Our goal will be to devise a new approach that really integrates the two worlds in a way that is both powerful and practically feasible.

PhD 2: Mitigating Multifaceted Biases in Recommender Systems
Contact: Markus Schedl <markus.schedl@jku.at>
This PhD project aims at making recommender systems fairer for user groups that are unfairly treated by current recommender systems technology (e.g., according to gender, age, or ethnicity). The thesis will achieve this by: (1) extending state-of-the-art neural network architectures, (2) adopting adversarial learning and algorithmic regularization, (3) evaluating resulting approaches using accuracy-based metrics and bias/unfairness metrics. The thesis' outcome will be less biased recommendation algorithms that act fairer towards protected user group(s). Target domains will include job recommendation and music recommendation, tasks for which we have access to huge data collections thanks to our industry cooperations.

PhD 3: Explaining Visual Patterns in Embedding Spaces
Contact: Marc Streit <marc.streit@jku.at>
This PhD project aims to develop novel visualization techniques to allow an effective and robust interactive exploration of embedding spaces. Such an interactive visualization needs to provide a way for analysts to detect visual patterns and relate them to high-dimensional data.
Possible approaches include (1) interactively manipulated or user-augmented embeddings, (2) summary+difference encodings for the high-dimensional data items, and (3) automatic annotation strategies.

PhD 4: Human-AI Collaboration
Contact: Mirjam Augstein <Mirjam.Augstein@fh-hagenberg.at>
This PhD project approaches HCAI from a CSCW perspective and analyzes the characteristics of human-AI interaction in the sense of collaboration. The thesis will involve a systematic literature review on the definition and characterization of collaboration. It will further analyze and evaluate existing descriptive models and frameworks which aim to capture the nature of collaboration between humans. Based on this analysis, prototypes of human-AI collaboration scenarios and thorough empirical work, we aim at establishing a novel conceptual framework for human-AI collaboration and guidelines for future designers and developers of collaborative AI systems.

PhD 5: Integration of Human Expertise and a-priori Knowledge in White-box Machine Learning
Contact: Affenzeller Michael <Michael.Affenzeller@fh-hagenberg.at>
This PhD project builds upon and extends the interpretation of learning in AI. Interpretability and explainability are essential prerequisites for involving humans holistically in machine learning processes. For structured numerical data, genetic programming-based symbolic regression is a promising approach to learn complex nonlinear systems behavior in interpretable form. Our main goals will be the integration of knowledge from the domain (e.g. physics, chemistry, mechatronics, automotive, or macroeconomics) like (1) knowledge about correlations between features, (2) knowledge about extrapolation behavior, (3) knowledge about partial model structures (model of models) already during the learning phase.

If you are interested in joining our vibrant research community in Upper Austria and would like to apply, please send the following documents to the contact person of your preferred topic(s).

- Detailed CV
- Publication list (if you have already published in scientific venues)
- Certificates (including English translations!)
- Lists of courses (and corresponding grades) taken during your studies
- Some documents that demonstrate your scientific writing skills (e.g., a scientific article you published, a seminar paper, your Master's thesis)
- Short statement of your research background, including a short motivation explaining why you are interested in the selected PhD topic (no more than 1 page)

For general inquiries, please contact the project coordinators Ulrich Bodenhofer (FH OÖ) <Ulrich.Bodenhofer@fh-hagenberg.at> and Markus Schedl (JKU) <markus.schedl@jku.at>.