



## Open Position Announcement - Nr 01/2019 - P2

Within the frame of the **VirtualWorkshop for Digitization in Sciences** funded by the Carl Zeiss Foundation, the Friedrich Schiller University through the Michael Stifel Center Jena offers the following position with Jena as job location and a preferred starting date of April 1st, 2019:

### Doctoral Researcher (m/f)

### Topic: Detection of causal relationships by means of deep learning processes

#### PROJECT DESCRIPTION

The determination of unknown causalities between variables from large amounts of data would allow for a gain of knowledge of the system's behaviour. The aim of this project is to investigate to what extent causal relationships can be derived from learned, deep networks. This allows better insights into the functioning of deep networks and integrate causal relationships in a constructive way. The developed methods will be used and implemented in important and generic tools of the Workshop for Digitization in Sciences.

#### DESIRED QUALIFICATIONS

- Master in Computer Science, Mathematics or related areas
- Background in machine vision and learning, preferably deep learning
- Desire and ability to work in an interdisciplinary team
- Creativity to develop new algorithms and learning paradigms
- Practical knowledge of current state of the art in computer vision and machine learning
- Commitment and dedication to develop robust, working systems on real data
- Fluency in written and oral English; German is a plus
- Interests in application of computer science and machine learning to environmental and climate sciences
- Strong programming expertise, preferably in C/C++/Python

Funding of the position is limited to 3 years. Salary will be based on 75% of TV-L 13. Severely handicapped people are given preference for equal qualifications, aptitude and professional qualifications. Friedrich Schiller University Jena is committed to increase the percentage of female scientists and therefore especially encourages them to apply. Applications should consist of a single .pdf file including: (i) a letter of interest and (ii) a brief CV. Please submit your application per email with the registration number in the subject until **February 15th, 2019** to the contact person given below. Interviews are likely to be held in February 2019. For any queries please contact: Yanira Guanche Garcia, [yanira.guanche.garcia@uni-jena.de](mailto:yanira.guanche.garcia@uni-jena.de)



## Open Position Announcement - Nr 01/2019 - P10

Within the frame of the **VirtualWorkshop for Digitization in Sciences** funded by the Carl Zeiss Foundation, the Friedrich Schiller University through the Michael Stifel Center Jena offers the following position with Jena as job location and a preferred starting date of April 1st, 2019:

### Doctoral Researcher (m/f)

### Topic: Methods for data driven virus diagnostics at multiple levels

#### PROJECT DESCRIPTION

In this project, new data analysis and learning methods will be developed to improve the diagnosis of known and unknown viruses and their interaction with their host and other pathogens. We assume that there are three complex data streams: Sequences (genome and transcriptome of virus and host), images (virus, by TERS technique newly developed in Jena), and molecular spectra (mass spectra of virus and host). The doctoral study should focus on: (a) the development of novel or improvement of existing (machine-learning) methods for virus identification in sequencing data (Illumina and Oxford Nanopore Technology). (b) the development and application of techniques for realtime sequencing. (c) the development of methods to identify and characterize viruses based on tip-enhanced Raman spectroscopy (TERS). Overall, in cooperation with P3, the developed methods and models shall increase the accuracy and confidence of diagnostics.

#### WE OFFER

Challenging and interesting research questions from different areas of computational intelligence and machine learning, a national and international network of cooperation partners to interact, with respect to method development and their application.

#### DESIRED QUALIFICATIONS

- Master's degree (or a qualification equivalent) in bioinformatics, chemoinformatics, computer science, physics, or mathematics with very good grades.
- Strong programming skills in Python and C/C++
- Experience in machine learning and image analysis
- Experience in the analysis of sequencing data (both Illumina and Nanopore)
- Strong interest in evolutionary algorithms, genetic programming and optics
- Knowledge in (molecular) biology and virology

Funding of the position is limited to 3 years. Salary will be based on 75% of TV-L 13. Severly handicapped people are given preference for equal qualifications, aptitude and professional qualifications. Friedrich Schiller University Jena is committed to increase the percentage of female scientists and therefore especially encourages them to apply. Applications should consist of a single .pdf file including: (i) a letter of interest and (ii) a brief CV. Please submit your application per email with the registration number in the subject until **February 15th, 2019** to the contact person given below. Interviews are likely to be held in February 2019. For any queries please contact: Yanira Guanche Garcia, [yanira.guanche.garcia@uni-jena.de](mailto:yanira.guanche.garcia@uni-jena.de)



## Open Position Announcement - Nr 01/2019 - P5

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### **Doctoral Researcher (m/f)** **Topic: Learning from data annotations**

#### **PROJECT DESCRIPTION**

Data used in science were often originally collected for a completely different purpose. In order for such re-use to be truly successful, a machine-readable description of the data is essential. However, creating such a description requires considerable manual effort. In existing data sets, such a description is therefore often missing. In this project, a series of generic tools will be developed that (semi-) automatically supplement existing, insufficiently described data sets with the metadata necessary for meaningful re-use. The actual use of the resulting tools will be demonstrated using biodiversity as an example.

#### **DESIRED QUALIFICATIONS**

- A master's degree or something similar in Computer Science, Bioinformatics or a related field.
- Background in semantic web and/or machine learning
- Interest in interdisciplinary work.
- Strong communication skills (both written and oral) in English.

Funding of the position is limited to 3 years. Salary will be based on 75% of TV-L 13. Severly handicapped people are given preference for equal qualifications, aptitude and professional qualifications. Friedrich Schiller University Jena is committed to increase the percentage of female scientists and therefore especially encourages them to apply. Applications should consist of a single .pdf file including: (i) a letter of interest and (ii) a brief CV. Please submit your application per email with the registration number in the subject until **February 15th, 2019** to the contact person given below. Interviews are likely to be held in February 2019. For any queries please contact: Yanira Guancho Garcia, [yanira.guancho.garcia@uni-jena.de](mailto:yanira.guancho.garcia@uni-jena.de)



## Open Position Announcement - Nr 01/2019 - P3

Within the frame of the **VirtualWorkshop for Digitization in Sciences** funded by the Carl Zeiss Foundation, the Friedrich Schiller University through the Michael Stifel Center Jena offers the following position with Jena as job location and a preferred starting date of April 1st, 2019:

### Doctoral Researcher (m/f)

### Topic: Methods for data driven virus diagnostics at multiple levels

#### PROJECT DESCRIPTION

In this project, new data analysis and learning methods will be developed to improve the diagnosis of known and unknown viruses and their interaction with other pathogens. We assume that there are three complex data streams: Sequences (genome and transcriptome of virus and host), images (virus, by TERS technique newly developed in Jena), and molecular spectra (mass spectra of virus and host). The doctoral study should focus either on: (a) the development of new methods of machine learning and stochastic inference for the metabolomics of viral infections (molecular level), based on existent methods (SIRIUS, CSI:FingerID) for gas chromatography and electron ionization, or (b) the development of novel genetic programming methods (cf., e.g., CMAES-GEGP) for learning simultaneously model structure together with its quantitative parameters. As model structure we envision small human-readable formulas ("laws"), computer programs, and reaction networks. Overall the new methods will generate knowledge from data in the form of learned models that should then be used for diagnostics in collaboration with other projects in the WERKSTATT.

#### DESIRED QUALIFICATIONS

- Master's degree (or a qualification equivalent) in bioinformatics, chemoinformatics, computer science, physics, or mathematics with very good grades.
- strong programming and algorithmic engineering skills
- Proven interest in one or more of the following fields: combinatorics, computational mass-spectrometry, machine learning, evolutionary algorithms, genetic programming, complex dynamical systems, reaction networks, computational systems chemistry
- Introductory course level knowledge in (molecular) biology

#### WE OFFER

Challenging and interesting research questions from different areas of computational intelligence and machine learning, a national and international network of cooperation partners to interact, with respect to method development and their application.

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## Open Position Announcement - Nr 01/2019 - P6

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### Doctoral Researcher (m/f)

**Topic: Deep learning for gravitational wave data analysis**

### PROJECT DESCRIPTION

Finding gravitational wave signals in the data stream produced by the detectors is a task in signal analysis for time-series data. Given analytical and numerical templates of gravitational waves, as they are for example computed within the Jena collaboration, the task is to perform matched filtering on detector data. The methods of deep learning have recently been introduced as a powerful and efficient alternative to standard methods of matched filtering for gravitational wave data analysis. The goal of the project is to implement and evaluate different methods, to determine optimal hyperparameters for specific applications, and to finally produce a state-of-the-art data analysis pipeline. Since this research area is largely unexplored, the embedding into the framework of the Virtual Workshop, which involves both physicists and computer scientists, plays an important role.

### DESIRED QUALIFICATIONS

- Doctoral Degree in physics, computer science or neighboring fields.
- Skills in data analysis, computer programming, and/or machine learning are desirable, but not strictly required.
- Candidates should have a strong background in at least one of the above topics, and be strongly motivated to learn the others.

Funding of the position is limited to 3 years. Salary will be based on 75% of TV-L 13. Severely handicapped people are given preference for equal qualifications, aptitude and professional qualifications. Friedrich Schiller University Jena is committed to increase the percentage of female scientists and therefore especially encourages them to apply. Applications should consist of a single .pdf file including: (i) a letter of interest and (ii) a brief CV. Please submit your application per email with the registration number in the subject until **February 15th, 2019** to the contact person given below. Interviews are likely to be held in February 2019. For any queries please contact: Yanira Guanche Garcia, [yanira.guanche.garcia@uni-jena.de](mailto:yanira.guanche.garcia@uni-jena.de)



## Open Position Announcement - Nr 01/2019 – P7

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### **Doctoral Researcher (m/f)**

### **Topic: Combined analysis of image data from head and neck cancer**

#### **PROJECT DESCRIPTION**

Before, during and after the therapy of head and neck tumours, a large amount of multimodal image data is generated. This includes image data obtained during surgery as well as data from histopathological analyses of the removed tissue, proteomic analyses with MALDI imaging, pre- and posttherapeutic multimodal imaging for tumor staging (computer tomography, positron emission tomography and magnetic resonance imaging). These image data have so far hardly been linked, although it has already been proven that the combined analysis of such data allows a better prediction of tumor control. The aim of this project is therefore to bring together the data collected during the course of therapy on a common platform and to analyse them with machine learning methods in order to achieve the necessary breakthrough in the development of more precise diagnostics and therapy.

#### **DESIRED QUALIFICATIONS**

- Master degree in medical oriented Biology or Bioinformatics
- Mutual understanding of biological, medical and bioinformatics contexts
- Experience in molecular and histological techniques is welcome
- Readiness to work in an interdisciplinary team and self-reliant work

Funding of the position is limited to 3 years. Salary will be based on 75% of TV-L 13. Severly handicapped people are given preference for equal qualifications, aptitude and professional qualifications. Friedrich Schiller University Jena is committed to increase the percentage of female scientists and therefore especially encourages them to apply. Applications should consist of a single .pdf file including: (i) a letter of interest and (ii) a brief CV. Please submit your application per email with the registration number in the subject until **February 15th, 2019** to the contact person given below. Interviews are likely to be held in February 2019. For any queries please contact: Yanira Guanche Garcia, [yanira.guanche.garcia@uni-jena.de](mailto:yanira.guanche.garcia@uni-jena.de)



## Open Position Announcement - Nr 01/2019 - P8

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### **Doctoral Researcher (m/f)**

### **Topic: Use and reuse of MRI data in biomedical research Environment**

#### **PROJECT DESCRIPTION**

This PhD project is intended to establish methods for the sustainable continued use of large research magnetic resonance imaging (MRI) data sets. The overarching aim includes development of data quality assessment tools as well as new AI-based strategies to identify hidden patterns in these datasets that may potentially serve as biomarkers and /or predict disease status and future progression. Tasks include (1.) identification and annotation of high-quality, artifact-free MRI data sets using image-based approaches; (2.) identification of characteristic properties in the data sets using machine learning algorithms; (3.) inclusion of these properties in subsequent image analysis pipelines; (4.) implementation of so-called Image-derived phenotypes (IDPs).

#### **DESIRED QUALIFICATIONS**

- M.Sc. in Physics, Biomedical Engineering, Computer Sciences or Mathematics with above-average study results
- Strong programming/scripting experience (e.g. Matlab, Python)
- Interest in medical imaging, high affinity towards data science, ability to handle complex mathematical problems, strong computer skills and networking with other scientists
- Fluent English (and/or German)

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## **Open Position Announcement - Nr 01/2019 - P9**

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### **Doctoral Researcher (m/f)**

**Topic: Development, digitization and establishment of sensor-assisted phenological observations of plant species**

### **PROJECT DESCRIPTION**

The monitoring of biodiversity is one of the most important tasks in the course of global change. Phenological shifts, which are also regarded as "fingerprints of climate change", lead to changes in biodiversity and can influence ecosystem services (e.g. flower supply for insects) at landscape level. Objective observations on the impacts of climate change are important for identifying changes in good time and taking measures to protect ecosystems. The development of a digital species-specific collection of phenological data in different ecosystems with the help of sensors, coupled with automated image analysis, is purposeful in order to objectify previously subjective methods and to enable the acquisition of extensive data on phenology (BigData). This is not only relevant in global change research, but the establishment of species-specific automated monitoring also opens the door to answering many further questions in remote sensing and applied ecology.

### **DESIRED QUALIFICATIONS**

- Master's degree in Biology (Botany/ Ecology), Geography, Informatics, Mathematics or related disciplines
- Strong background in a programming language like Python, Matlab or R
- Excellent oral and written communication skills in English
- Ability to work in highly inter-disciplinary teams
- Plant identification skills are desirable

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