



The Hospital of the University of Munich, Germany, is one of the largest and most competitive university hospitals in Germany and Europe. 48 specialized hospitals, departments and institutions harbouring excellent research and education provide patient care at the highest medical level with approximately 10.000 employees.

The Medizinische Klinik and Poliklinik V invites applications for a

## **PhD Student for the project "Machine Learning for asthma patient stratification from clinical and genomic data" (m/w/d)**

### **Your area of responsibility:**

The Ph.D. project will focus on understanding the etiology of asthma from the analysis of a cohort of individuals of unprecedented large size from a multi-center study conducted primarily at the Children Clinic LMU Munich. The project, with strong computational focus, will be shared between the group of Prof. Erika v Mutius at the Children Clinic LMU Munich and the group of Dr. Annalisa Marsico, Computational RNA Biology at the ICB Helmholtz Zentrum and Technische Universität München (TUM). The candidate will obtain his PhD degree in data science from TUM.

The candidate will develop innovative machine learning methods which integrate clinical data, as well as different high-throughput genomic data, in order to predict the observed phenotypes and stratify patients in different sub-groups. Unraveling the diversity of asthma patients at both phenotype and molecular level is extremely important for precision medicine, in order to define different ways to approach the disease, develop different treatments and effectively design genetic tests.

### **Job description:**

- Develop both supervised and unsupervised machine learning methods to predict patient phenotypes from both clinical and genomic data while taking into account potential sample biases and confounding effects (e.g., sex, age)
- Design ad hoc approaches to infer sets of rules predictive of patient status, as well as reduced molecular signatures for their stratification in different subtypes
- Apply regularization or suitable data representation change techniques to extract meaningful information from high-dimensional data and facilitate the inference process
- Find statistical associations between clinical phenotypes and molecular properties (e.g. genetic variation and gene expression from transcriptomic data) in a large patient cohort
- Ultimately identify novel asthma biomarkers with clinical and therapeutic potential

### **Our requirements:**

- Master's Degree in Computer Science, Mathematics, Statistics, Bioinformatics or Physics. Alternatively, a Master's Degree in Biotechnology, Biology or equivalent with significant experience in statistical modeling and programming.
- Excellent programming skills in R, Python and/or C/C++
- Excellent academic record
- Keen interest in machine learning application for medical sciences as well as data integration techniques.
- Deep understanding of both supervised and unsupervised machine learning algorithms or multivariate statistics methods
- Scientific curiosity, propensity to problem solving, ability to work independently and develop original ideas
- High motivated to work in a multi-disciplinary environment and in collaborations with clinical partners

- Excellent communication and presentation skills
- Fluency in spoken and written English

The following skills are considered advantageous:

- Basic knowledge of methods to uncover genotype-phenotype relationships (e.g. GWAs).
- Basic expertise with NGS data analysis
- Working in a Linux environment, with experience of shell scripting, cluster or cloud computing

Our offer:

- Work place in an innovative, future-oriented company
- Extensive training offer
- The position is initially limited to three years
- Remuneration and benefits are in accordance with the collective agreement for the public service

The Ludwig-Maximilians University is an equal opportunity employer. Individuals of all nationalities, genders, ages, and those with disabilities are encouraged to apply. We give priority to applicants with a disability and essentially equal qualifications. Presentation costs cannot be refunded.

For further information please contact Dr. Annalisa Marsico ([annalisa.marsico@helmholtz-muenchen.de](mailto:annalisa.marsico@helmholtz-muenchen.de) 089 3187-43073). We are looking forward to receiving your comprehensive online application (cover letter, a short summary of your present and future research interests, CV, scans of your bachelor and master certificates, contact details of 2 referees) as a single PDF document.

Please send your application by e-mail to us promptly, quoting the reference number:

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