

PhD uncertainty visualization for Diffusion MRI Tractography

Department/faculty: Faculty Electrical Engineering, Mathematics and Computer Science

Level: University Graduate

Working hours: 38-40 hours weekly

Contract: 4 years

Salary: 2222 - 2840 euros monthly (full-time basis)

Faculty Electrical Engineering, Mathematics and Computer Science

The Faculty of Electrical Engineering, Mathematics and Computer Science (EEMCS) is known worldwide for its high academic quality and the social relevance of its research programmes. The faculty's excellent facilities accentuate its international position in teaching and research. Within this interdisciplinary and international setting the faculty employs more than 1100 employees, including about 400 graduate students and about 2100 students. Together they work on a broad range of technical innovations in the fields of sustainable energy, telecommunications, microelectronics, embedded systems, computer and software engineering, interactive multimedia and applied mathematics.

The Department of Intelligent Systems (INSY) conceptualises computer science methodologies to sense, abstract, learn, reason, elicit and adapt data and their meaning in ways that respect human values in order to increase human effectiveness, well-being and social innovation. At the heart of the department is therefore research and teaching in computer science theory, algorithms and solutions for information processing systems that support humans (e.g. robotics), new products (e.g. Internet services), and science (e.g. biology).

The Computer Graphics and Visualisation Group has a strong research record and is known for its expertise in visual analytics, medical visualization in general, and specifically in DWI. Other topics within the group are modelling, game technology, and rendering. Besides these major topics, interaction techniques, virtual/augmented reality, vision, perception, computational photography, and simulations play an important role. The group is strongly involved in the Delft Data Science initiative (www.delftdatascience.tudelft.nl), with health likewise as one of the main research domains. It is also an active partner in Medical Delta (www.medicaldelta.nl), a network of life sciences,

health and technology partners. It maintains a strong network of partners worldwide from academia, medical centres and industry.

Job description

Knowledge of subcortical anatomy is vital in brain surgery. Tractography refers to reconstruction of bundles of axons ('fibre tracts') comprising white matter pathways in the brain based on diffusion weighted magnetic resonance imaging. Tractography is hardly used in clinical routine mainly because it is notoriously hard to infer, apprehend and validate tractography results. On top of this, uncertainties related to multiple factors accumulate along the visualization pipeline, hampering its interpretation. Despite this limitations, feasibility studies in the context of temporal lobe as well as brain tumor resection surgery have demonstrated that tractography can, in principle, be incorporated into the daily neurosurgical workflow.

One of the main challenges of this PhD position is to provide tractography accompanied by reliable estimates and insightful visualizations of its 'limits of accuracy'. In the overall project, the inherent limitations of diffusion tensor imaging (DTI, the model used in the foregoing study) will be handled to cope with regions of complex anatomy. If these goals are met, tractography analysis will become less cumbersome and more reliable, a crucial step towards clinical adoption in the neurosurgical workflow, which is our ultimate goal.

You will be working in a mixed team of mathematicians, computer scientists and clinicians, on a joint project of TUDelft Computer Graphics and Visualization section together with the Department of Neurosurgery of Elisabeth Tweesteden Hospital, the Department of Mathematics & Computer Science of Eindhoven University of Technology. In this common endeavor, your specific focus will be on state-of-the-art visualization and visual analytics strategies to visualize uncertainty in tractography visualization results, and aid the decision making process of the neurosurgeons. You will develop this work in collaboration with the TU Eindhoven partners which will focus on the theory and methodology for tractography, including quantification and uncertainty propagation, and the Elisabeth Tweesteden Hospital which will develop experimentation and validation in a neurosurgical context.

This position is coupled with <https://jobs.tue.nl/en/vacancy/phd-position-in-diffusion-mri-tractography-341713.html>

Requirements

We are looking for a candidate who meets the following requirements:

- You are a talented and enthusiastic researcher.
- You have experience with or a strong background in (medical) visual analytics or visualization, computer graphics, uncertainty, stochastic processes and image analysis. Preferably you finished a master in Computer Science, (Applied) Mathematics, (Applied) Physics or Electrical Engineering.
- You have excellent programming skills and experience.
- You have good communication skills, and the ability to participate successfully in the work of a multidisciplinary research team.
- You are creative, ambitious, hardworking and persistent.
- You have a good command of the English language (knowledge of Dutch is not required).

Conditions of employment

TU Delft offers a customisable compensation package, a discount for health insurance and sport memberships, and a monthly work costs contribution. Flexible work schedules can be arranged. An International Children's Centre offers childcare and an international primary school. Dual Career Services offers support to accompanying partners. Salary and benefits are in accordance with the Collective Labour Agreement for Dutch Universities.

As a PhD candidate you will be enrolled in the TU Delft Graduate School. TU Delft Graduate School provides an inspiring research environment; an excellent team of supervisors, academic staff and a mentor; and a Doctoral Education Programme aimed at developing your transferable, discipline-related and research skills. Please visit www.tudelft.nl/phd for more information.

Information and application

For information about this vacancy, you can contact Anna Vilanova, Associate Professor at Computer Graphics and Visualization; a.vilanova@tudelft.nl. Phone: +31(0)152783107.

To apply, please e-mail a detailed CV (with contact to two referees) along with a letter of motivation and a detailed transcript of university grades. If applicable, please also attach a (draft) version of your Master thesis. Please send your application material before July 20, 2018 to: Hr-eeemcs@tudelft.nl. When applying for this position, please refer to vacancy number EW12018.45.

Enquiries from agencies are not appreciated.



Apply now

Factsheet

Department/faculty

Faculty Electrical Engineering, Mathematics and Computer Science

Level

University Graduate

Working hours

38-40 hours weekly

Location

Delft

Contract

4 years

Salary

2222 - 2840 euros monthly (full-time basis)

Closing date

July 20, 2018

Vacancy nr.

EWI2018-45

Information

For more information about this job, please contact Anna Vilanova.

T
E a.vilanova@tudelft.nl

For more information about the application procedure, please contact:

E hr-eemcs@tudelft.nl

Share

[facebooktwitterlinkedinemail](#)