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Description of two vacant PhD fellowship positions in visualization

The Department of Informatics, University of Bergen, Norway, announces two new open PhD fellowship positions in the research field of visualization (and in the visualization research group at the UiB Department of Informatics). One of the positions is part of a larger collaborative research project called "GeoIllustrator – methods and tools for illustrative visualization of earth models" and it is offered for three years – the project is coordinated by Christian Michelsen Research and the position is funded through the StatoilHydro Academia Program. The other position is part of another larger, also collaborative (and prestigious) European research project called "SemSeg – 4D Space-Time Topology for Semantic Flow Segmentation" and it is also offered for three years – this project is coordinated by the University of Bergen and funded by the European Commission in the 7th Framework Programme (basic research in FET, Future and Emerging Technologies).

Description of the vacant GeoIllustrator PhD fellowship position

The vision of the GeoIllustrator project is to establish a world-leading research group with focus on computer-generated geo-scientific illustrations for oil exploration and production. The project partners are StatoilHydro, Christian Michelsen Research (CMR), and in the University of Bergen (UiB) the Dept. of Informatics with its visualization research group (one PhD fellowship) and the Dept. of Earth Science (another PhD fellowship).

The GeoIllustrator project defines a context for collaboration of the PhD fellows and the project teams at CMR and at StatoilHydro. The PhD fellows are intended to conduct their research in a tight, *tandem*-like fashion where each fellow represents one key research area of this interdisciplinary project. Their research scope is motivated by the needs of oil industry for new visualization technology and modeling approaches.

The primary task of the here offered PhD fellow in visualization will be to conduct world-class research in new visualization technology. The outcome of the research may be integrated into the GeoIllustrator software platform. Possible topics for this interdisciplinary research include (but are not limited to):

- illustrative visualization of findings from multimodal geological field studies
- generation of digital models of geological sketches
- visualization of theories and interpretations of palaeogeographic development
- integration of dynamic models with measurements and reservoir simulations

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Description of the vacant SemSeg PhD fellowship position

The analysis of flows plays an important role for understanding important application processes, including vehicle design, environmental research, and medicine. Visualization helps to visually analyze large and complex flow datasets and so-called topological methods play an outstanding role in flow visualization. Previous related research work mostly concentrated on steady flows.

It is the objective of the SemSeg project to research a segmentation method for unsteady flow. It is defined by the formulation of a sound theoretical mechanism to describe structural features in time-dependent flow. Similar to the case of steady flow, were topology has proven its usefulness, it is straight-forward to expect that the new approach will also establish its important role in the analysis and discussion of time-dependent flow scenarios. As part of a successful project, concrete algorithms to extract and visualize the topological structures are derived from the new mechanism. Implementations of them will allow studying the usefulness on a number of real-life flow data from different areas of application.

The SemSeg project is a cooperative "high scientific risk / high potential pay-off" basic research effort that is supported by the very competitive Future and Emerging Technologies (FET) programme of the European Commission (in the 7th Programme Framework) after an extraordinarily good evaluation of the respective research proposal. ETH Zürich in Switzerland (R. Peikert), the Univ. of Magdeburg / Germany (H. Theisel), the VRVis Research Center in Vienna, Austria (Kr. Matković), and the Univ. of Bergen / Norway (H. Hauser) are collaborating in this project, where at each partner (at least) one PhD student will be employed.

The primary task of the here offered PhD fellow in visualization (at UiB) will be:

- research on continuous measures to characterize segments in flow data (and according visualization approaches)
- multi-variate investigation of flow characteristics and according interactive visual exploration and analysis – the excellent SimVis research software will be available for according research
- collaboration with the cooperating PhD students, e.g., on visualization research related to finite-time Lyapunov exponents (FTLE) and/or feature flow fields (FFF)

Further information wrt. both vacant PhD fellowship positions

The research of the two PhD research fellows will be carried out in the visualization group of the UiB Department of Informatics. 20 professors / associate professors, 5 adjunct professors, a supporting staff of eight, approximately 45 PhD students and 15 post doctoral researchers work in the context of the department's teaching and research. The scientific staff is organized into six

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research groups: algorithms, bioinformatics, optimization, programming theory, secure communication, and visualization. Each research group is responsible for research in its field and for teaching courses within its subject area.

The UiB visualization group (www.ii.UiB.no/vis) is the newest of the six research groups at the UiB Department of Informatics. Currently one prof. (H. Hauser), one associate prof. (I. Viola), five PhD students, and several Master students work on medical visualization, the interactive visual exploration and analysis of data from the oil & gas sector, from meteorology & climate research, as well as from other application fields. The group publishes scientific results in journals and conference proceedings with respectable success. At UiB the group offers a visualization Master study program to students of computer science (dimensioned for 120 ECTS in two years) with courses on computer graphics, visualization, scientific work, special topics in visualization, etc.

All PhD research fellows enroll in the University's approved PhD program, designed to lead to the degree within a time limit of 3 years. If financed through third-party funding (as in this case here), no teaching obligations are set by the University; the participation in coaching project students and master theses projects can be foreseen, however, as a form of integration of the PhD fellow into the group and the university study program.

With respect to the language question, the situation is as follows: While it generally is of advantage to learn the language of the place of living and working (and the University of Bergen does accordingly offer language courses in Norwegian to employees and partners), it is foreseen that English (and occasionally also German, esp. in the SemSeg project) will do well – Master students, colleagues, and most of all others in Bergen / Norway, as well, are usually fluent in English. The teaching-related tasks contribute to the "relaxed" language situation.

The applicants must have relevant background (usually a Master degree in computer science or any other Master degree when combined with documented qualifications in informatics – background in visualization, of course, is appreciated and background/interest in mathematical / topological aspects of visualization is seeked especially for the SemSeg fellow). The according background must be sufficiently documented in the application, and the research interests should fit with the described project (applicants are invited to indicate which project is more interesting for them, or whether they would be interested in both positions). With this opening, we are primarily searching for candidates in (1) illustrative visualization (to fit into the research scope of the GeoIllustrator research project) and (2) flow visualization / topological considerations (to fit into the research scope of the SemSeg project). Especially if applicants can report experiences with related research, they should verbosely document this (scientific papers written, talks given, participation in research projects and related documentation, aso.).

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Both projects are supposed to start 1st of June, 2009, and, accordingly, the starting date for both positions as announced here is also the 1st of June, 2009. For both projects the following holds: the funding partners have evaluated the respective project proposals very positively and they have agreed upon the funding of the projects. Accordingly, we can assume (with a near-100% probability) that these project will start according to the plan. However, the final grant agreement negotiations are still in progress – esp. with the European Commission it always takes time to finalize the respective legal documents, leaving a minimal possibility that still something can go wrong (would be really unexpected and also without example).

Interested candidates can contact prof. Helwig Hauser (Helwig.Hauser@UiB.no, +47/55584380) for more information (for both positions more information is available).