SCHLOSS DAGSTUHL
Leibniz-Zentrum für Informatik

Dagstuhl Seminars and Dagstuhl Perspectives Workshops Relevant for the Public

October 2014 – March 2016

Throughout the year Schloss Dagstuhl invites scientists from all over the world to the northern part of Saarland to discuss the latest research achievements in Information Technology. More than 3.500 IT-specialists from universities, research institutes and business companies participate in international scientific meetings at Dagstuhl every year. Since 2005 Schloss Dagstuhl has been a member of Leibniz Association, a union of 89 leading non-university research institutes and scientific service institutions throughout Germany.

Dagstuhl Seminars and Dagstuhl Perspectives Workshops benefit from a unique organizational concept that is renowned among informatics researchers worldwide. Several of today's core research topics, such as bioinformatics, took shape for the first time at Schloss Dagstuhl. Among the distinguished alumni of Schloss Dagstuhl are numerous laureates of the Turing Award – the highest achievable award within the international computer science community, an honor comparable to the Nobel Prize or Fields Medal. The center is proud of the continued engagement of these and other outstanding researchers in the scientific program of Schloss Dagstuhl.

A selection of Dagstuhl Seminars and Dagstuhl Perspectives Workshop that are of special interest to the general public are listed in the pages that follow. More information about these seminars and workshops can be found at the corresponding websites. It would be our pleasure to help you to establish personal contact with the scientists who participate in our seminars and workshops, for research or interview purposes.

If you have any questions or comments, please do not hesitate to contact:

Dr. Roswitha Bardohl
Geschäftsstelle Schloss Dagstuhl
Universität des Saarlandes, Campus E1.1
66123 Saarbrücken

Telefon: +49 681 302 3847
E-Mail: roswitha.bardohl@dagstuhl.de

14401 Dagstuhl Perspectives Workshop: Privacy and Security in an Age of Surveillance

Sunday, September 28 to Thursday, October 02, 2014
http://www.dagstuhl.de/14401

Matt Blaze (University of Pennsylvania, US)
Bart Preneel (KU Leuven, BE)
Phillip Rogaway (University of California – Davis, US)
Mark D. Ryan (University of Birmingham, GB)
Peter Y. A. Ryan (University of Luxembourg, LU)

The Snowden revelations have demonstrated that the US and other nations are amassing data about the minutiae of the daily lives of all citizens on an unprecedented scale. The data includes all forms of electronic communications among people, as well as web accesses, financial data, and the physical movements of people through cell-phone location tracking. The data is collected in numerous ways, using active as well as passive measures. Internet and telecommunication companies contribute their customers' data to the NSA, via programs including PRISM and Tempora. Additionally, the NSA and GCHQ have, allegedly, covertly weakened the encryption implementations in commercial software products and international standards - for example, by weakening the randomness of generated keys - in order to gain access to still more data.

A tension has always existed between the privacy rights of the individual and the security of society as a whole. Establishing and maintaining the right balance between these is a major challenge. The activities of intelligence services cannot be fully transparent, and this makes it challenging to find mechanisms for oversight that provide sufficient public assurance. The Snowden revelations have demonstrated that existing oversight has failed.

This Dagstuhl Perspectives Workshop aims to address questions related to the relevant principles, technology, business, and law. A broad set of individuals, from cryptographers and computer-security to those who work on intelligence, civil liberties, and the law are coming together at Schloss Dagstuhl.

14471 Towards an Affordable Internet Access for Everyone: The Quest for Enabling Universal Service Commitment

Sunday, November 16 to Friday, November 21, 2014
http://www.dagstuhl.de/14471

Jon Crowcroft (University of Cambridge, GB)
Louis-Francois Pau (Erasmus University – Rotterdam, NL)
Jean Walrand (University of California – Berkeley, US)
Adam Wolisz (TU Berlin, DE)

The Internet Society's recent global Internet survey reveals that the Internet should be considered as a basic human birthright. On one end, we have the developed world where access is getting faster and services being developed to utilize faster access. On the other end, there are people who do not have access to the Internet at all. Some may not be able to get it due to lack of infrastructure support. There have been significant initiatives to solve the problem of affordable infrastructure. Crucially, most of these approaches address infrastructural barriers without addressing economic ones. Leaving connectivity for all to be governed by market economics is a major impediment to achieving the full benefits of the Internet, and that basic Internet access should be made freely available to all due to its societal benefits. The current Internet access model governed by market economics makes it practically infeasible for enabling universal access especially for those with socio-economic barriers. The value chains do not reflect the technical development – as made obvious by recent debates between operators and content providers.

This Dagstuhl Seminar addresses a range of research questions, which are not only of academic interest but concern the private, public, and commercial spheres as well, like:

- Consider the vision of the Information society from the point of view of the risk of digital exclusion. The potential exclusion due to socio–economic barriers will be in the focus, but potential exclusion due to catastrophes or malicious actions will also be considered.
- Explore visions for solutions far beyond the recent value chain models, including "free" access to some scope of information/services, options for more "benevolent participation", "cooperative non-profit participation" and a combination thereof.
- Address the technological, social, economical and policy challenges needed to make the Future Internet universally accessible to all under any circumstances.

14491 Socio-Technical Security Metrics

Sunday, November 30 to Friday, December 05, 2014
`http://www.dagstuhl.de/14491`

Dieter Gollmann (TU Hamburg-Harburg, DE)
M. Eric Johnson (Dartmouth College Hanover, US)
Wolter Pieters (TU Delft & University of Twente, NL)
Martina Angela Sasse (University College London, GB)

Safety metrics inform many decisions, from the height of new dikes to the design of nuclear plants. We can state, for example, that the dikes should be high enough to guarantee that a particular area will flood at most once every 1000 years. Even when considering the limitations of such numbers, they are useful in guiding policy.

Metrics for the security of information systems have not reached the same maturity level. This is partly due to the nature of security risk, in which an adaptive attacker rather than nature causes the threat events. Moreover, whereas the human factor may complicate safety and security procedures alike, in security an attacker may actively exploit this "weakest link", such as in phishing or social engineering. In order to measure security, one therefore needs to compare online hacking against such social manipulations, since the attacker may simply take the easiest path.

In this Dagstuhl Seminar, the organizers and participants search for suitable metrics that allow estimating information security risk in a socio-technical context, as well as the costs and effectiveness of countermeasures. In particular, they'll study the risk metrics in the context of recent developments, where information systems move to the cloud and access moves to personal devices such as smartphones.

14511 Programming Languages for Big Data (PlanBig)

Sunday, December 14 to Friday, December 19, 2014
`http://www.dagstuhl.de/14511`

Véronique Benzaken (University Paris South, FR)
James Cheney (University of Edinburgh, GB)
Torsten Grust (Universität Tübingen, DE)
Dimitios Vytiniotis (Microsoft Research UK – Cambridge, GB)

Big Data – that is, large-scale, data-intensive computing – has already benefited from concepts from programming languages. For example, MapReduce's map and reduce operators are based on classical list-manipulation primitives introduced in LISP. Programming systems that manipulate big data poses many new challenges: some can already be addressed using known techniques from programming languages, while others require advances in the foundations of programming languages. As the amount of data being processed grows beyond the capabilities of any one computer system, the problem of effectively programming multiple computers, each possibly with multiple CPUs, GPUs, or software subsystems, becomes unavoidable; issues such as security, trust and provenance become increasingly entangled with classical efficiency and correctness concerns.

Cross-model programming is increasingly required for modern applications, using paradigms both established (e.g. database, dataflow or data-parallel computing models) and emerging (multicore, GPU, or software-defined networking).

These problems are currently being addressed in a variety of different communities, often using methods that share a great deal of common features, for example the use of comprehensions to structure database queries, data-parallelism, or MapReduce/Hadoop jobs, the use of semantics to clarify the meaning of new languages and correctness of optimizations, the use of static analyses for effectively optimizing large-scale jobs, and the need for increased security and assurance including new techniques for provenance and trust.

This Dagstuhl Seminar seeks to identify and develop these common foundations in order to reap the full benefits of Big Data and associated data-intensive computing resources.

15041 Model-driven Algorithms and Architectures for Self-Aware Computing Systems

Sunday, January 18 to Friday, January 23, 2015
`http://www.dagstuhl.de/15041`

Jeffrey O. Kephart (IBM TJ Watson Research Center – Hawthorne, US)
Samuel Kounev (KIT – Karlsruhe Institute of Technology, DE)
Marta Kwiatkowska (University of Oxford, GB)
Xiaoyun Zhu (VM Ware, Inc., US)

Self-aware computing systems are best understood as a sub-class of autonomic computing systems characterized by a combination of three properties: self-reflective, self-predictive and self-adaptive. The design of such systems naturally calls for an integrated interdisciplinary approach with input from multiple areas of computer science and engineering, including software and systems engineering, systems modeling, simulation and analysis, machine learning and autonomic computing, data center resource management, and so on.

Inspired by a common vision requiring expertise from and being relevant to all of the mentioned research fields, this Dagstuhl Seminar brings together researchers from the respective communities in order to enable the exchange of ideas and experiences as well as to encourage active collaborations and cross-fertilization between related research efforts on model-driven algorithms and architectures for self-aware computing systems. Overall, the seminar will open up new exciting research opportunities in each of the mentioned fields contributing to the emergence of a new research area at their intersection.

15072 Distributed Cloud Computing

Sunday, February 08 to Wednesday, February 11, 2015
`http://www.dagstuhl.de/15072`

Yvonne Coady (University of Victoria, CA)
James Kempf (Ericsson – San Jose, US)
Rick McGeer (HP Enterprise Services – Palo Alto, US)
Stefan Schmid (TU Berlin, DE)

The applications and usage patterns of the Internet have changed significantly over the years. One of the most striking properties of the Internet today regards the enormous amount of traffic it carries, imposing high bandwidth requirements and costs. Also latency is becoming increasingly critical. Motivated by these challenges, the distributed cloud model envisions new architectures exploiting spatially distributed resources, to keep traffic more local and reduce latency, offering innovative new services. For example, today, various resources are already available in the geographically distributed facilities of telecoms. These "resource micro clouds" could be used and interconnected to offer new services in the network core. Distributed cloud also encompasses the federated cloud, where data centers managed by different organizations federate to allow users to utilize any of the data centers.

This interdisciplinary Dagstuhl Seminar is an opportunity for academic and industrial scientists working in the different fields of networking, cloud computing, and distributed systems, to meet and exchange their vision and expertise on how to plan and manage future research on distributed cloud. Accordingly, the seminar will be structured in three parts, cloud, networking, and distributed systems.

15081 Holistic Scene Understanding

Sunday, February 15 to Friday, February 20, 2015
`http://www.dagstuhl.de/15081`

Jiri Matas (Czech Technical University, CZ)
Vittorio Murino (Italian Institute of Technology – Genova, IT)
Bodo Rosenhahn (Leibniz Universität Hannover, DE)
Silvio Savarese (Stanford University, US)

Understanding the scene in an image or video requires much more than recording and storing it, extracting some features and eventually recognizing objects. Ultimately, the overall goal is to find a mapping to derive semantic information from sensor data. Besides, purposive scene understanding may require different representations for different specific tasks and, actually, the task itself can be used as driver for the subsequent data processing. However, there is still the need of capturing local, global and dynamic aspects of the acquired observations, which are to be utilized to understand what is occurring in a scene. For example, one might be interested to realize from an image if there is a person present or not and where, and beyond that, to look for its specific pose, e.g., if the person is sitting, walking or raising a hand, etc.. When people move in a scene, the specific time (e.g., 7:30 in the morning, workdays, weekend), the weather (e.g., rain), objects (e.g., cars, a bus approaching a bus stop, crossing bikes, etc.) or surrounding people (crowded, fast moving people) yield to a mixture of low-level and high-level, as well as abstract cues, which need to be jointly analyzed to get an profound understanding of a scene. In other words, generally speaking, all information, which is possible to extract from a scene must be considered in context in order to get a comprehensive scene understanding, but this information, while it is easily captured by humans, is still difficult to obtain from a machine.

Next generation recognition systems require a full, holistic, understanding of the scene components and their dynamics in order to cope more and more effectively with real applications like car driver assistance, urban design, surveillance, and many others.

With such topics in mind, the aim of this Dagstuhl Seminar is to discuss which are the sufficient and necessary elements for a complete scene understanding, i.e. what it really means to understand a scene. Not only researchers well-known in Computer Vision areas such as object detection, classification, motion segmentation, crowd and group behavior analysis or 3D scene reconstruction will participate in this Dagstuhl Seminar, but also Computer Vision affiliated people from Machine Learning, Robotics, Computer Graphics, Mathematics, Natural Language Processing and Cognitive Sciences in order to share each others point of view on the common topic of scene understanding. Additionally, disciplines like Psychology, Anthropology, Sociology, Linguistics or Neuroscience touch upon this problem, which is inherent in the human comprehension of the environment and our social lives. Rarely these communities get a possibility to share their views on this same topic.

15091 Smart Buildings and Smart Grids

Sunday, February 22 to Friday, February 27, 2015
http://www.dagstuhl.de/15091

Hans-Arno Jacobsen (TU München, DE)
Randy H. Katz (University of California – Berkeley, US)
Hartmut Schmeck (KIT – Karlsruher Institut für Technologie, DE)

Motivated by the increasing importance of producing and consuming energy more sustainably, a new and highly dynamic research community within computer science has evolved: Energy Informatics (EI). EI research addresses two major research questions: how to leverage information and communication technology (ICT) to improve energy efficiency, and how to realize new control systems for integrating decentralized renewable energy sources into the power grid (smart grids).

This Dagstuhl Seminar has three major goals: (i) to provide a forum for leading EI researchers to discuss their recent research, (ii) to further elaborate EI research agenda and methods, and, (iii), to kick-start new research projects with industry. Based on their relevance for achieving a sustainable energy supply, the focus is on two topics, namely smart buildings and smart grids.

Buildings consume approximately 40% of the total energy, both in the EU and the US. Using advanced real-time control, both their total energy consumption and demand response capability can be significantly improved. Smart grid systems are necessary to control large numbers of distributed flexible loads and energy storages such that their demand follows non-dispatchable renewable power supply. This control task is hard since such systems have to satisfy complex constraints in real time, such as maintaining the stability of power grids and guaranteeing the non-disruptive primary use of flexible loads. Current EU legislation mandates an increase of energy production from renewable sources like wind and solar from currently 12% to 20% in 2020. The development of smart grid systems that enable deep integration of renewable energy sources has been prioritized both by European countries and the US.

15101 Bridging Information Visualization with Machine Learning

Sunday, March 01 to Friday, March 06, 2015
http://www.dagstuhl.de/15101

Daniel A. Keim (Universität Konstanz, DE)
Tamara Munzner (University of British Columbia – Vancouver, CA)
Fabrice Rossi (University of Paris I, FR)
Michel Verleysen (University of Louvain, BE)

Information visualization (IV) and visual data mining leverage the human visual system to provide insight and understanding of unorganized data. On the other hand, Machine learning (ML) provides a collection of automated data summarizing/compression solutions; among them, dimensionality reduction methods may be used for visualization too, among others.

The IV community has developed user-centric and interactive methods to handle the human vision scalability issue, while the ML community focuses on more automatic methods with numerical criteria, at a price of a looser link with natural objectives of visualization tasks. Despite obvious common interests, the ML and IV communities have largely grown separately.

The aim of this Dagstuhl Seminar is to bridge the gap between the two communities and open new common research paths. Main topics for discussions will be related to the questions of quality assessment (of visualization methods), interactivity, and common platforms that could be used by both communities for further joint developments.

15151 Assuring Resilience, Security and Privacy for Flexible Networked Systems and Organizations

Tuesday, April 07 to Friday, April 10, 2015
http://www.dagstuhl.de/15151

David Hutchison (Lancaster University, GB)
Klara Nahrstedt (University of Illinois – Urbana, US)
Marcus Schöller (NEC Laboratories Europe – Heidelberg, DE)
Indra Spiecker gen. Döhmann LL.M. (Goethe-Universität Frankfurt, DE)

IT systems' composability will in future encompass not only traditional office and industrial applications, but also new critical infrastructure applications. Using flexible service composition, computational work is increasingly done in a shared manner among different physical infrastructures and devices, virtualized resources and providers. This will soon be achieved with technologies based on the principles of what we refer to as "cloud computing" today. Furthermore, the omnipresence of composable and flexible services will result in the utilization of devices currently not explicitly recognized as IT systems, including wearable devices, physical enhancement via IT or control devices in (critical) infrastructures, such as smart grids.

In such applications, it is absolutely crucial to be able to assure security, privacy and perhaps above all property of resilience, which is the ability to continue to provide the required – and indeed the legally contracted – quality of service to the system's users. These multi-disciplinary challenges are highly interrelated and therefore have to be addressed by researchers and industry experts from different disciplines concurrently.

Only individual aspects of the issues above have been investigated so far. Hence the goal of this Dagstuhl seminar is to bring together researchers and engineers who can contribute to the overall goals of helping to create a research agenda in assuring resilience, security and privacy for networked systems and organizations.

15161 Advanced Stencil-Code Engineering

Sunday, April 12 to Friday, April 17, 2015
http://www.dagstuhl.de/15161

Matthias Bolten (Universität Wuppertal, DE)
Robert D. Falgout (LLNL – Livermore, US)
Christian Lengauer (Universität Passau, DE)
Olaf Schenk (University of Lugano, CH)

The aim of the Dagstuhl Seminar is to form a new international research community on an aggressively domain-driven, highly automated software technology for the generation of high-performance stencil codes.

Stencil codes are compute-intensive algorithms, in which data points arranged in a large grid are being recomputed repeatedly from the values of data points in a predefined neighborhood. They are used on large-scale parallel computers in many different scientific applications, e.g., coming from physics and engineering. Stencil codes come in a myriad of different variants which cannot be developed and maintained effectively if done so individually and manually. Rather a radically new software technology based on architectural metaprogramming and involving a number of different highly automated program transformation, optimization and management techniques is required.

The seminar will bring together representatives of a number of international projects – which, as of yet, do not act as a community – and internationally renowned experts in the techniques required to achieve the set goal. The host project will be ExaStencils, a research venture in the DFG priority programme SPPEXA aimed at bringing stencil codes to exascale performance.

15171 Theory and Practice of SAT Solving

Sunday, April 19 to Friday, April 24, 2015
http://www.dagstuhl.de/15171

Armin Biere (Universität Linz, AT)
Vijay Ganesh (University of Waterloo, CA)
Martin Grohe (RWTH Aachen, DE)
Jakob Nordström (KTH Royal Institute of Technology, SE)
Ryan Williams (Stanford University, US)

The purpose of this Dagstuhl Seminar is to explore one of the most significant problems in all of computer science, namely that of computing whether formulas in propositional logic are satisfiable or not. This problem is believed to be intractable in general (by the theory of NP-completeness). However, the last two decades have seen dramatic developments in algorithmic techniques, and today so-called SAT solvers are routinely and successfully used to solve large-scale real-world instances in a wide range of application areas.

A surprising aspect of this development is that the best current SAT solvers are still based on methods from the early 1960s, which can often handle formulas with millions of variables but may also get hopelessly stuck on formulas with just a few hundred variables. The fundamental question of when SAT solvers perform well or badly, and what underlying mathematical properties of the formulas influence SAT solver performance, remains very poorly understood.

Another intriguing fact is that although today other, much stronger, mathematical methods of reasoning are known, in particular methods based on algebra and geometry, attempts to harness the power of such methods have conspicuously failed to deliver any significant improvements in practical performance.

In this seminar, leading researchers in applied and theoretical areas of SAT and computational complexity are gathered to stimulate an increased exchange of ideas between these two communities. There will be great opportunities for fruitful interplay between theoretical and applied research in this area, such that a more vigorous interaction between the two has potential for major long-term impact in computer science, as well for applications in industry.

15192 The Message in the Shadow: noise or knowledge?

Sunday, May 03 to Friday, May 08, 2015
http://www.dagstuhl.de/15192

Roberto Casati (ENS – Paris, FR)
Patrick Cavanagh (Paris Descartes University, FR)
Paulo E. Santos (Centro Universitario da FEI – Sao Paolo, BR)

Recently, psychologists have turned their attention to the study of cast shadows and demonstrated that the human perceptual system values information from shadows very highly in the perception of spatial qualities, sometimes to the detriment of other cues. At the same time, with some notable and recent exceptions, computer vision systems treat cast shadows not as signal but as noise.

The purpose of this Dagstuhl Seminar is to bring together researchers from the various disciplines involved in investigating the problem of understanding the perception of shadows (both in biological and in artificial systems) and experts and practitioners that try to bridge the gap between the perception and the use of the knowledge content in shadows in robotics and computer vision systems.

15241 Computational Social Choice: Theory and Applications

Sunday, June 07 to Friday, June 12, 2015
`http://www.dagstuhl.de/15241`

Craig Boutilier (University of Toronto, CA)
Britta Dorn (Universität Tübingen, DE)
Nicolas Maudet (UPMC – Paris, FR)
Vincent Merlin (Caen University, FR)

Computational Social Choice is an interdisciplinary research area dealing with the aggregation of preferences of groups of agents that brings together research themes from economics, political science, computer science, statistics, and a variety of other areas. Social choice puts the emphasis on non-market mechanisms such as rules, protocols, algorithms to enhance coordination among the agents. Prominent examples of social choice problems with important computational components include:

- voting procedures, where a common group decision has to be taken given the preferences of the individuals;
- fair division, or how to distribute goods among a group reflecting individual preferences and fairness criteria;
- matching problems, in which agents/items are matched in a way that respects both preferences and other constraints.

The aim of this Dagstuhl Seminar is to facilitate and stimulate interaction between the theory and the practice of social choice. On the one hand, theoretical investigations of the existence of solutions to these problems are of interest as well as the design of suitable algorithms and protocols, and characterizations of their theoretical properties (efficiency, computational/communication complexity, incentives, etc.). On the other hand, the seminar will also emphasize real-world applications — such as the design of voting systems, web page ranking, fair buy-sell/exchange solutions, group decision support/recommender systems, school choice programs, organ transplant exchanges — which reveal new constraints, computational challenges, and design criteria.

Deeper engagement between these two communities will stimulate developments in both: theoretical considerations enable and justify efficient and successful practical applications, while the features and constraints of specific applications provide novel theoretical challenges and directions.

15251 Sparse modelling and multi-exponential analysis

Sunday, June 14 to Friday, June 19, 2015
`http://www.dagstuhl.de/15251`

Annie Cuyt (University of Antwerp, BE)
George Labahn (University of Waterloo, CA)
Avraham Sidi (Technion – Haifa, IL)

Throughout computational science, numerous attempts are being made to represent data in a parsimonious way. In many applications, real-time experiments involve the measurement of signals falling exponentially with time. The parametric methods based on multi-exponential analysis can often capture the major features of such data more efficiently than the nonparametric Fourier based approaches. Exponential models appear, for instance, in power system transient detection, motor fault diagnosis, spectrum sensing for cognitive radio, electrophysiology, magnetic resonance spectroscopy, seismic data analysis, music signal processing, etc.

The general technique of multi-exponential analysis is closely related to what is commonly known in the applied sciences as the Pade-Laplace method, and the technique of sparse interpolation in computer algebra and error correcting codes. Recently, progress has been made in all these

domains. This leads to promising results in signal processing and new possibilities in many applications.

This Dagstuhl Seminar brings together researchers from a diverse set of areas and application domains. These include experts involved in algorithm design for sparse interpolation either over finite fields (where the main applications come from coding theory) or over floating point numeric domains (where the main applications often come from signal processing), and experts in exponential analysis whether theoretical (focusing on the mathematical properties) or practical (modeling the application domain). The expectation is that understanding the subtle similarities and differences of the methods used for computation can lead to a range of new and interesting research directions.

15302 Dagstuhl Perspectives Workshop: Digital Scholarship and Open Science in Psychology and Behavioral Sciences

Sunday, July 19 to Friday, July 24, 2015
`http://www.dagstuhl.de/15302`

Alexander Garcia Castro (Madrid, ES)
Janna Hastings (European Bioinformatics Institute – Cambridge, GB)
Robert Stevens (University of Manchester, GB)
Gary VandenBos (American Psychological Association, US)
Erich Weichselgartner (ZPID – Trier, DE)

It is widely acknowledged that data and documents are of the most value when they are interconnected rather than isolated. Understanding mental health disorders requires correlating information from diverse sources — e.g. cross-referencing clinical, psychological, and genotypic sources. This interoperability layer has several components; many are related to data standards and ontologies. Data standards and ontologies are also central for Open Science and Digital Scholarship. Interoperability is additionally central to Open Science; data should be open and self-describing so that an intelligent, machine readable, interoperable layer may emerge. Thus, the Web becomes a platform supporting Open Science and Digital Scholarship. Critical issues in scholarly communication such as reproducibility, reporting structures for experimental results, and data annotation, can be solved only with widespread deployment and adoption of data standards and ontologies.

Information in the biomedical domain is highly interconnected so it is expected that Brain Activity Map (BAM) data will generate new insights by complementing existing datasets from all over biomedical sciences – e.g. genetic clues for Post Traumatic Stress Disorder (PTSD) or molecular markers for cognitive disorders in relation to behavioral traits. Understanding and developing treatment breakthroughs of disorders such as schizophrenia, Alzheimer's, suicide, PTSD and others will require a much more sophisticated infrastructure than currently exists.

This sort of Big Data in research requires an integrated interoperable infrastructure that helps researchers to makes sense out of it; the dissemination of research results is an integral part of research and hence a crucial component for any scientific discipline. Domains such as physics, astronomy and biomedicine have been building such infrastructures for decades. As research in psychology and the behavioral sciences is becoming more and more driven by data, the need to support shareability and discoverability is growing; furthermore, the mandate of Open Science needs to be seriously addressed by this community.

Psychology and the Behavioral Sciences are a challenge and an opportunity for Computer Sciences; the lack of standards, reporting structures, minimal amounts of information, ontologies and, broadly speaking, data and knowledge management, present an open field that requires interdisciplinary approaches.

This Dagstuhl Perspectives Workshop is the first of its kind; it will bring together computer scientists, psychologists and behavioral scientists, addressing issues in data standards, e-science,

ontologies, knowledge management, text mining, scholarly communication, semantic web, cognitive sciences, neurosciences, and psychology in order to devise a road map for building such interoperability layer.

15392 Measuring the Complexity of Computational Content: Weihrauch Reducibility and Reverse Analysis

Sunday, September 20 to Friday, September 25, 2015
http://www.dagstuhl.de/15392

Vasco Brattka (Universität der Bundeswehr – München, DE)
Akitoshi Kawamura (University of Tokyo, JP)
Alberto Marcone (Università di Udine, IT)
Arno Pauly (University of Cambridge, GB)

Reducibilities such as many-one, Turing or polynomial-time reducibility have been an extraordinarily important tool in theoretical computer science from its very beginning. In recent years these reducibilites have been transferred to the continuous setting, where they allow classify ing computational problems on real numbers and other continuous data types.

On the one hand, Klaus Weihrauch's school of computable analysis and several further researchers have studied a concept of reducibility that can be seen as an analogue of many-one reducibility for functions on real numbers. On the other hand, Stephen Cook and Akitoshi Kawamura have independently introduced a polynomial-time analogue of Weihrauch's reducibility, which has been used to classify the computational complexity of problems on real numbers.

The classification results obtained with Weihrauch reducibility are in striking correspondence to results in reverse mathematics. This field was initiated by Harvey Friedman and Stephen Simpson and its goal is to study which comprehension axioms are needed in order to prove certain theorems in second-order arithmetic. The results obtained so far indicate that Weihrauch reducibility leads to a finer uniform structure that is yet in basic agreement with the non-uniform results of reverse mathematics, despite some subtle differences.

While the close relation between these approaches are obvious, the exact situation has not yet been fully understood. One goal of this Dagstuhl Seminar is to bring researchers from the respective communities together in order to discuss the relations between these research topics and to create a common forum for future interactions.

16061 Functoriality in Geometric Data

Sunday, February 07 to Friday, February 12, 2016
http://www.dagstuhl.de/16061

Mirela Ben-Chen (Technion – Haifa, IL)
Frédéric Chazal (INRIA Saclay – Île-de-France – Orsay, FR)
Leonidas J. Guibas (Stanford University, US)
Maks Ovsjanikov (Ecole Polytechnique – Palaiseau & INRIA, FR)

This application proposes a seminar to bring together researchers interested in the fundamental questions of similarity and correspondence across geometric data sets, which include collections of GPS traces, images, 3D shapes and other types of geometric data. A recent trend, emerging independently in multiple theoretical and applied communities, is to understand networks of geometric data sets through their relations and interconnections, a point of view that can be broadly described as exploiting the functoriality of data, which has a long tradition associated with it in mathematics.

Functoriality, in its broadest form, is the notion that in dealing with any kind of mathematical object, it is at least as important to understand the transformations or symmetries possessed by the object or the family of objects to which it belongs, as it is to study the object itself. This idea has inspired a large amount of progress, both theoretical and practical, often leading to state-of-the-art methods in various application domains. However, so far, there has not been a formal gathering dedicated explicitly to exploring and exploiting the functoriality of geometric data. This Dagstuhl Seminar can have a profound and lasting impact on a variety of scientific and engineering disciplines in which geometry plays an important role.

16092 Computational Music Structure Analysis

Sunday, February 28 to Friday, March 04, 2016
http://www.dagstuhl.de/16092

Juan Pablo Bello (New York University, US)
Elaine Chew (Queen Mary University of London, GB)
Meinard Müller (Universität Erlangen-Nürnberg, DE)

Music is a ubiquitous and vital part of the lives of billions of people worldwide. In view of the rapid and sustained growth of digital music sharing and distribution, the development of computational methods to help users find and organize music information has become an important field of research in both industry and academia.

This Dagstuhl Seminar is devoted to a research area known as music structure analysis, where the general objective is to uncover the patterns and relationships that govern the organization of notes, events, and sounds in music. The objectives for the seminar are as follows:

1. critically review the state of the art of computational approaches to music structure analysis in order to identify the main limitations of existing methodologies, while outlining a roadmap for future developments based on the most pressing challenges in this field;
2. trigger interdisciplinary discussions that leverage insights from fields as disparate as psychology, music theory, composition, signal processing, machine learning, and information sciences in addressing the specific challenges of understanding structural information in music;
3. explore novel applications of these technologies in music and multimedia retrieval, content creation, musicology, education, and human-computer interaction.