

Aalto Digi Matchmaking March 23rd, 2017

List of registered demos, posters and pitch talks

Human-Computer Interaction, Games, Graphics, Speech and Audio

<p>Speech interfaces for distributed IoT devices - Efficiency and Security Aspects</p> <p>The user interface and audio quality of speech interfaces can be greatly improved using multiple microphones. Our objective is to develop methods, which can use all nearby IoT devices with a microphone to jointly pick up speech signals. Central challenges include resource-efficient operation, data-driven source modelling as well as security and privacy.</p>	<p>Tom Bäckström, Professor of Practice Department of Signal Processing and Acoustics School of Electrical Engineering</p> <p>Email: tom.backstrom@aalto.fi Tel: +358 50 406 6120</p> <p>Pitch</p>
<p>Statistical parametric speech synthesis by modeling the human voice production system</p> <p>Speech synthesis is a technique to convert arbitrary text into natural-sounding artificial speech using a computer. Speech synthesis can be implemented in a highly data-driven form, called statistical parametric speech synthesis (SPSS). Aalto's research on SPSS is particularly addressing techniques, which aim to parameterize speech according to the functioning of the real human speech production mechanism. We will describe and demonstrate different milestones of our data-driven speech synthesis.</p>	<p>Manu Airaksinen, MSc (Tech) Department of Signal Processing and Acoustics School of Electrical Engineering</p> <p>Email: manu.airaksinen@aalto.fi Tel: +358 50 531 1126</p> <p>Poster</p>
<p>Dissecting the End-to-end Latency of Interactive Mobile Video Applications</p> <p>In this project, we measure the latency in the pipeline of three kinds of interactive mobile video applications that are rapidly gaining popularity, namely Remote Graphics Rendering, Mobile Augmented Reality, and Mobile Virtual Reality. We show through measurements that control input and display buffering have a substantial effect on the overall delay. Our results shed light on the latency bottlenecks and the maturity of technology for seamless user experience with these applications.</p>	<p>Teemu Kämäräinen, Doctoral Candidate Department of Computer Science School of Science</p> <p>Email: teemu.kamarainen@aalto.fi Tel: +358 40 760 0684</p> <p>Demo & Poster</p>

<p>Digitala: An Augmented Test and Review Process Prototype for High-Stakes Spoken Foreign Language Examination</p> <p>This demo introduces the first prototype for a computerized examination procedure of spoken foreign languages in Finland, intended for national scale upper secondary school final examinations. Speech technology and profiling of reviewers are used to minimise the otherwise massive reviewing effort.</p>	<p>Aku Rouhe Department of Signal Processing and Acoustics School of Electrical Engineering</p> <p>Email: aku.rouhe@aalto.fi Tel: +358 40 813 3607</p> <p>Demo</p>
<p>Personal and Social Interactions</p> <p>I will present ongoing work in my group looking at tangible and augmented reality as applied to health, wellbeing and social interactions. As the smartphone revolution comes to an end, interaction designers are asking what's next? We are focusing on how new paradigms of interaction can help people connect with themselves, others and their environment in new meaningful ways.</p>	<p>David McGookin, Assistant Professor Department of Computer Science School of Science</p> <p>Email: david.mcgookin@aalto.fi Tel: +358 50 462 4525</p> <p>Pitch</p>
<p>Spotlights: A technique to facilitate skimming of long documents</p> <p>We demonstrate a novel technique that can improve user performance in skim reading. Users typically use a continuous-rate-based scrolling technique to skim works such as longer Web pages, e-books, and PDF files. However, visual attention is compromised at higher scrolling rates because of motion blur and extraneous objects with overly brief exposure times. In response, we present Spotlights. It complements the regular continuous technique at high speeds (2--20 pages/s).</p>	<p>Antti Oulasvirta and Olli Savisaari</p> <p>Department of Communications and Networking School of Electrical Engineering</p> <p>Email: antti.oulasvirta@aalto.fi Tel: +358 50 3841561</p> <p>Demo & Poster</p>

Machine Learning and Artificial Intelligence

<p>Exploratory search - more transparency and user control</p> <p>We present an interactive visualization used for exploratory search of scientific documents. The system uses machine learning to model a user's search intent from feedback: the machine learning predictions are shared with the user via an intuitive interactive radar visualization</p>	<p>Jonathan Strahl, Doctoral Student Department of Computer Science School of Science</p> <p>Email: jonathan.strahl@aalto.fi Tel: +358 44 554 0032</p> <p>Demo & Poster & Pitch</p>
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<p>through which the user can make changes to the machine learning model to direct the search. We recently added support for negative feedback to further improve control of the search.</p>	
<p>Visual media content analysis and description: a deep neural approach Approximately 80-90% of all internet traffic consists of videos and other visual data. Machine learning based methods for analyzing and indexing that data have recently seen tremendous development due to the renewed interest to neural network architectures. We have developed award-winning deep neural network based techniques for image and video content description together with state-of-the-art methods for human gaze fixation prediction and action recognition in the video domain.</p>	<p>Jorma Laaksonen, Teaching Researcher Department of Computer Science School of Science</p> <p>Email: jorma.laaksonen@aalto.fi Tel: +358 50 305 8719</p> <p>Demo & Poster</p>
<p>Efficient Privacy-Preserving Machine Learning Many applications of machine learning for example in health care would benefit from methods that can guarantee data subject privacy. Differential privacy has recently emerged as a leading framework for private data analysis. We present differentially private linear regression methods that improve predictive accuracy over a very small non-private data set. In addition, we show how to achieve differential privacy in a distributed setting, where each party only holds a separate subset of the data.</p>	<p>Teppo Niinimäki, Department of Computer Science</p> <p>email: teppo.niinimaki@aalto.fi Tel: +358453144431</p> <p>Poster</p>
<p>Massively Scalable Recommendation Engines for Drug Discovery This work develops scalable machine learning models which learn hidden knowledge underlying exascale (e.g. millions of compounds) biological data sources. The proposed models can be used to (i) predict compound activities, (ii) explore practical questions, e.g. a) Which compounds show positive/negative response on targets (cells/proteins)? b) Which compounds share similar chemical structures? Such knowledge can help wet-lab researchers to optimize biological assays / compounds in a desired way.</p>	<p>Xiangju Qin and Blomstedt Paul, Department of Computer Science</p> <p>email: xiangju.qin@aalto.fi Tel: +358469397766</p> <p>Poster</p>

<p>Machine learning on locally inferred probabilistic models</p> <p>Probabilistic models are representations which combine data and domain knowledge to extract information and added value from raw data. Additional added value can often be obtained by sharing information between multiple data owners or locations. We develop algorithms which operate directly on locally inferred probabilistic models instead of data. Advantages include computational efficiency and scalability, as well as the ability to exchange information through models, without sharing data.</p>	<p>Paul Blomstedt, Department of Computer Science</p> <p>email: paul.blomstedt@aalto.fi Tel: +358 50 4300917</p> <p>Poster</p>
<p>Engine for Likelihood-Free Inference (ELFI)</p> <p>We introduce an Engine for Likelihood-Free Inference (ELFI), a Python software package for approximate Bayesian inference that can be used when the likelihood function is difficult to evaluate or unknown, but a generative simulator model is available. ELFI allows representing the probabilistic inference model intuitively as a graph and users can execute the inference in a computational environment best suited for their needs, from single laptops to cluster computers.</p>	<p>Jarno Lintusaari , Department of Computer Science</p> <p>email: jarno.lintusaari@aalto.fi Tel: +358 45 135753</p> <p>Poster</p>
<p>Expert knowledge elicitation for interactive improvement of machine learning models</p> <p>We study prediction methods that take into account the user's prior knowledge. The user can improve predictions by interacting with the machine learning system, and providing prior knowledge that can be relevant for the prediction task considered. These methods have a wide range of applications, from personalized medicine to recommender systems. Recently, we have shown improvement in prediction accuracy in both document classification applications and personalized medicine.</p>	<p>Iiris Sundin, Department of Computer Science</p> <p>email: iiris.sundin@aalto.fi Tel: +358 40 0687359</p> <p>Poster</p>

Security and Privacy

<p>Model-Based System Design</p> <p>As Cyber-Physical Systems (CPS) become common-place, design by trial-and-error</p>	<p>Stavros Tripakis, Professor Department of Computer Science School of Science</p>
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<p>becomes too costly but also unsafe. Model-based design (MBD) offers an alternative design methodology that relies on three elements: modeling (describe the system that we want), analysis (make sure this is the system that we want before actually building it), and synthesis (build the system). MBD promises to reduce costs and at the same time improve system safety by integrating formal verification methods.</p>	<p>Email: stavros.tripakis@aalto.fi Tel: +358 50 430 1862</p> <p>Demo & Pitch</p>
<p>Profiling Users by Modeling Web Transactions Users have characteristic behaviors while surfing the Web and profiling this behavior can help identify the person using a given device. Hence, we propose a new technique relying on one class models like OC-SVM to profile users based on their web transactions. The efficacy and speed of this new technique at differentiating users is assessed on real-world web traffic data from a small company network.</p>	<p>Samuel Marchal, Postdoctoral Researcher Department of Computer Science School of Science</p> <p>Email: samuel.marchal@aalto.fi Tel: +358 50 433 4884</p> <p>Poster</p>
<p>Automated Device-Type Identification in IoT Several IoT vendors are producing IP-connected devices that often suffer from flawed security designs and implementations. Securing networks where the presence of such vulnerable devices is given, requires a brownfield approach. We propose a machine learning based system capable of identifying the types of devices being connected to an IoT network. Device-types can be linked to know vulnerabilities in order to take the appropriate measures for mitigating the risk of vulnerable devices.</p>	<p>Samuel Marchal, Postdoctoral Researcher Department of Computer Science School of Science</p> <p>Email: samuel.marchal@aalto.fi Tel: +358 50 433 4884</p> <p>Demo</p>
<p>Managing your personal data with MyData MyData is a new approach that allows people themselves to better manage how their personal data is used within services and also shared to other services thus opening up new business opportunities. In the Digital Health Revolution (DHR) project we've developed a software developer kit (SDK) of the MyData Operator that manages the data sharing, and a proof of concept demo of a mobile Operator UI, where users can consent to sharing their health data between services.</p>	<p>Yki Kortensniemi, D.Sc. (Tech.) Department of Computer Science School of Science</p> <p>Email: yki.kortensniemi@aalto.fi Tel: +358 45 203 1255</p> <p>Demo</p>
<p>Blockchain, Consensus, and Beyond</p>	<p>Andrew Paverd, Post-doctoral researcher</p>

<p>With market capitalizations in the billions of Euros, blockchain-based cryptocurrencies like Bitcoin are rapidly becoming real-world trading instruments. However, challenges remain: Bitcoin payments currently take about an hour to confirm, are visible to everyone, and rely on timeouts for fairness. We use modern hardware security features to make instant, anonymous, and fair payments, and propose a new consensus protocol to improve the efficiency and robustness of blockchain cryptocurrencies.</p>	<p>Department of Computer Science School of Science</p> <p>Email: andrew.paverd@aalto.fi Tel: +358 50 467 3975</p> <p>Demo & Poster</p>
<p>Improving Web Security Using Trusted Hardware Passwords are arguably the number one target of cybercriminals on the web. Although password database breaches have become alarmingly frequent and phishing is an ever-present threat, passwords will remain the de-facto way to authenticate users because of their low cost and ease of deployment. Using modern hardware security features, we show how web servers can eliminate the risk of password breaches, and how users can protect themselves from phishing, even if they visit compromised websites.</p>	<p>Andrew Paverd, Post-doctoral researcher Department of Computer Science School of Science</p> <p>Email: andrew.paverd@aalto.fi Tel: +358 50 467 3975</p> <p>Demo & Poster</p>
<p>Privacy-preserving oblivious neural network predictions Deep learning is extensively used for prediction services. Users benefit from such services, but suffer from privacy risks since they must submit sensitive information. A solution is to download the model and run prediction on client-side, but this may reveal significant information about the training set. We provide an oblivious way to run prediction: the service provider learns nothing about clients' inputs, and clients learn nothing about the model except the prediction results.</p>	<p>Jian Liu, Doctoral Candidate Department of Computer Science School of Science</p> <p>Email: jian.liu@aalto.fi Tel: +358 50 462 0730</p> <p>Poster</p>

Software Engineering, Business and Digital Services

<p>A.I. for Intelligent Information Systems (EIAI Software) Large-scale information systems are difficult and expensive to build, by using conventional software engineering methodologies and</p>	<p>Jussi Rintanen, Research Fellow Department of Computer Science School of Science</p> <p>Email: jussi.rintanen@aalto.fi</p>
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<p>programming tools. EIAI Software minimizes the need of human programming effort, and leads to reliable and flexible software systems that are easy to maintain, modify and upgrade. Additionally, EIAI Software enables the easy integration of intelligent assistants and other advanced subsystems, to increase productivity and the user experience.</p>	<p>Tel: +358 45 348 6788</p> <p>Pitch</p>
<p>Image based indoor navigation service Indoor positioning and navigation is still hard to do due to lack of GPS signals inside buildings. State of the art indoor navigation systems call for hardware installations like bluetooth beacons or extensive site surveys are needed (case Indoor Atlas). We have developed an indoor navigation system that is based on pictures taken with ordinary cameras like smartphones. We achieve 3D positioning accuracy around 3 meters which enables development of usable indoor navigation services.</p>	<p>Antti Ylä-Jääski, Professor Department of Computer Science School of Science</p> <p>Email: antti.yla-jaaski@aalto.fi Tel: +358 40 595 4222</p> <p>Demo & Poster & Pitch</p>
<p>Systemic approach for evaluating the value of IT The evaluation of IT value is a challenging tasks: 1) understanding and explicating IT impacts within a socio-technical business system, and 2) multifaceted interpretations and meanings of value. Systemic evaluation approach combines systems thinking, system dynamics, multifaceted value conceptualisations and evaluation workflow with efficient and flexible dialogue.</p>	<p>Harri Töhönen, Doctoral Candidate Department of Computer Science School of Science</p> <p>Email: harri.tohonen@aalto.fi Tel: +358 40 552 7035</p> <p>Poster</p>
<p>DINE - Digital Infrastructures and Enterprise Integration Digitalization and the need for any business or public service to integrate on various digital infrastructures (such as Google services, cloud platforms, IoT platforms, etc,) cause changes on how software, services and systems are developed, which is very challenging to all local software and service developers. The main objective is to provide scientific knowledge on the question "How to build and manage software-intensive services over a combination of evolving digital infrastructures?"</p>	<p>Jesse Yli-Huumo, Project Manager, Researcher Department of Computer Science School of Science</p> <p>Email: jesse.yli-huumo@aalto.fi Tel: +358 40 821 0488</p> <p>Poster</p>

Communications and Networking, 5G, Internet of Things and Industrial Internet

<p>Otaniemi SmartCampus SmartCampus is an attempt to bring data (generated by people and IoT devices) and spaces (buildings, rooms etc.) under one roof. An initial prototype serving sensors data (real-time and historical) from the K1 building is available at otaniemi3d.cs.hut.fi. Aalto IT and Campus & Real Estate is involved to extend the pilot to the entire Otaniemi campus. The goal is to create a multidisciplinary research platform, with open access to data and the infrastructure itself.</p>	<p>Andrea Buda, Doctoral Candidate Department of Computer Science School of Science Email: andrea.buda@aalto.fi Tel: +358 50 433 4206 Demo</p>
<p>IoT device management The last few years have seen an exceptional growth in the diffusion of smart objects and sensors not only at home, but also in workplaces and even in public spaces such as malls, theaters, and concert halls. Unfortunately, embedded devices in the Internet of Things (IoT) are not very user friendly and cumbersome to manage due to their sheer number. These constraints call not only for novel interaction methods, but also for practical techniques in configuration and management of IoT devices.</p>	<p>Mario Di Francesco, Assistant Professor Department of Computer Science School of Science Email: mario.di.francesco@aalto.fi Tel: +358 50 597 5250 Demo & Pitch</p>
<p>Digital twin in engineering design - case smart crane A digital twin i.e. virtual copy of a physical product together with smart features, OPC-UA interfaces and open innovation ecosystem enable data based product development and new business opportunities. In the smart crane demo the digital twin in PLM environment is presented to envision how to utilize industrial internet knowledge in creating and testing new features and digital services.</p>	<p>Jari Juhanko, Chief Operating Officer Industrial Internet Campus Department of Mechanical Engineering School of Engineering Email: jari.juhanko@aalto.fi Tel: +358 50 556 3564 Demo & Poster</p>
<p>Standalone Narrowband Internet of Things (NB-IoT) base station for industrial use The 3rd Generation Partnership Project (3GPP) has introduced a new narrow band radio technology called Narrow Band Internet of Things (NB-IoT) in order to support large number of very</p>	<p>Riku Jäntti, Professor Department of Communications and Networking School of Electrical Engineering Email: riku.jantti@aalto.fi Tel: +358 50 597 8588</p>

<p>low power consumption, low data rate, and low cost devices in extreme coverage conditions. Researchers at Aalto University have developed a software defined radio (SDR) implementation of standalone mode NB-IoT base station (BS) which can be used as a femto cell or integrated to other e.g. automation systems.</p>	<p>Demo & Poster & Pitch</p>
<p>Ambient Intelligence for smart environments We present our recent work in applying ambient intelligence techniques to achieve (1) personalized or context-conditioned ad-hoc security and authentication, (2) environmental perception and (3) recognition of activities, intention and emotion.</p>	<p>Stephan Sigg, Assistant Professor Department of Communications and Networking School of Electrical Engineering</p> <p>Email: stephan.sigg@aalto.fi Tel: +358 50 466 6941</p> <p>Demo & Poster & Pitch</p>

Data Science, Big Data, Complex Systems and Data Driven Health

<p>Variation in microbiome LPS immunogenicity contributes to autoimmunity in humans The human gut microbiome has important connections to health and disease. We studied the infant gut microbiome of 222 children in Finland, Estonia and Russia, in order to study the role of environmental factors in early onset autoimmune diseases, such as type 1 diabetes. Using DNA sequencing-based methods we discovered marked differences between the countries and further confirmed a molecular mechanism that may partly explain the difference in autoimmune disease between these countries.</p>	<p>Tommi Vatanen, Doctoral Candidate Department of Computer Science School of Science</p> <p>Email: tommi.vatanen@aalto.fi Tel: +358 40 590 7751</p> <p>Poster</p>
<p>Exploring racism in the online spaces We show observations how to conduct social science motivated data-intensive research approaches and discuss how big data ethnography, network analysis etc. computational methods can be used together with social scientists to understand social media data.</p>	<p>Matti Nelimarkka, Researcher Department of Computer Science/HIIT School of Science</p> <p>Email: matti.nelimarkka@hiit.fi Tel: +358 50 527 5920</p> <p>Demo</p>
<p>Digital Me Our lives are getting increasingly digital; much of</p>	<p>Jesper Hjorth, Researcher Department of Computer Science/HIIT</p>

<p>our personal interactions are digitally mediated. A side effect of this is a growing digital footprint, as every action is logged and stored. This data can be very powerful, but is seldom in the hands of the individuals themselves. In this project we have developed the Digital Me personal data management framework which brings the digital footprint to knowledge workers and leverages state-of-the-art machine learning to help them utilise it.</p>	<p>School of Science</p> <p>Email: matti.nelimarkka@hiit.fi Tel: +358 50 527 5920</p> <p>Demo</p>
<p>Aalto Science-IT: Scientific computing support for research</p> <p>The Science-IT team supports scientific computing at Aalto. We administer the Triton high performance computing cluster, which is part of the Finnish Grid and Cloud Infrastructure. We also provide support for scientific software, data management, and training. We connect researchers, IT services, and CSC.</p>	<p>Richard Darst, Staff Scientist Department of Computer Science/HiIT School of Science</p> <p>Email: richard.darst@aalto.fi Tel: -</p> <p>Demo & Poster</p>
<p>High-throughput crop recommendation engine for precision agriculture</p> <p>To feed the growing population in 2050, we need to get the most out of each field. We have developed machine learning technology that allows making decisions based on field-specific data (soil, microclimate) to maximize yields. The technology can be used at various levels of the food production value chain, starting from the plant breeding process but also at farms for improved decision making. We present the problem and also discuss the promising financial opportunities involved.</p>	<p>Jussi Gillberg, Doctoral Candidate Department of Computer Science School of Science</p> <p>Email: jussi.gillberg@aalto.fi Tel: +358 50 538 0987</p> <p>Pitch</p>