

Skövde Workshop on Information Fusion Topics (SWIFT 2008): Conference Report

Erik Blasch (Wright State University/AFRL, Dayton, Ohio)
erik.blasch@wpafb.af.mil

Marcus Brohede, Joeri van Laere, Ronnie Johansson, Henrik Boström, Sten F Andler
(University of Skövde)
marcus.brohede@his.se
joeri.van.laere@his.se
ronnie.johansson@his.se
henrik.bostrom@his.se
sten.f.andler@his.se

Submission : Journal for Advances in Information Fusion

The second annual Skövde Workshop on Information Fusion Topics (SWIFT 2008) was held in Skövde, Sweden, on 4-6 November 2008. The workshop featured plenary speakers, 20 regular papers, and almost 60 attendees. The organization of the SWIFT workshop was lead by Prof. **Sten F Andler**, member of the ISIF board.



The Information Fusion Research Program (Infusion) at University of Skövde is a growing program to promote the research and education in information fusion. Offering a Master's program and PhD courses in Information Fusion, Skövde University also offers Master's programs in Informatics, Engineering, and Bioinformatics. The Skövde Infusion Program has 5 full-time professors, a couple of post-docs, and supports more than 20 Ph.D. students. Funded since 2005, the Skövde Infusion Program supports education, industry, and the defense technology.

The SWIFT2008 workshop was organized in partnership with Knowledge Foundation and supported by various organizations such as Skövde Kommun, EuroMaint, Gothia Science Park, and the Swedish Emergency Management Agency (SEMA). The themes of this year's conference program included: (1) Situation awareness and human decision-making, (2) Decision and classifier fusion, (3) Support and infrastructure issues, and (4) Future directions for information fusion.



The program included four plenary sessions. **Dr. James Llinas** (Center of Multisource Information Fusion, University of Buffalo, NY) opened the conference with a discussion on hard/soft data fusion, graphical matching techniques, and ontologies.



Additionally, **Dr. Erik Blasch** (Wright State University/AFRL, Dayton, Ohio) presented on user performance needs and evaluation of information fusion systems.



Dr. Ludmila Kuncheva (University of Wales, UK) discussed the contemporary needs of using constant-stream data in "Classifier ensembles for handling concept change in streaming data" such as utilizing the Shewhart process in coordination with classifier design for gradual and abrupt changes.

Dr. David Lindgren (Swedish Defense Research Agency) described "Fusion challenges in scalable sensor networks", with emphasis on wireless communication constraints and topology that require information fusion solutions.



Exciting presentations were provided by students pursuing PhDs in information fusion research. **Sandor Ujvari**

presented on "Reflections on fusion systems requirements analysis for maintenance planning" by considering the actors {machine, customer, service provider, environment} needs over the model, data, technique (case), and goal-driven strategies. **Fredrik Johansson** discussed "A survivability-based testbed for comparing threat evaluation algorithms" by using a combination of Capability, Intent, Proximity Properties with Template, rule-based, graphical based (Bayesian) Algorithm Categories to compute survivability as a measure of correctness. **Maria Nilsson** offered an exciting way of "Formalizing distributed cognition into a tool to capture information fusion processes" by creating a taxonomy and reporting technique to describe the cognitive fusion interactions and identify the bottlenecks in the user-fusion system. Finally, "Using optimized optimization criteria in ensemble member selection", by **Tuve LÖfström** was overviewed.

Multiple papers were presented by Skövde faculty including **Henrik Boström** on "Analyzing strategies for predicting probabilities with fused classifiers by decomposing the mean squared error of constituent classifiers". **Ronnie Johansson** presented a paper that was the work of program committee **Joeri van Laere, Henrik Boström, Ronnie Johansson** and **Alexander Karlsson** on "Practical application of ranking based fusion methods on a soccer pool". **Gunnar Mathiason** set up the adaption network wireless design at the University in: "Exploring a multi-tiered whiteboard infrastructure for information fusion in wireless sensor networks". **Jonas Mellin** presented Middleware for application management (scheduling, allocation, and partitioning) and resource management (quality of service metrics) for crisis management titled "Adaptive application and resource management". Finally, **Sten F Andler** presented on "Maritime Domain Awareness" in which the University of Skövde is combing efforts with Saab to support a world-wide ship tracking solution.

Many exciting questions and oversights were provided by industry participation from Saab, Ericsson, and AstraZeneca. Industry presentations were provided by various other Swedish industries and the Swedish Defence Research Agency (FOI). A combined effort between Lexware Labs and University of Skövde for linguistic extraction of chemical data for compound synthesis and classification included "Information retrieval combined with extraction to assist decision making", by **Elżbieta Dura** and **Björn Olsson**. **Pontus Svenson** (Swedish Defence Research Agency, FOI) initiated novel developments in "Social network analysis of uncertain networks" highlighting the need for graphical networks to support uncertain and conflicting information as well as fusion support for graph-network combinations. **Christian Mårtenson** discussed "Using semantic technology in intelligence analysis" with the triple {subject, predicate, object} for analysis. Mårtenson emphasized the need for tagging using the JC3IEDM ontology and even presented a bonus slide. **Pontus Svenson** also presented "An overview of the Impactorium tools 2008" which was an overview of a tool that presents events/alerts/indicators on a time/location map assimilated from an impact / threat analysis model utilizing Bayesian networks. The Impactorium Tool was reported in previous ISIF conferences and can be applied to defense, crisis, emergency, and cyber domains. **Joel Brynielsson** discussed "A vision of a toolbox for intelligence production" which supports intelligence analysts for strategic situational awareness using game-theoretic approaches, entity extraction, and semantically tagging and fusing information from extracted knowledge.

International presentations included those from the US, UK, Germany, and China as well as attendees from Iran, Spain, and Bulgaria. **Michael Heizmann** (Fraunhofer-Institut, Germany) developed "Object oriented environment model for autonomous systems", supporting autonomous robots by using Recursive Bayes methods to update the objects in the scene model. "Information fusion based moving person detection", was presented by **Jiagen Jin** (Wuhan University of Technology, China). Also discussed were wireless sensor networks for tracking RFID's in "Information fusion for WSID", by **Li Wenfeng**, of Wuhan University. The international participation enhanced the coordination of the Skövde IF Program to support ongoing developments for the students and faculty.

In addition to the general program and paper discussions, the conference supported a dinner at the historic downtown Scandic Billingen hotel, lunchtime receptions at the campus location, as well as a reception at the Chancellery Faculty Club. Lively discussions and reflections on fusion research were continuously ongoing at these events, which covered future research, novel applications, and planning and discussions for the annual ISIF fusion conference.

The next SWIFT workshop will be held in October 2009 and the call for papers will soon be available. All are welcome to submit to demonstrate your latest developments in information fusion research. Further questions can be answered by **Ronnie Johansson**, who coordinated most of the conference details and program arrangements at the SWIFT 2008 website.

Further information about SWIFT2008 can be found at <http://www.his.se/infusion/swift2008>. Information about the 2009 conference will appear at <http://www.his.se/infusion/swift2009>.