Austrian Computer Science Day 2019

“Business meets Computer Science”
# Young Experts – *Minute Madness*

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<thead>
<tr>
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<th>Name</th>
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<tr>
<td>1</td>
<td>Svetlana Abramova</td>
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<td>Sebastian Neumaier</td>
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<td>16</td>
<td>Tiago Santos</td>
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<td>Michael Schwarz</td>
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<td>18</td>
<td>Katta Spiel</td>
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<td>19</td>
<td>Josef Tkadlec</td>
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Security and Privacy in Online Payment Systems: Empirical and Theoretical Perspectives

Svetlana Abramova
Universität Innsbruck
Coin Selection Ain’t So Easy…

Real world

Physical wallet

Digital world

Cryptocurrency wallet

Addresses (public keys)

…more details about cryptocurrencies on the poster!
Security and Privacy in Large-scale Infrastructure

Adrian Dabrowski
TU Wien
PRNU-based Detection of Morphed Face Images

3
Luca DeBiasi
Universität Salzburg
How can we detect morphed face images?

PRNU
Photo Response Non-Uniformity
Group decision-making in the eTourism domain

Amra Delic
TU Wien
How can we truly help groups in their travel related decision-making process?

Group decision-making process:
1. Preference disclosure
2. Information / opinion exchange
3. Final decision
4. Evaluation of the final decision

Group setting comprises of:
- Variety of preferences
- Individuals of various personalities
- Social relationships

Research objectives:
1) Understand which individual and group factors influence choice satisfaction
2) Model and predict the decision-reaching approach of a group and
3) Predict the group choice
A Participatory Approach to a Mobile Serious Game to Foster Social Media Literacy

Barbara Göbl
Universität Wien
User-Centered Serious Game Design

- Interdisciplinary Analysis of Social Media Practice
  - Mixed Methods

- Participatory Design: Game Elements and Learning Goals

Interaction Design

- Natural Language Interfaces in Learning Games
Dynamic Graph Algorithms and Graph Sparsification: New Techniques and Connections

Gramoz Goranci
Universität Wien
Dynamic Graph Algorithms

input graph $G$

Dynamic Algorithm

adversary inserts and deletes edges

$R_G(s, v)$?

query

answer

$\delta_G(s, v)$

Graph Sparsification

input graph $G$

$G \approx H$

sparsifier $H$
Drone Delivery Systems

Pasquale Grippa
AAU Klagenfurt
Drone Delivery Systems
Variational Networks for Medical Image Reconstruction

Kerstin Hammernik
TU Graz
Variational Networks: Connecting two successful fields

**Impact for medical imaging**
- Faster acquisition, improved patient safety
- Reduced health care costs
- Higher patient throughput
- Improved image quality and reconstruction time
- Direct integration into clinical workflow
A NoSQL Model Repository for Scalable Model Versioning, Querying & Persistence

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Martin Häusler
Universität Innsbruck
A NoSQL Model Repository for Scalable Model Versioning, Querying & Persistence
Martin Häusler, PhD

Industrial Context

Solution Approach

External SQL Databases
Container Orchestrators
Virtualization Environments
Cloud Compute Platforms
EAM Tools
Central Model Repository
Operations Managers
Enterprise Architects
Security Managers

Application
ChronoSphere
ChronoGraph
ChronoDB
Computational Topology in Machine Learning – Connecting the Dots

10
Christoph Hofer
Universität Salzburg
Computational Topology in Machine Learning – Connecting the Dots

\[ K \xrightarrow{\text{ph}} B \xrightarrow{\nu} \text{NN} \xrightarrow{\mathcal{L}} \]

\[ f_\theta \]

Hofer et al., ICML ’19
Hofer et al., NIPS ’19 (in submission)

Hofer et al., NIPS ’17
Hofer et al., JMLR (revision)

Prior state-of-the-art

Implementation (on GitHub)
Circuit Verification

11
Daniela Kaufmann
JKU Linz
**Problem**

Does the circuit always compute the correct result?

**Approach**

Formal Verification & Automated Reasoning

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Daniela Kaufmann, FMV, JKU Linz
Emotion-exchange motifs: Uncovering the basic building blocks of emotion-annotated communication networks

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Ema Kusen
WU Wien
Emotion-exchange motifs: Uncovering the basic building blocks of emotion-annotated communication networks

Ema Kusen, Vienna University of Economics and Business (WU)

OBJECTIVES

- The impact of emotions on user behavior in OSNs.
- A multiplex model to represent an emotion-annotated communication network.
- A collection of emotion-exchange motifs.

RESEARCH METHOD

Algorithm 1: Motif detection.

```plaintext
1 Input: input_network;
2 Output: list_of_motifs;
3 Initialize i = 0;
4 # ENUMERATE AND CLASSIFY SUBGRAPHS
5 def procedure: enu_v2(list_layers)
6 foreach i in list_layers do
7     subgraphs = enu()
8     foreach j in subgraphs do
9         if j2j() then
10             assign_common_isomorphism_class
11             subgraphs = subgraphs \ j
12         end
13 end
14 end
15
16 end
17 procedure
18 # GENERATE LAYERS AND INTER-LAYERS
19 detect layers in input_network
20 layer_negative.add_edges_from(layer_anger, layer_sadness, layer_disgust, layer_fear)
21 layer_positive.add_edges_from(layer_joy, layer_surprise, layer_positive, layer_interlayer)
22 foreach i in range(length(input_network)) do
23     if v1 in layer_negative & v2 in layer_positive then
24         list_layers = [layer_anger, layer_joy, ...]
25         enu_v2(list_layers)
26     end
27 end
28
29 while i < 1000 do
30     foreach j in list_layers do
31         if j in list_layers do
32             null[j] = matching_In_degree(), Out_degree()
33         end
34     end
35     enu_v2(null)
36 end
37 i = i + 1
38```

Twitter

[Diagram of layers and motifs]
Simulation-based Code Duplication in a Dynamic Compiler

13
David Leopoldseder
JKU Linz
SIMULATION-BASED CODE DUPLICATION IN A DYNAMIC COMPILER

David Leopoldseder, JKU Linz

Problem: Control-flow prohibits many optimizations

Solution: Duplicate & Optimize

Approach:
- Program
  - Simulation 1
  - Simulation 2
  - Simulation ...

Rank & Evaluate

Optimized Program

- Simulation 1
- Simulation 2
- Simulation ...

Scan me
Preventing and Repairing Build Breakage

14
Christian Macho
AAU Klagenfurt
Preventing and Repairing Build Breakage

INFO
INFO BUILD FAILURE
INFO


Prevent from Failing

Automatically Repair

Christian Macho
Semantic Enrichment of Open Data on the Web

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Sebastian Neumaier
WU Wien
Semantic Enrichment of Open Data on the Web

Or: How to build an Open Data Knowledge Graph

PROBLEM

Quality issues:
• Heterogeneity
• Discoverability
• Integration

APPROACH

Monitoring and analysis

Semantic labelling/annotation

Search & integration

This work has been supported by the Austrian Research Promotion Agency (FFG) under the project ADEQUATe (grant no. 849982).
Evolution of Online Communities: Distilling Temporal Patterns in User Behavior and Community Lifecycles

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Tiago Santos
TU Graz
Evolution of Online Communities

Distilling Temporal Patterns in User Behavior and Community Lifecycles

How and why do some online communities succeed, while others do not?

→ Understand and model community fundamentals:

Baseline

Self-Excitation

Cross-Excitation

Empirical Excitation

→ Predict community size and timing of community lifecycles

Tiago Santos is a recipient of a DOC Fellowship of the Austrian Academy of Sciences at the Institute of Interactive Systems and Data Science, TU Graz.
Software-based Side-Channel Attacks and Defenses in Restricted Environments

Michael Schwarz
TU Graz
Evaluating Experiences of Autistic Children with Technologies in Co-Design

18
Katta Spiel
TU Wien
A role of graph structures in evolutionary processes

19
Josef Tkadlec
IST Austria
Moran process on a graph $G$

strength(○) = 1

strength(○○) = $r > 1$

Quantity of interest:
Fixation probability $\text{fp}(G, r)$ of a single invading mutant with strength $r$.

<table>
<thead>
<tr>
<th>$G_n$</th>
<th>$1 - 1/r = 1 - 1/r &lt; 1 - 1/r^2 \ll 1$</th>
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<tr>
<td>$\lim_{n \to \infty} \text{fp}(G_n, r)$</td>
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