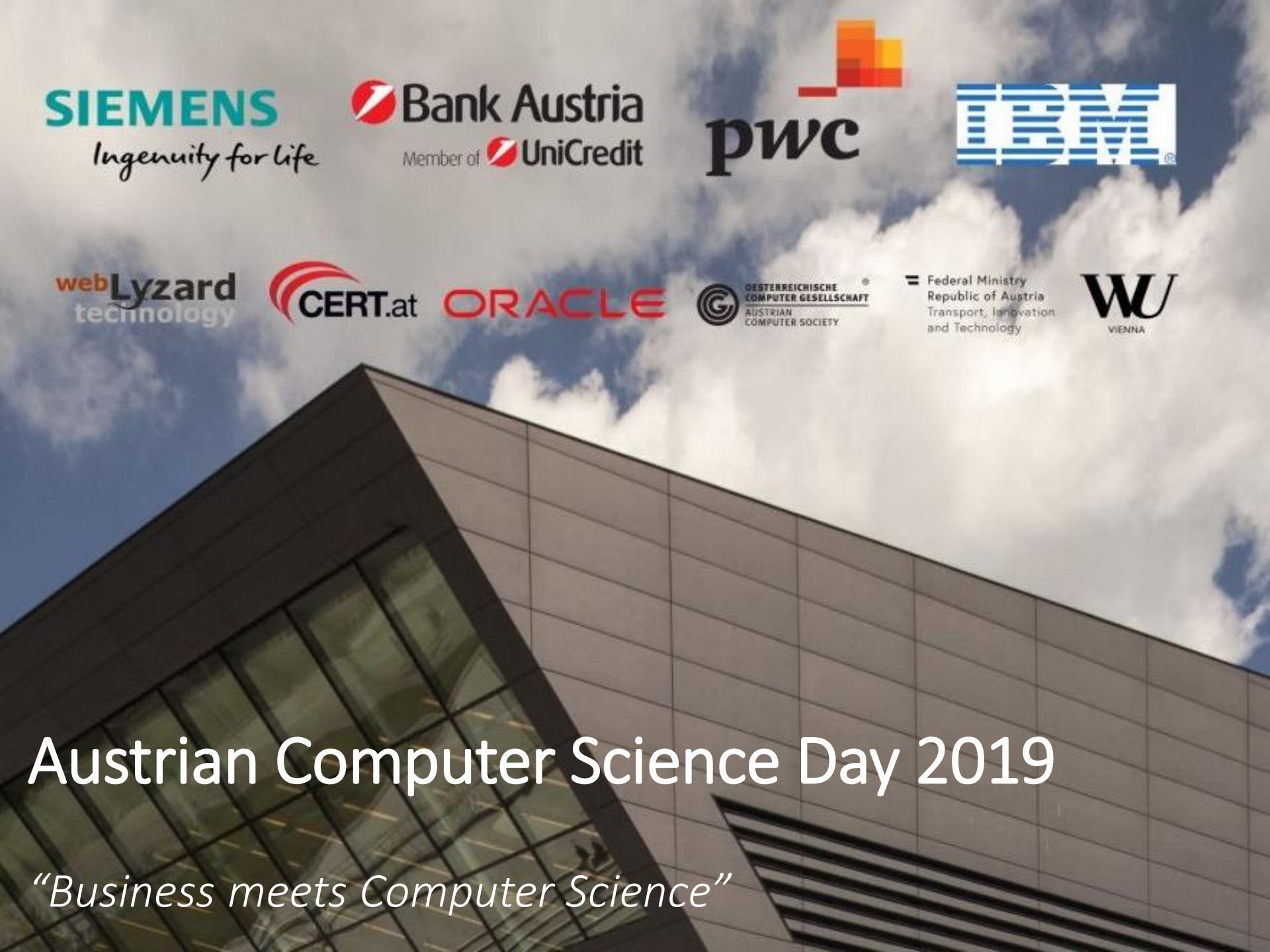

Austrian Computer Science Day 2019

"Business meets Computer Science"

Young Experts – *Minute Madness*

1	Svetlana Abramova
2	Adrian Dabrowski
3	Luca Debiasi
4	Amra Delic
5	Barbara Göbl
6	Gramoz Goranci
7	Pasquale Grippa
8	Kerstin Hammernik
9	Martin Häusler
10	Christoph Hofer

11	Daniela Kaufmann
12	Ema Kusen
13	David Leopoldseder
14	Christian Macho
15	Sebastian Neumaier
16	Tiago Santos
17	Michael Schwarz
18	Katta Spiel
19	Josef Tkadlec

Security and Privacy in Online Payment Systems: Empirical and Theoretical Perspectives

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1

Svetlana Abramova

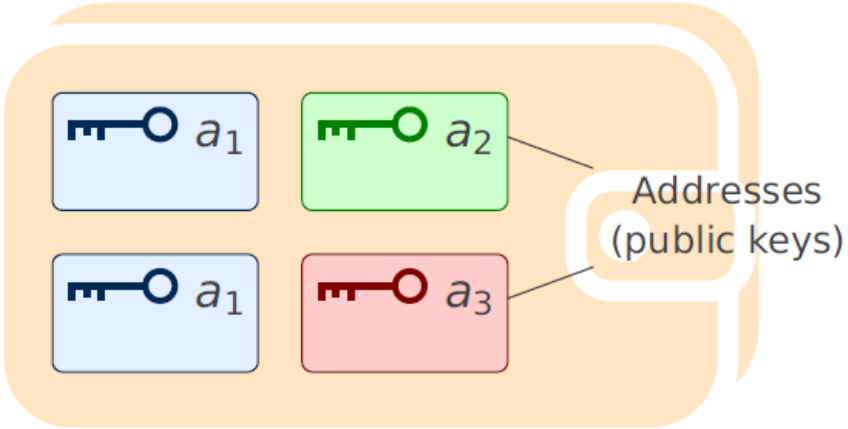
Universität Innsbruck

Coin Selection Ain't So Easy...

Real world

Physical wallet

Digital world



Cryptocurrency wallet

... more details about cryptocurrencies on the poster!

Security and Privacy in Large-scale Infrastructure

2

Adrian Dabrowski

TU Wien

SBA Research

TU WIEN

FAKULTÄT FÜR !NFORMATIK

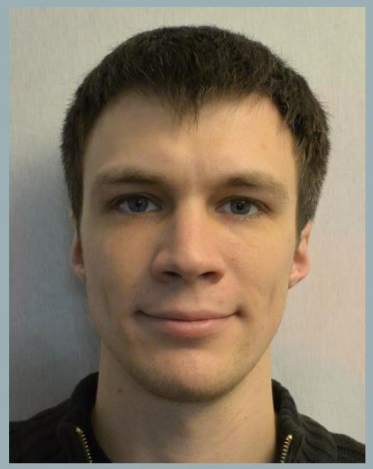
Faculty of Informatics

PRNU-based Detection of Morphed Face Images

3

Luca Debiasi

Universität Salzburg

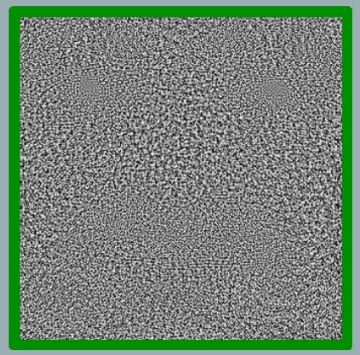


Subject A

Morph

Subject B

How can we detect morphed face images?



PRNU

Photo Response Non-Uniformity

Group decision-making in the eTourism domain

4

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

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5

Barbara Göbl

Universität Wien

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

A Participatory Approach to a Mobile Serious Game to Foster Social Media Literacy
Barbara Göbl*, Research Group Entertainment Computing, Faculty of Computer Science
*Recipient of a DOC-team-fellowship of the Austrian Academy of Sciences

Dynamic Graph Algorithms and Graph Sparsification: New Techniques and Connections

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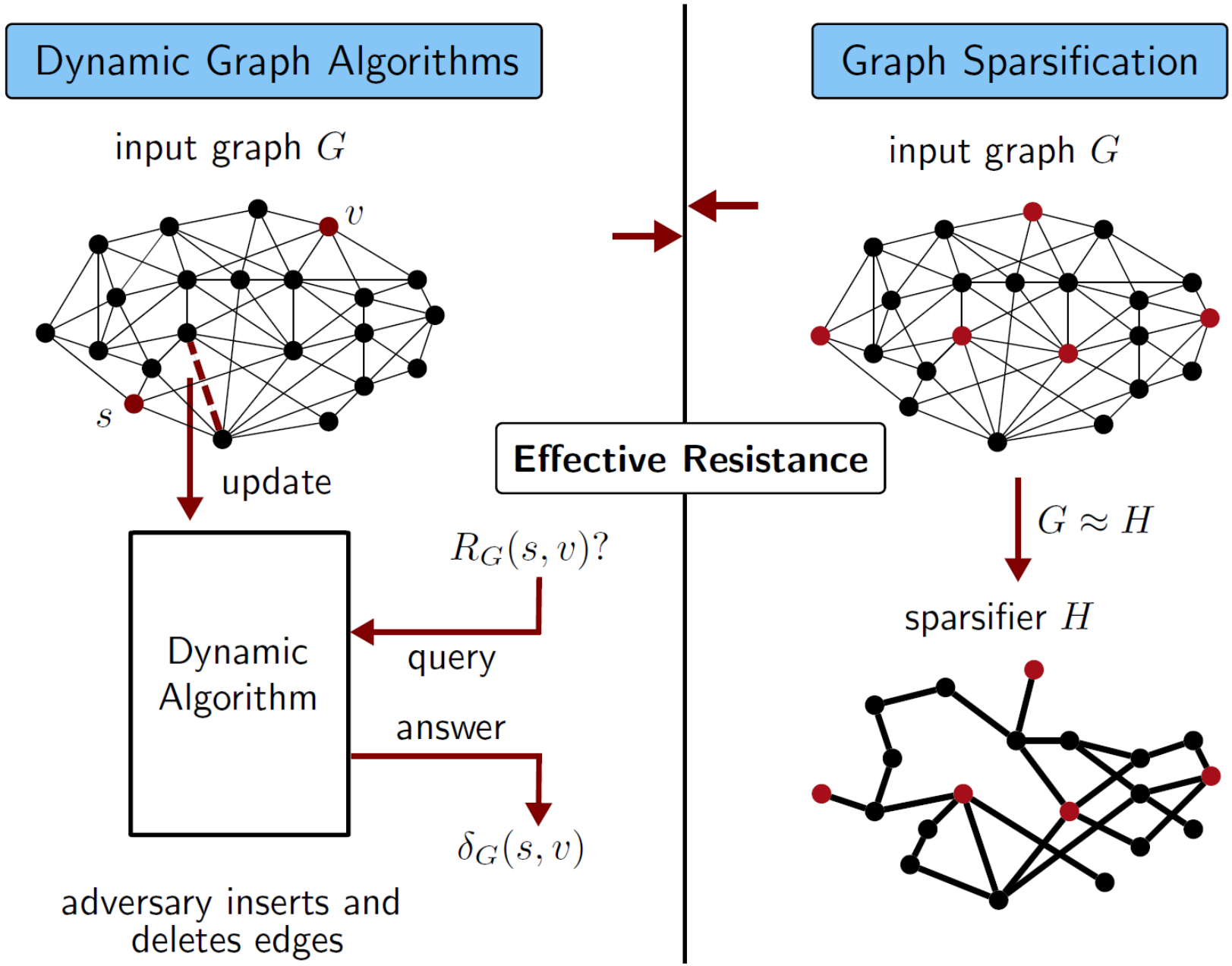
6

Gramoz Goranci

Universität Wien


Dynamic Graph Algorithms
Graph Sparsification
input graph G
input graph G
v
s
update
Effective Resistance
$G \approx H$
sparsifier H
$R_G(s, v)$?
Dynamic Algorithm
query
answer
$\delta_G(s, v)$
adversary inserts and deletes edges

Drone Delivery Systems

7

Pasquale Grippa
AAU Klagenfurt

Background picture by Melpomene (Fotolia)

Drone Delivery Systems

Variational Networks for Medical Image Reconstruction

8

Kerstin Hammernik

TU Graz

Variational Networks for Medical Image Reconstruction

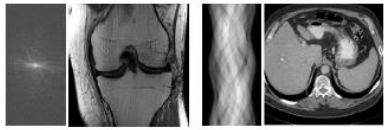
Kerstin Hammernik[1]

[1]Institute of Computer Graphics and Vision, Graz University of Technology

hammernik@icg.tugraz.at
khammernik
khammernik

Introduction

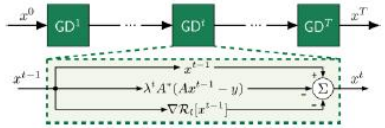
Inverse problems in medical imaging



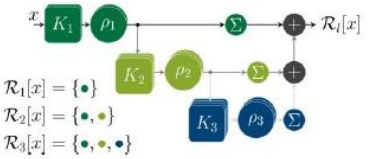
k-space → MR image sinogram → CT image

Methods

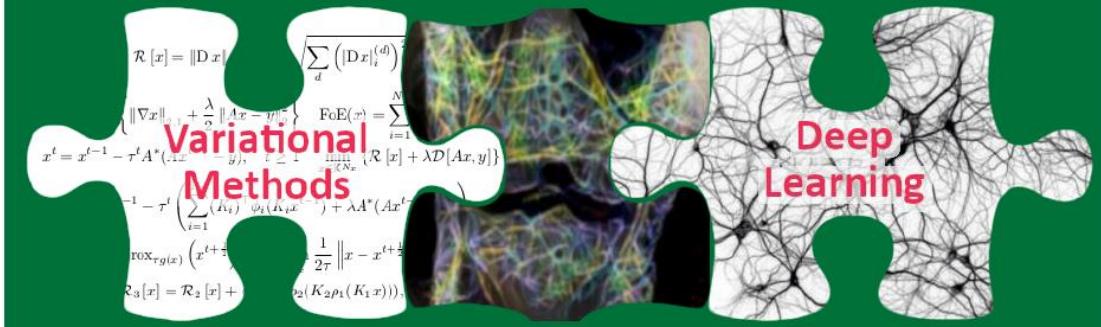
To learn an unrolled gradient descent scheme for a fixed number of iterations ...



... including the data term weight and the regularization term



Variational Networks: Connecting two successful fields

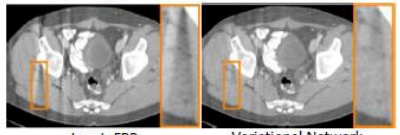


Impact for medical imaging

- Faster acquisition, improved patient safety
- Reduced health care costs
- Higher patient throughput
- Improved image quality and reconstruction time
- Direct integration into clinical workflow

Applications

Limited-Angle CT Reconstruction



Input: FBP Variational Network

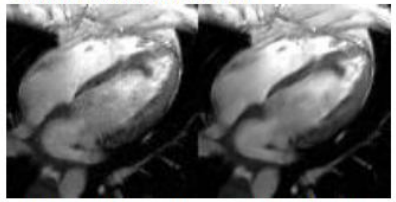
Static MRI Reconstruction

Total Generalized Variation Variational Network

Data set	Criterion	Reader scores regular: PI-CS TGV	Learning	p-value
Coronal PD	Artifact	3.60±0.57	1.65±0.07	**0.0010**
	Sharpness/Blur	2.90±0.14	2.15±0.07	**0.0234**
	SNR	2.60±0.28	1.45±0.21	**0.0078**
	Overall image quality	3.30±0.14	2.05±0.21	**0.0010**
Coronal fat-sat. PD	Artifact	3.95±0.07	2.90±0.42	**0.0020**
	Sharpness/Blur	3.95±0.07	3.15±0.64	**0.0020**
	SNR	3.75±0.21	2.90±0.71	**0.0049**
	Overall image quality	3.95±0.07	3.20±0.57	**0.0020**

Evaluation using a 4-point ordinal scale:
Presence of aliasing artifacts: 1: none, 2: mild, 3: moderate, 4: severe
Sharpness: 1: no blurring, 2: mild blurring, 3: moderate blurring, 4: severe blurring
SNR: 1: excellent, 2: good, 3: fair, 4: poor
Overall image quality: 1: excellent, 2: good, 3: fair, 4: poor

Dynamic MRI Reconstruction



Infimal Convolution TGV Variational Network

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Business meets Computer Science – 03.06.2019 / WU Wien

A NoSQL Model Repository for Scalable Model Versioning, Querying & Persistence

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9

Martin Häusler

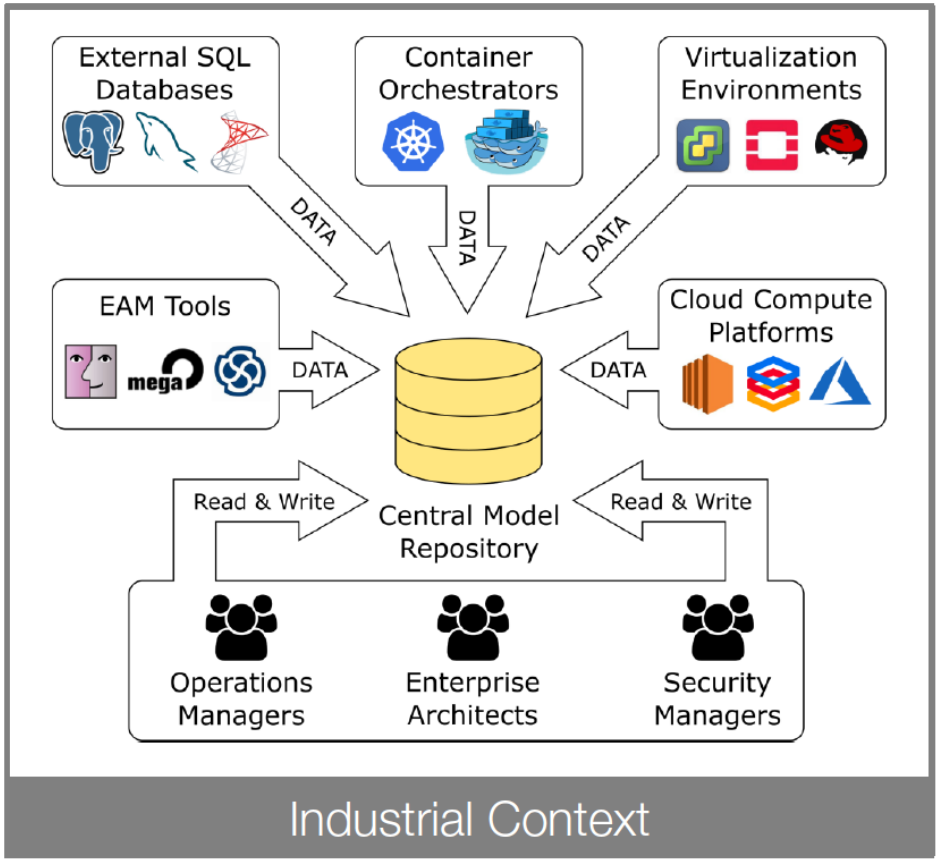
Universität Innsbruck

A NoSQL Model Repository for Scalable Model Versioning, Querying & Persistence

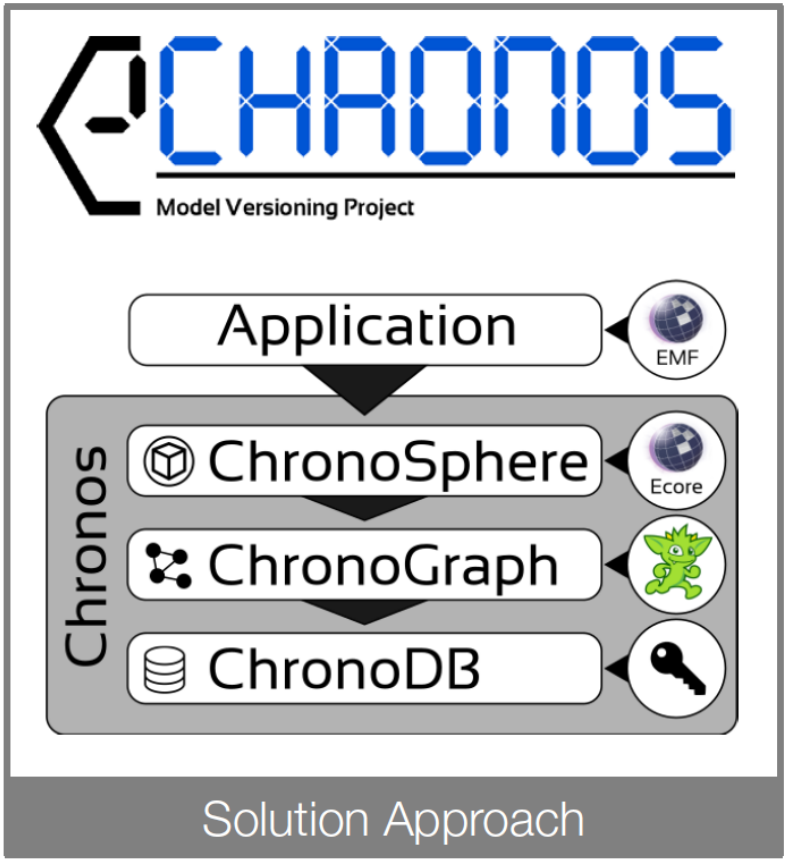
Martin Häusler, PhD

universität innsbruck

QUALITY ENGINEERING



Industrial Context



Solution Approach

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Computational Topology in Machine Learning – Connecting the Dots

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10

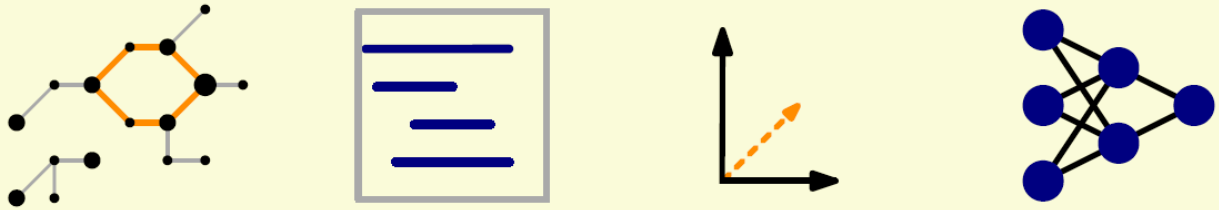
Christoph Hofer

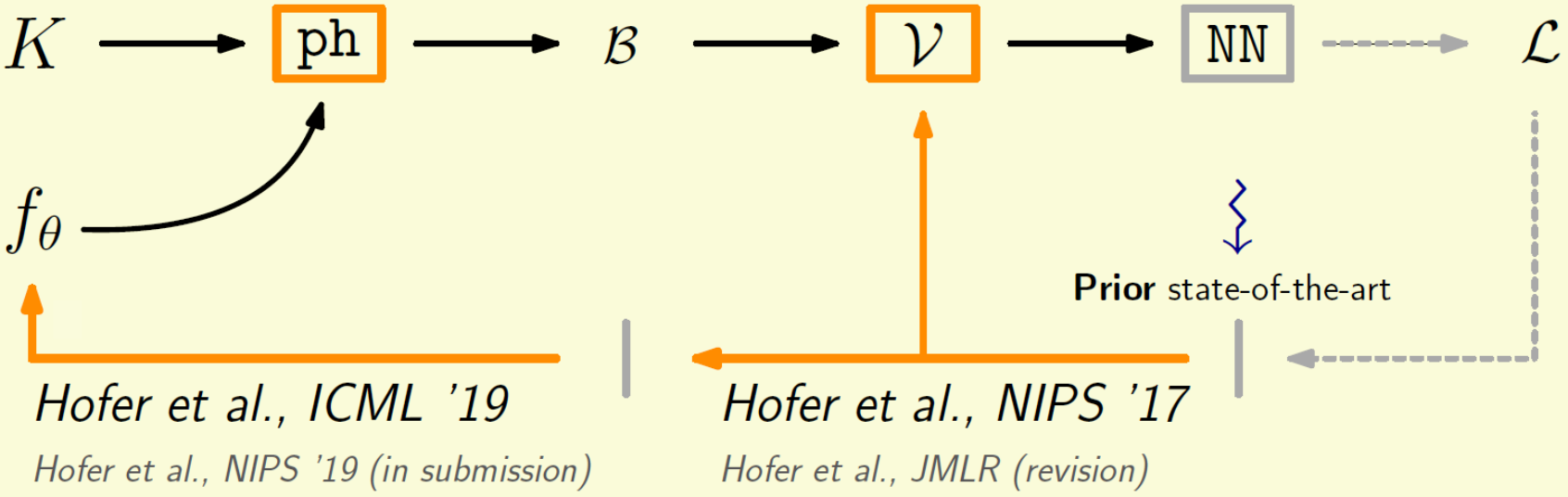
Universität Salzburg

Computational Topology in Machine Learning –

Connecting the Dots

Christoph D. Hofer
University of Salzburg





Implementation

(on GitHub)

Circuit Verification

11

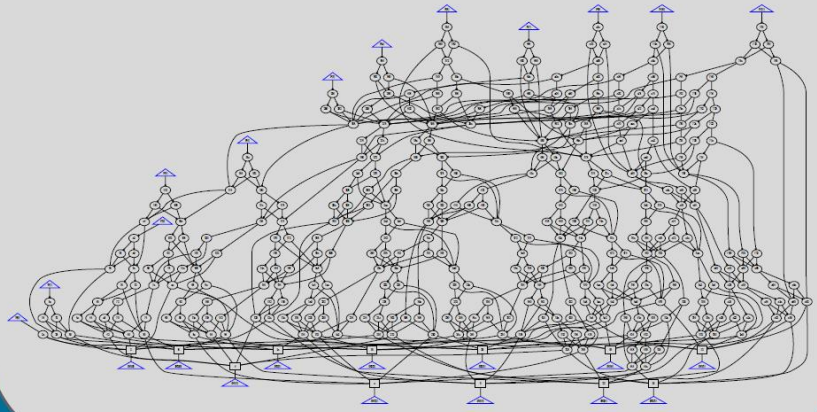
Daniela Kaufmann

JKU Linz

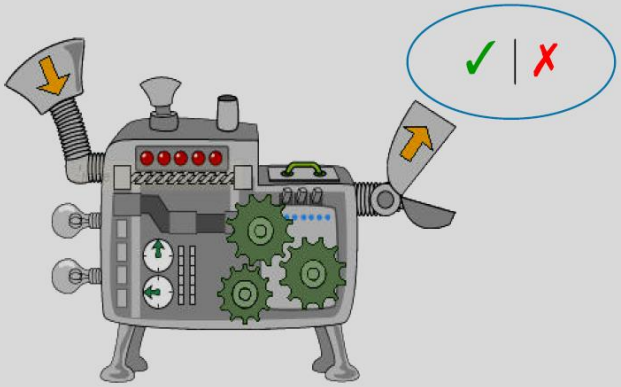
Circuit Verification

Problem

Does the circuit always compute the correct result?



Approach



Formal Verification & Automated Reasoning

JKU Daniela Kaufmann, FMV, JKU Linz

Emotion-exchange motifs:
Uncovering the basic building blocks of emotion-annotated communication networks

---

12

Ema Kusen

WU Wien

Emotion-exchange motifs: Uncovering the basic building blocks of emotion-annotated communication networks

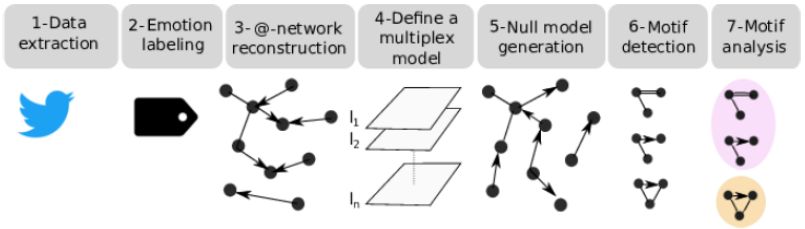
Ema Kusen, Vienna University of Economics and Business (WU)

WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

OBJECTIVES

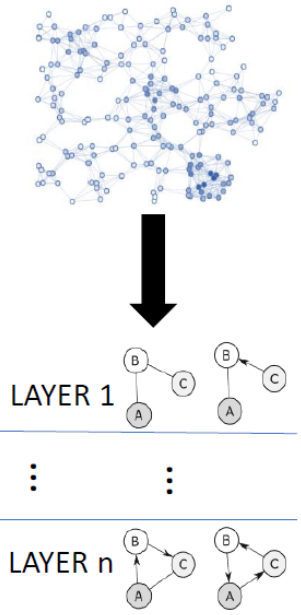
- The impact of emotions on user behavior in OSNs.
- A multiplex model to represent an emotion-annotated communication network.
- A collection of emotion-exchange motifs.

RESEARCH METHOD



Algorithm 1: Motif detection.

```
1  Input: input_network;
2  Output: list_of_motifs;
3  Initialize: i = 0;
4  # ENUMERATE AND CLASSIFY SUBGRAPHS
5  def procedure: esu_vf2(list_layers)
6  foreach l in list_layers do
7      subgraphs = esu(l)
8      foreach s in subgraphs do
9          subgraphs' = subgraphs \ s
10         foreach s' in subgraphs' do
11             if vf2(s, s') then
12                 assign_common_isomorphism_class
13                 subgraphs' = subgraphs' \ s'
14                 subgraphs = subgraphs \ s'
15             end
16         end
17     end
18 end
19 end procedure
20 # GENERATE LAYERS AND INTER-LAYERS
21 detect layers in input_network
22 layer_negative.add_edges_from(layer_anger, layer_sadness, layer_disgust, layer_fear)
23 layer_positive.add_edges_from(layer_joy, layer_anticipation, layer_trust)
24 foreach i in range(length(V(input_network))) do
25     if v_i ∈ V(layer_negative) & v_i ∈ V(layer_positive) then
26         inter_layer.add_edges_from(layer_negative.edge_containing(v_i),
           layer_positive.edge_containing(v_i))
27     end
28 end
29 list_layers = [layer_anger, layer_joy, ... , layer_surprise, layer_negative, layer_positive,
   interlayer, input_network]
30 esu_vf2(list_layers)
31 # GENERATE NULL MODELS
32 while i < 1000 do
33     foreach l ∈ list_layers do
34         null[l] = matching(l.in_degree(), l.outdegree())
35     end
36     esu_vf2(null)
37     i = i+1
38 end
```



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Simulation-based Code Duplication in a Dynamic Compiler

13

David Leopoldseder

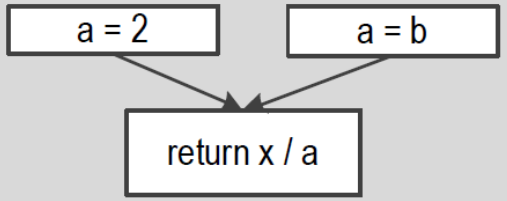
JKU Linz

SIMULATION-BASED CODE DUPLICATION IN A DYNAMIC COMPILER

David Leopoldseder, JKU Linz

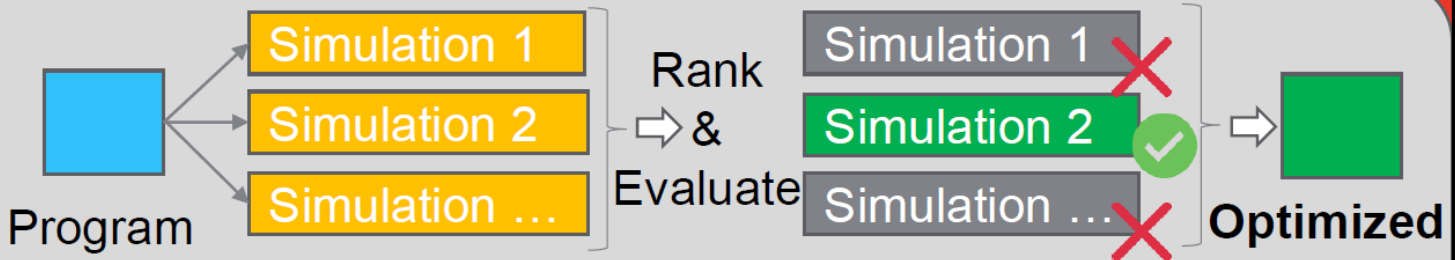
Problem

⇒ Control-flow **prohibits** many optimizations



Solution

Approach



Scan me

JKU GraalVM ORACLE

Preventing and Repairing Build Breakage

14

Christian Macho

AAU Klagenfurt

Preventing and Repairing Build Breakage

```
[INFO] ------------------------------------------------------------------------
[INFO] BUILD FAILURE
[INFO] ------------------------------------------------------------------------
[ERROR] Failed to execute goal on project gdx-backend-robovm: Could not resolve
 dependencies for project com.badlogicgames.gdx:gdx-backend-robovm:jar:1.5.5-SN
APSHOT: The following artifacts could not be resolved: org.robovm:robovm-cocoat
ouch:jar:1.0.0-SNAPSHOT, org.robovm:robovm-objc:jar:1.0.0-SNAPSHOT, org.robovm:
robovm-rt:jar:1.0.0-SNAPSHOT: Could not find artifact org.robovm:robovm-cocoato
uch:jar:1.0.0-SNAPSHOT in sonatype-nexus-snapshots (https://oss.sonatype.org/co
ntent/repositories/snapshots) -> [Help 1]
```

Prevent from Failing

Automatically Repair

Christian Macho

Semantic Enrichment of Open Data on the Web

15

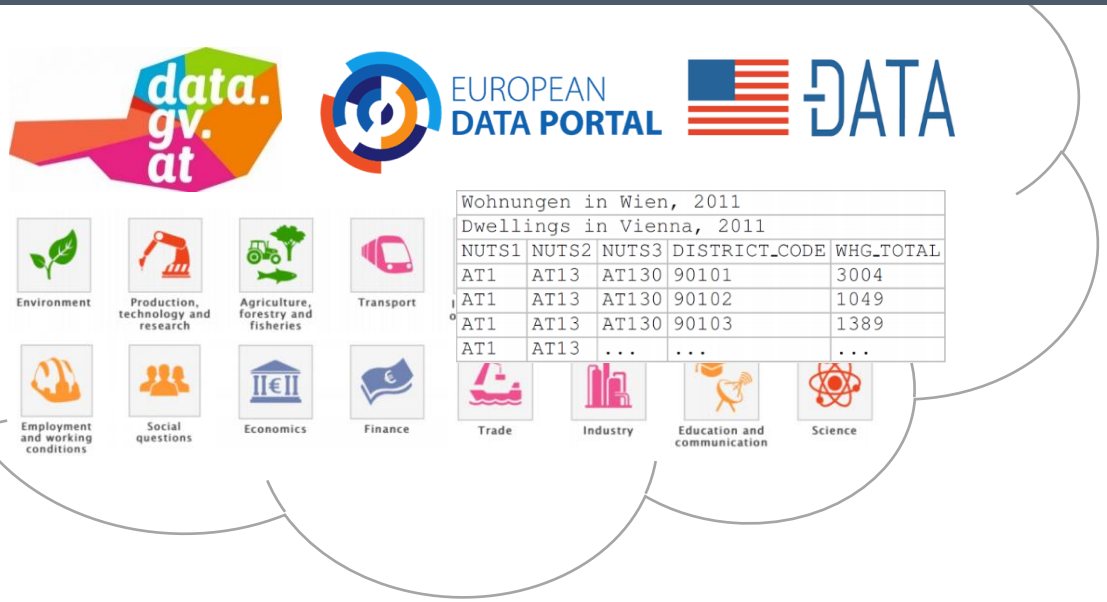
Sebastian Neumaier

WU Wien

Semantic Enrichment of **Open Data** on the Web

Or: How to build an Open Data Knowledge Graph

data.wu.ac.at



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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16

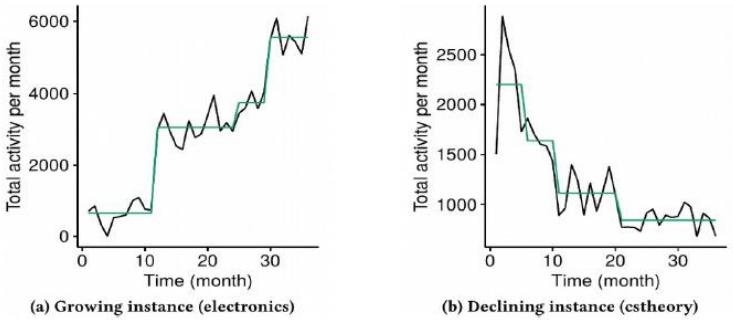
Tiago Santos

TU Graz

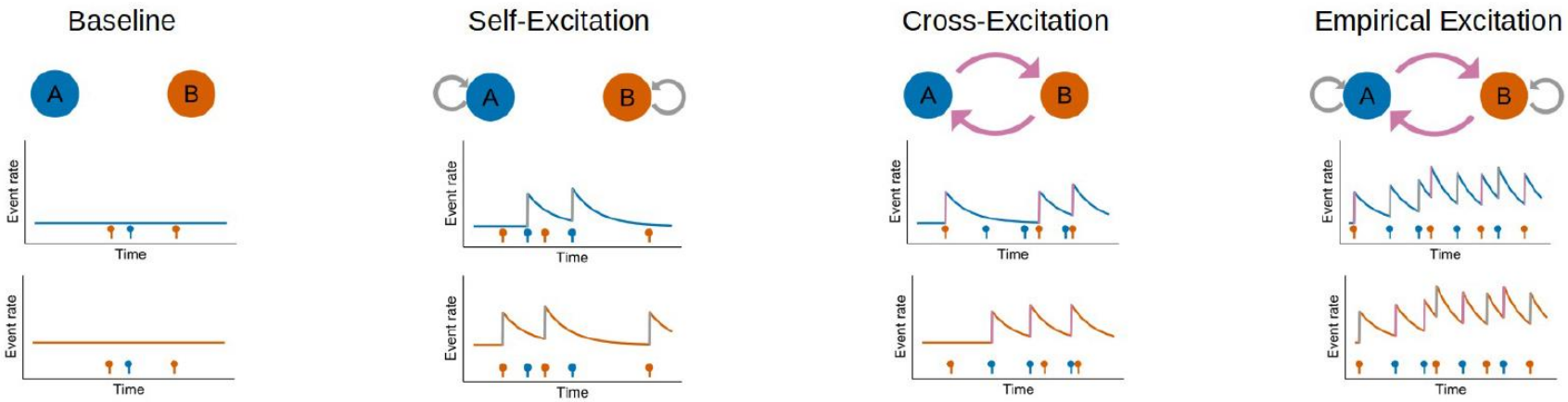
Evolution of Online Communities

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:



→ **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

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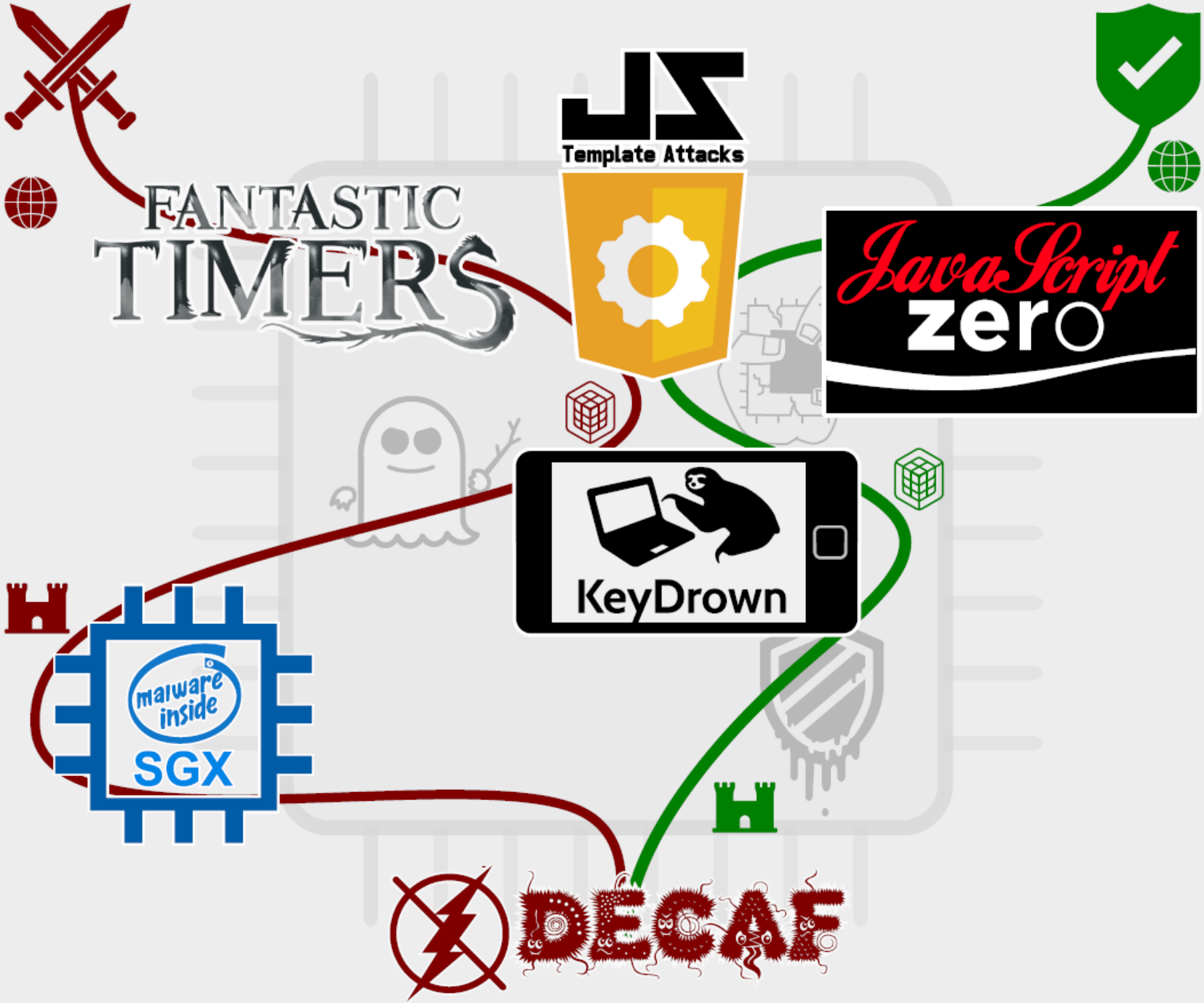
17

Michael Schwarz

TU Graz


FANTASTIC
TIMERS
Template Attacks
JavaScript
zero
KeyDrown
malware
inside
SGX
DECAF

Evaluating Experiences of Autistic Children with Technologies in Co-Design

---

18

Katta Spiel

TU Wien

OUTSIDE THE BOX

Rethinking Assistive Technologies with Children with Autism

ADAJA

Claude

PRODRAW

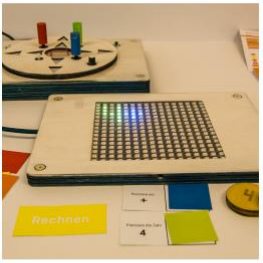
Andy

THINKM

Blaine

DSMART

Dean



ÖXE

Oliver

RATTLE C

Mia

SOUND CUBES

Quentin

TIME MACHINE

Yvan & Hank

Three Years,
Eight Technologies

Katta Spiel
TU Wien

TU WIEN
FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

A role of graph structures in evolutionary processes

19

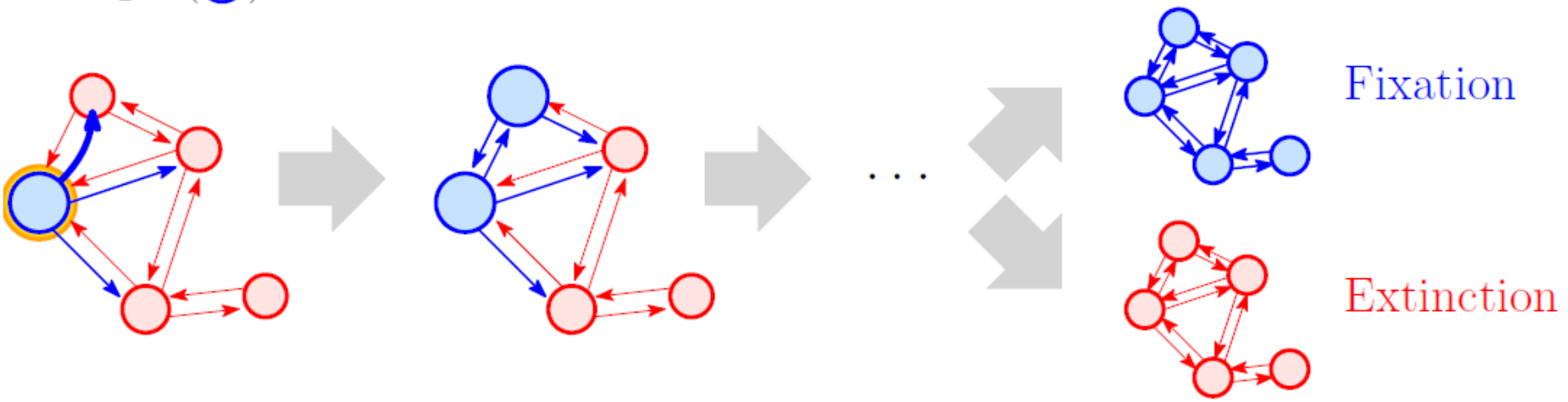
Josef Tkadlec

IST Austria

Moran process on a graph G

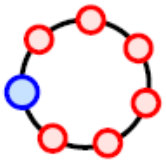
strength( ) $= 1$

strength( ) $= r > 1$



Quantity of interest:

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

G_n				
$\lim_{n\to\infty} \mathrm{fp}(G_n, r)$	$1 - 1/r$	$=$ $1 - 1/r$	$<$ $1 - 1/r^2$	$\ll$ 1