Master's Project Market · FS 2023

Nathan Labhart, Academic Coordinator

Projects and presentations by:

Ibrahim Al Hazwani, Clara-Maria Barth, Madhav Sachdeva, Kathrin Wardatzky, Andreas Bucher, Oana Inel, Lucien Heiz, Roy Adrian Rutishauser, Anastasia Ruvimova, Isabelle Cuber, Parminder Makode, Nimra Ahmed, Thomas Grübl, Liburn Gjonbalaj, Maryam Rezayati.

Important to know: The Master's Project…

… is a **group project** of 2 to 5 members.
If you are a group of two and one person has to cancel, the whole project has to be canceled.

… must be done **with an Ifi professor**.
You may be required to have passed certain modules. External co-supervision may be possible.

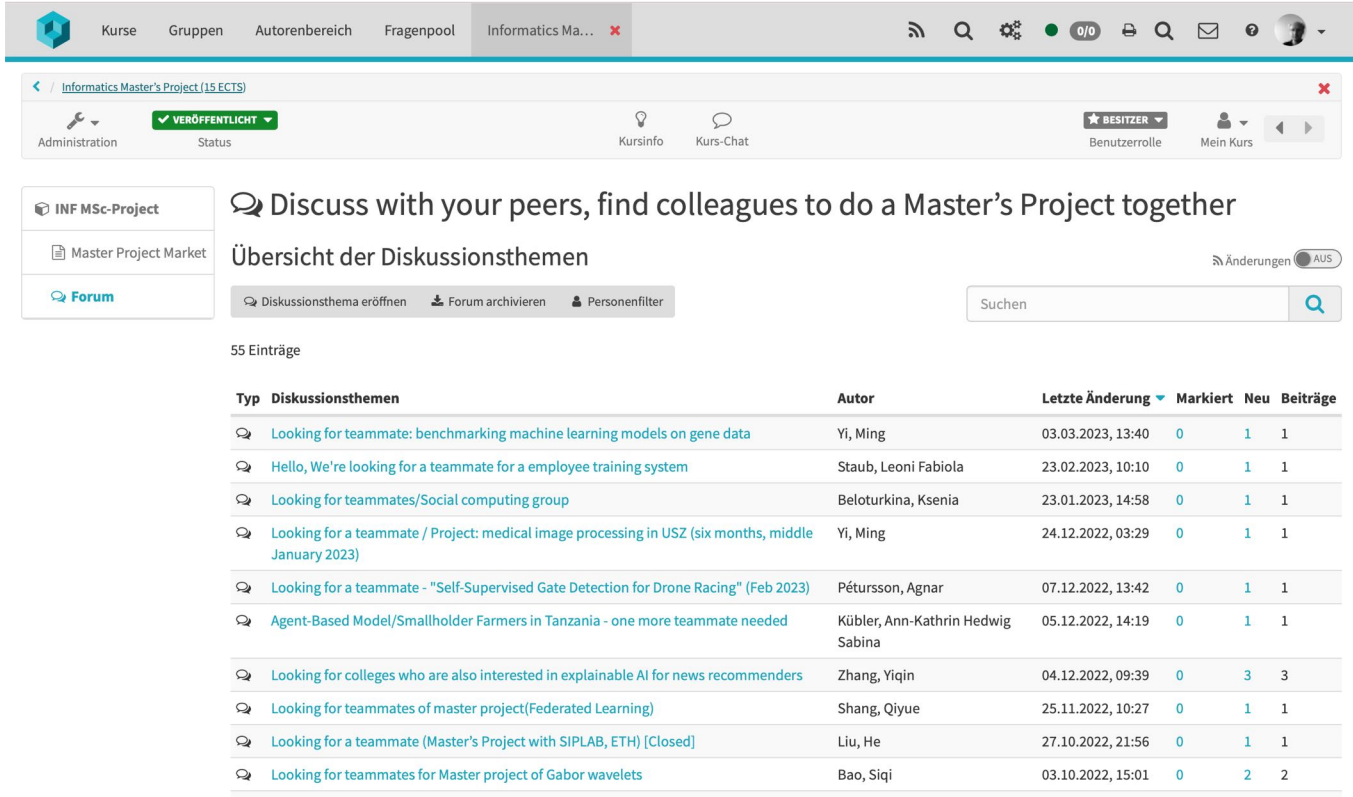
… is carried out with **scientific methods**, requires **final report**.
And usually a presentation or demonstration of the solution.

… yields 15 ECTS Credits.

… is ideally carried out during the summer break; **max. 1 year** to complete.
Usually 6 months (part-time), 3 months (full-time). Start date depends on context and supervisors.

Master's Project: Procedure

1. Find a project, e.g., here at the Master's Project Market, on the IfI website for MSc https://www.ifi.uzh.ch/en/studies/msc-info.html, in OLAT http://t.uzh.ch/yi, or on the individual group pages.
2. Build groups (find peers here, in OLAT, …)
3. Meet with supervisor and submit the registration form.
4. Start.



University of Zurich[UZH]

Department of Informatics

Master's Project presentations (1 minute each, 15 seconds in-between).

http://t.uzh.ch/yi

The slides will be uploaded tonight.

Ready… set…

University of Zurich[UZH]

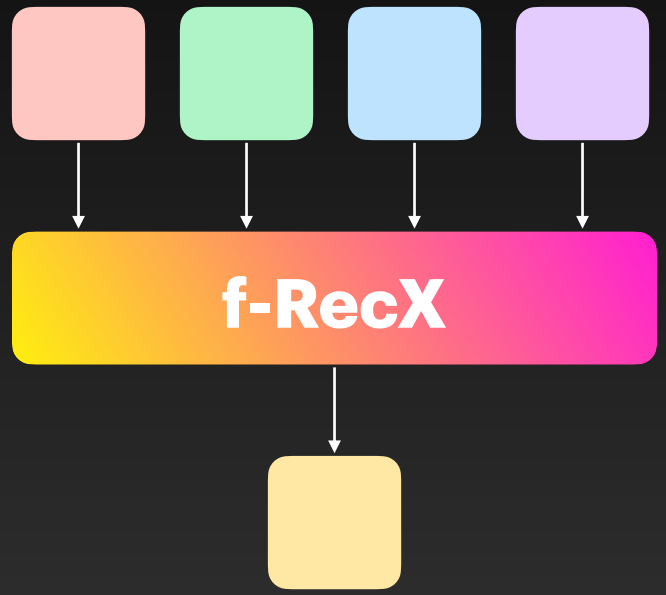
Department of Informatics

Ibrahim Al Hazwani:
f-RecX: A framework for the characterization and design of textual explanation

f-RecX

A framework for the characterization and design of textual explanation

- f-RecX is a **theoretical framework** developed by the IVDA Group.
- The framework **supports the designer in the early phases** of the development of **recommender system user interface** that have a textual explanation in it.
- Goal: **make this theoretical framework a web application** that a system designer can use to **quickly prototype a user interface for explainable recommendation**.
- Research area: XAI, UI/UX design, recommender system, and GenAI.



⚠️ a larger group (from to 4 to 6 people) is preferred

Contact info: Ibrahim Al Hazwani, alhazwani@ifi.uzh.ch

IVDA INTERACTIVE VISUAL DATA ANALYSIS

University of Zurich[UZH]

Department of Informatics

Ibrahim Al Hazwani:
Who put this song in the queue?
Explainable group recommendation using Spotify API

Who put this song in the queue?

Explainable group recommendation using Spotify API

- **Group recommender systems** are a class of recommendation system that recommends items to a group of users collectively, given their personal preferences.
- Goal: develop **interactive data visualizations** to explain how each individual's music choices are considered and factored into the recommendation of subsequent songs.
- Research area: XAI, UI/UX design, data visualization, recommender system, and data humanism.

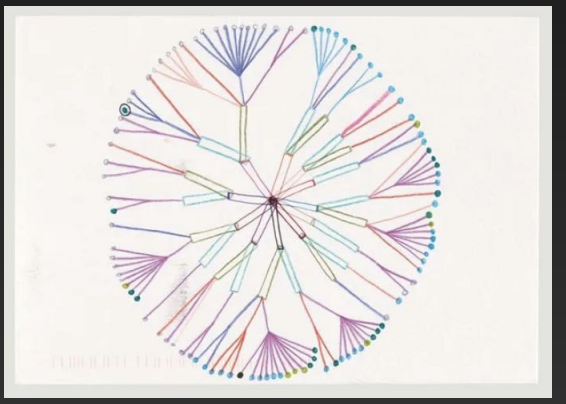


Image credit: Giorgia Lupi and Stefanie Posavec

Contact info: Ibrahim Al Hazwani, alhazwani@ifi.uzh.ch

IVDA INTERACTIVE VISUAL DATA ANALYSIS

University of Zurich[UZH]

Department of Informatics

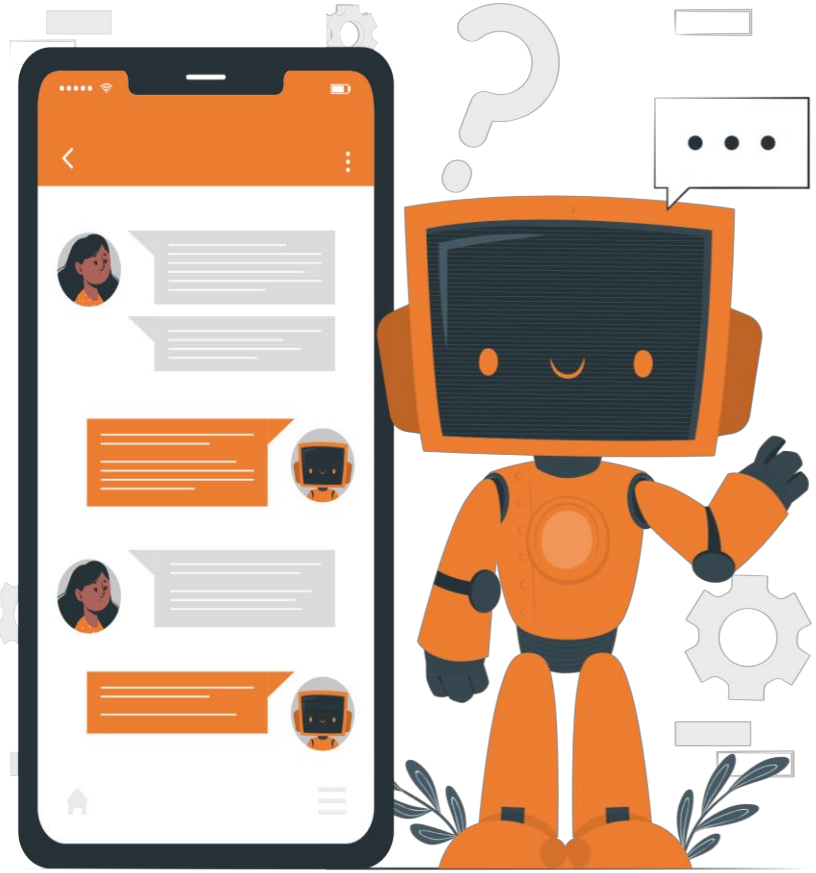
Clara-Maria Barth:
Chatbot vs. VIS: Communicating Blood Glucose to Individuals with Type 1 Diabetes (T1D)

Chatbot vs. VIS: Communicating Blood Glucose to Individuals with Type 1 Diabetes (T1D)

Problem Context: Current applications for T1D self-management communicate blood glucose values all similarly.

Goal: Understand whether individuals with T1D would prefer to interact with a Chatbot versus the common way of communicating blood glucose data.

Approach: 1) Build a Q&A engine on top of a LLM including blood glucose data, 2) develop two versions of the same app, one including the Chatbot, the other showing common blood glucose visualizations, and 3) set up a short user study to test users preferences



Contact: cbarth@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

Madhav Sachdeva:
Discovering relations through interactive visual analytics

Discovering relations through interactive visual analytics

A Data Science Journey

New opening!
November
2023 onwards

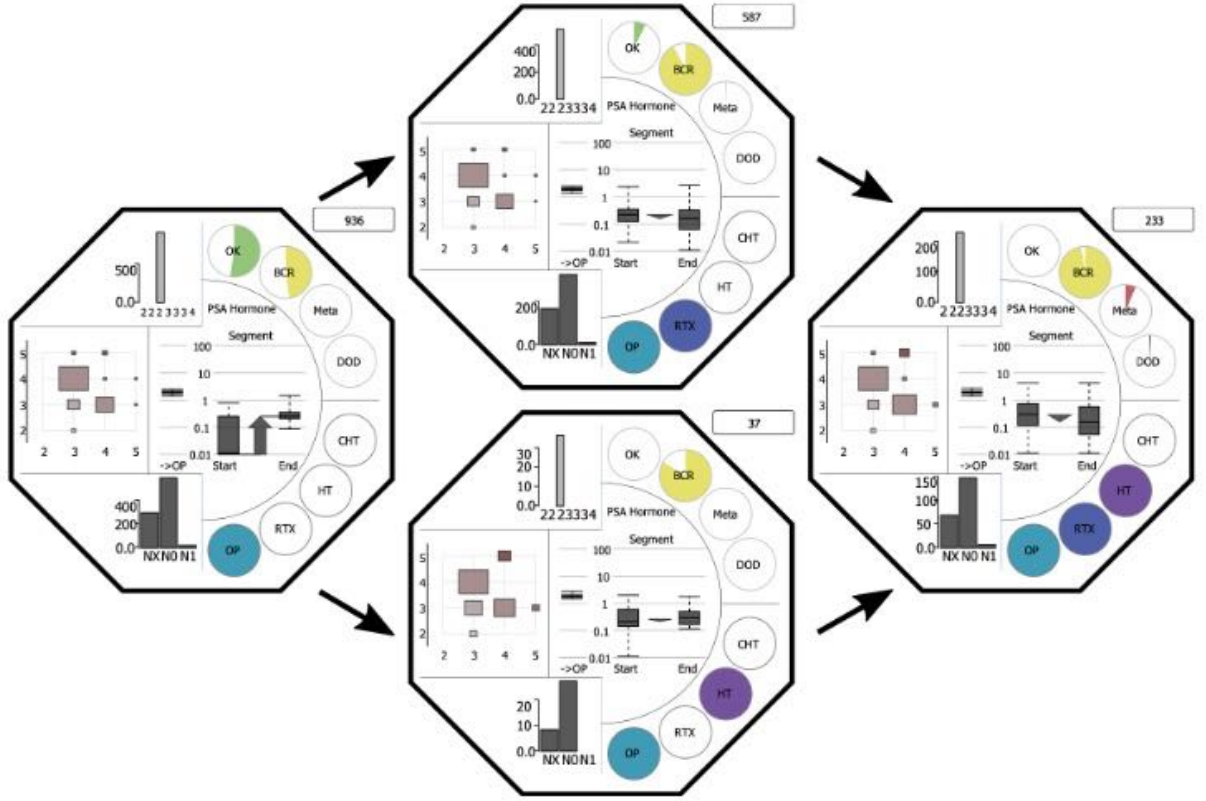
Master Project | Master's Thesis

Motivation: Relation-seeking is everywhere!

1. How can human and ML work together to find interesting relations?
2. How do relations change over time?
3. How can you explain relations in the data (XAI)?

Approach

1. Parse features from the given datasets
2. Develop a **visual interface** to support the **exploration** and human-centered **relation-discovery** of the datasets
3. Create a pipeline to add external data sources to the tool
4. Evaluate the tool with a user study



Source: Bernard, Jürgen. "Exploratory search in time-oriented primary data." (2015)

Apply at sachdeva@ifi.uzh.ch and bernard@ifi.uzh.ch

Universität Zürich[UZH]

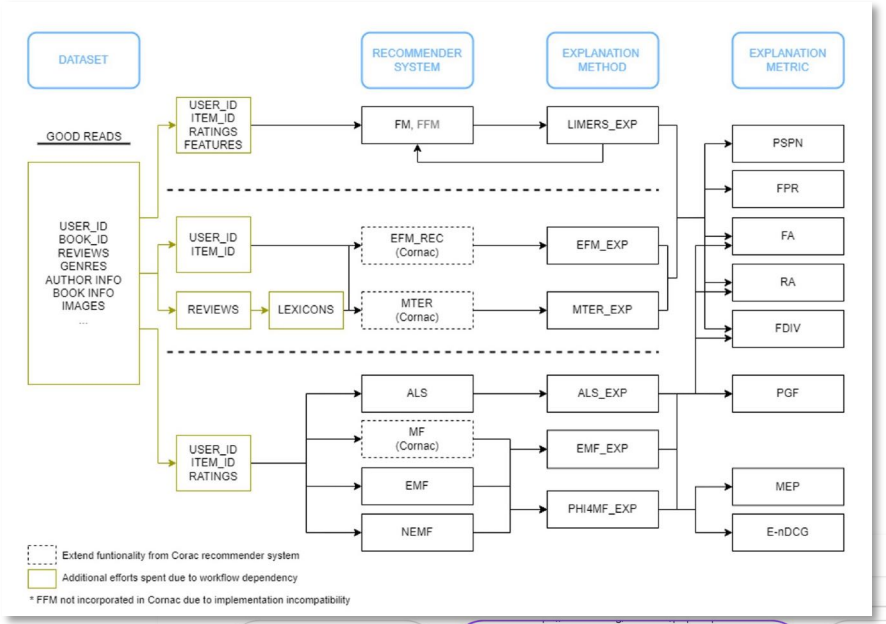
IVDA INTERACTIVE VISUAL DATA ANALYSIS GROUP

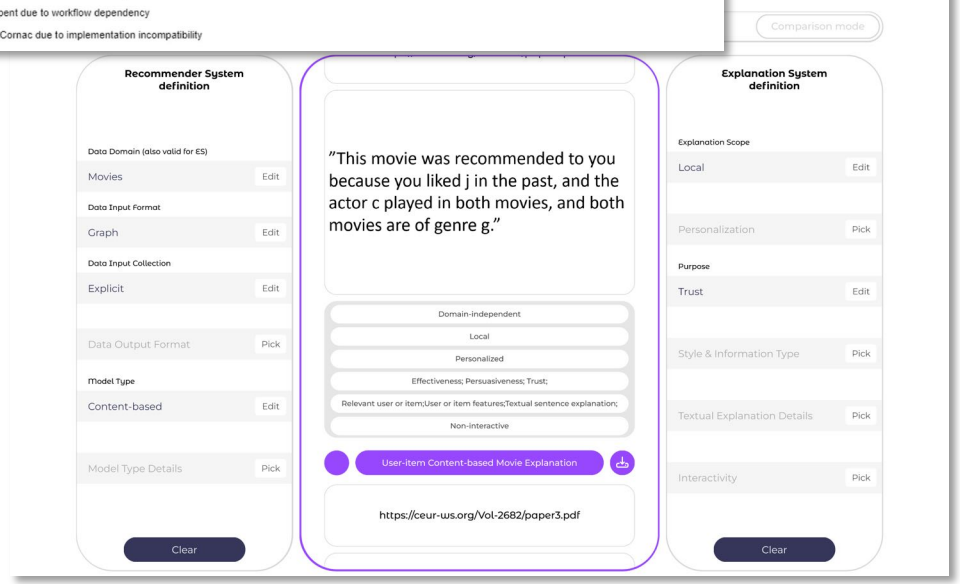
University of Zurich[UZH]

Department of Informatics

Kathrin Wardatzky:
Evaluation Framework for Explainable Recommender Systems

Evaluation Framework for Explainable Recommender Systems





Tasks:

1. Connect framework with UI
2. Extend and optimize framework
    1. datasets,
    2. explanation methods,
    3. evaluation metrics
3. Generate different explanations from explanation method output

Dynamic and Distributed Information Systems

Group size: 3 - 4 people

Requirements:

- Good programming skills (Python)
- Understanding of recommender systems and ML
- Interest in explainable AI

Preferred starting date:
Now-ish

Contact:
Kathrin Wardatzky
wardatzky@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

Andreas Bucher:
AI in the Meeting Room

AI in the meeting room

Exploring generative AI joining brainstorming sessions

Description of the overall research project

Together with the facilitation software provider Xleap, we want to examine how AI-based agents can be integrated into brainstorming activities of (large) groups and how the design of such agents affects the outcome of such activities. Therein, we are interested in understanding the role of such agents, how their interaction with humans unfolds, and how their contributions blend together with human contributions.

What will you do?

You will help us in developing the first prototype of such an agent. This will include: 1) definition of the target architecture, 2) design and development of a software prototype, and 3) evaluation of the prototype. You will have direct access to XLeap's CTO and the senior developer of the project.

When can you start?

As soon as possible

What skills should you have?

Programming skills (Java, Python, knowledge about APIs, …), NLP and ML, good communication skills

Contact:

Andreas Bucher (IMRG)
bucher@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

Oana Inel, Lucien Heiz:
Informfully – Diverse News Recommendations

Universität Zürich[UZH]

Department of Informatics – Dynamic and Distributed Information Systems Group

Informfully

Diverse News Recommendations

Goal: Framework for experimenting with diversity in news recommender systems.

1. *diversity-driven data analysis*
2. *multi-objective optimization for recommender systems*
3. *experimental testbed for diversity*

Scope: group of 3-5 students

start after Nov. 2023

DDIS Team: Oana Inel inel@ifi.uzh.ch

Lucien Heitz heitz@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

Roy Adrian Rutishauser: Seamless Navigation within Source Code Files

Seamless Navigation within Source Code Files

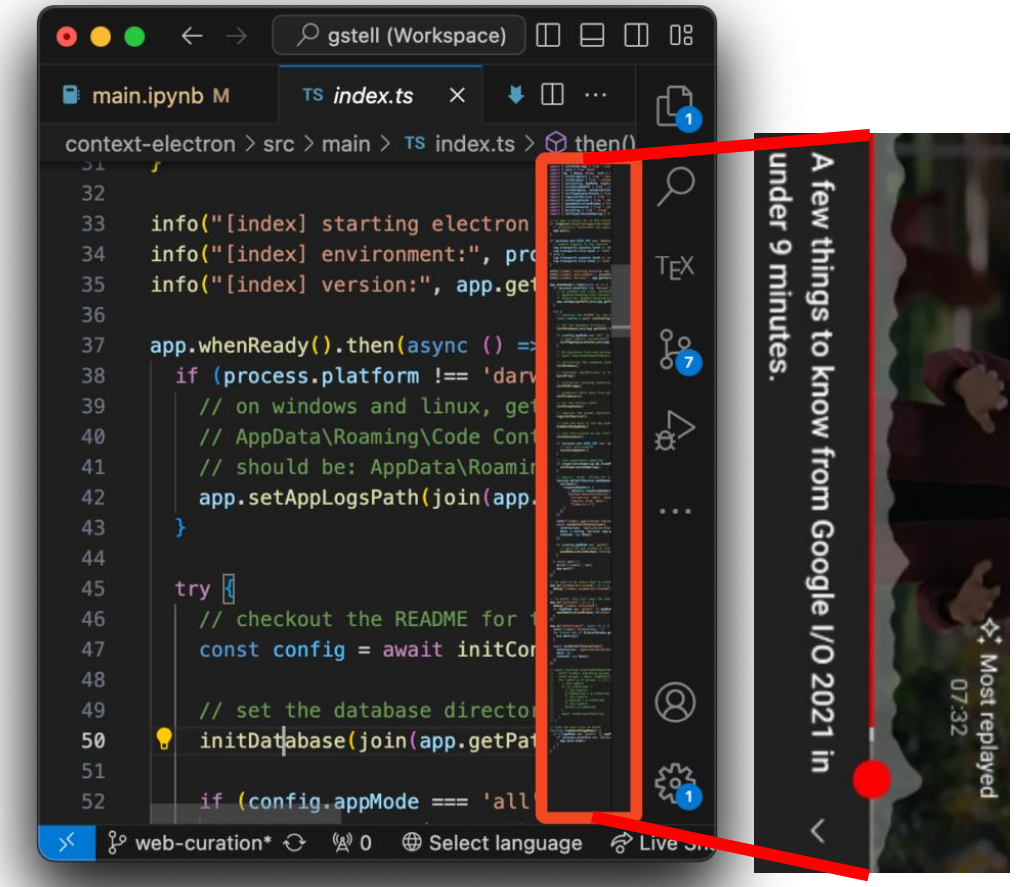
HASEL
Human Aspects of Software Engineering Lab

Motivation

- Developers often struggle to navigate within their source code files.
- Previous research investigated how to support navigation across source code files, but not within.

Goal

- Exploration of different visualizations to help software developers navigate more seamlessly within code files based on recency and frequency of their existing navigation.
- Development & evaluation of a VS Code Extension.



Potential visualization: integration of a "replay heatmap" in Visual Studio Code.

Contact: rutis@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

Anastasia Ruvimova: Your Best (Work)Day Ever

Your Best (Work)Day Ever

HASEL
Human Aspects of Software Engineering Lab

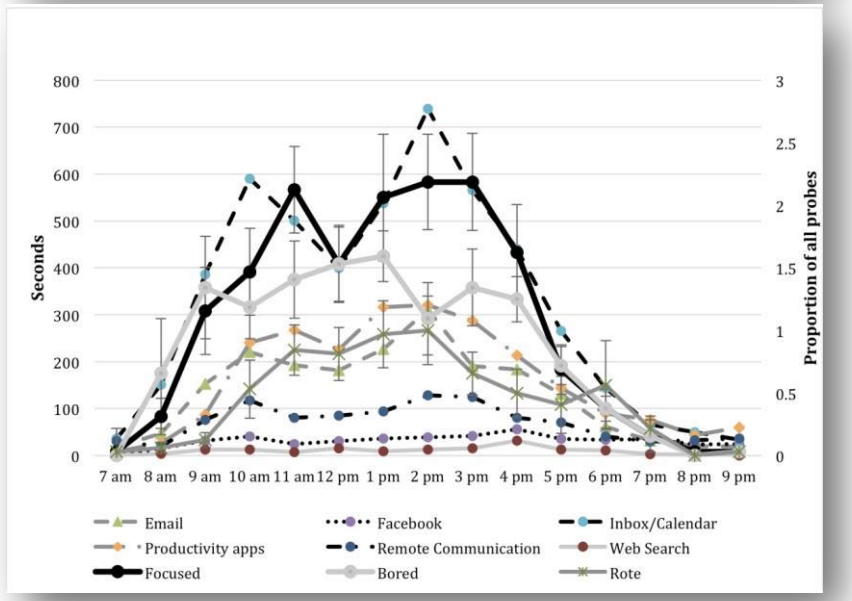
Motivation

- Can we leverage natural work rhythms (e.g. energetic in the morning and sleepy in the afternoons) to optimize how we plan our workday?

Goal

- Capture energy and focus, and model them in daily and hourly patterns
- Development & evaluation of a Rhythm-Aware Task Planner which tracks a worker's rhythms and suggests task planning based on their complexity

Contact Anastasia: ruvimova@ifi.uzh.ch



Mark et al. 2014

University of Zurich[UZH]

Department of Informatics

Isabelle Cuber:
TeamBreakScheduler
Finding the Right Time for a Break Without Breaking the Flow

TeamBreakScheduler

Finding the Right Time for a Break Without Breaking the Flow

In large offices where teams share a space, coordinating mutual break times can be a challenging task.

Motivation

- Provide a tool to communicate break wishes (timing and activity) without unnecessary interruptions
- Improve team spirit and team cohesion by having regular social breaks

Goals

- Conduct a literature review of existing work, approaches, and tools in the area of scheduling breaks, aligning breaks within a team, and similar
- Implement a tool that allows team members to communicate whenever they are ready for a break and suggests activities to them
- Conduct a field study
- Prepare a write-up of related literature, the approach, study, and results

Contact: lill@ifi.uzh.ch and cuber@ifi.uzh.ch
More information on https://hasel.dev/teachings/project-teambreakscheduler/

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Department of Informatics

Parminder Makode:
Understanding and Enhancing the Stellar Consensus Model

Understanding and Enhancing the Stellar Consensus Model

Description: This project seeks to delve deep into the scalability and capabilities of the current Stellar Consensus Protocol (SCP). A specialized model of SCP will be created to scrutinize its inherent properties and identify opportunities for enhancements to meet specific objectives. Areas of concentration include:

+ Incorporating consensus techniques such as balloting, nomination, and federated voting into the model.

+ Analysing the network's response during congestion periods and identifying potential mitigation strategies

+ Assessing the influence of transaction order on quorum slices.

Requirement:

Python programming, basics of blockchain consensus mechanisms.

Contact (BDLT Group):

Prof. Claudio J. Tessone, claudio@ifi.uzh.ch

Matija Piskorec, piskorec@ifi.uzh.ch

Parminder Kaur Makode, makode@ifi.uzh.ch

Mazieres, D. (2015). The stellar consensus protocol: A federated model for internet-level consensus. Stellar Development Foundation, 32, 1-45.
https://www.blockchain.uzh.ch/

Stellar

University of Zurich[UZH]

Department of Informatics

Nimra Ahmed:
Drug Information Center Zurich: Safer Rave

Drug Information Center Zurich: Safer Rave

Motivation: The Drug Information Center (DIZ Zurich) offers regular drug checkings on site as well as mobile at parties and festivals. A previous study revealed the need for a better digital support and help-seeking of their services.

Goal: Based on expert interviews with the DIZ, past research & designs, and interviews with the user population, come up with an app to to extend and digitalize the DIZ's services.

- 20% Research
- 30% Design
- 50% Development

Nimra Ahmed, Fast Track PhD,
People and Computing Lab

nimra@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

Nimra Ahmed:
Case Management System: Forced Marriages

Case Management System: Forced Marriages

Motivation: The Federal Department against Forced Marriages (Statesecretariat Human Rights & Migration) is an NGO that has been assisting individuals affected by forced marriages since 2001. They have been managing cases manually due to the absence of a suitable case management system.

Goal: The goal is to develop a case management system based on expert interviews with the NGO. This system should help the case managers improve their consultation services, improve their communication within the NGO, and provide statistical insights.

- 20% Research
- 20% Design
- 60% Development

Nimra Ahmed, Fast Track PhD,
People and Computing Lab

nimra@ifi.uzh.ch

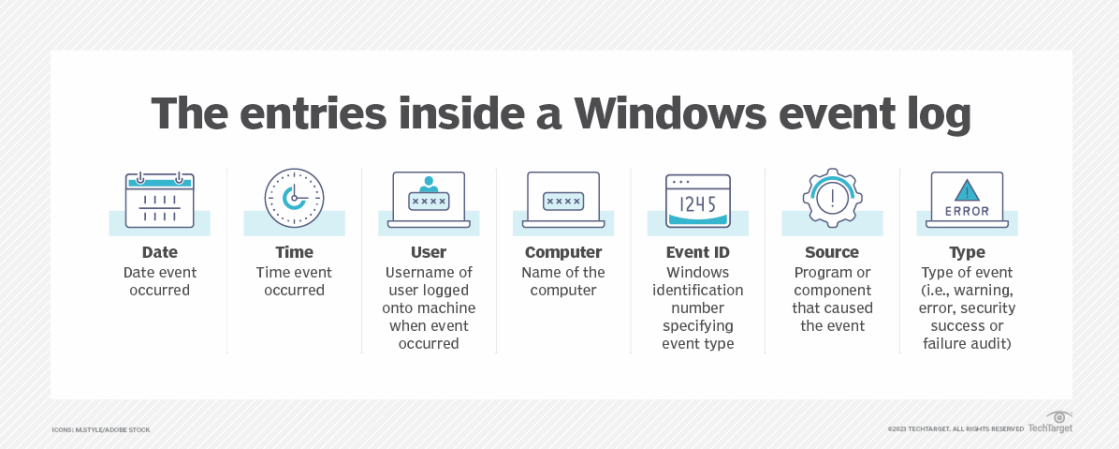
University of Zurich[UZH]

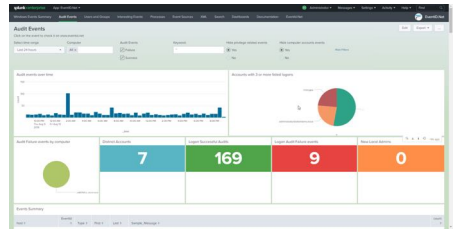
Department of Informatics

Thomas Grübl:
Anomaly Detection with Windows Event Logs

Anomaly Detection with Windows Event Logs (Master Project)

- Windows Event Logs (WEL) contain a range of information about application-, security- and system-specific activities
- For instance, information about login/logout activity, policy changes, privilege use, etc.
- Performing time-series analysis and event aggregation on the WEL, can be leveraged to spot anomalies in a system





Objectives

1. **A comprehensive analysis of the windows event log environment, which includes determining what types of attacks can/cannot be detected from the information available in the WEL. Further, prioritize attacks based on their risk and prevalence.**
2. **Implementation of a suite of analytics (potentially in Splunk) that can accurately detect selected anomalies/threats. May involve performing attacks on your own to generate sample logs or downloading existing WEL datasets that simulate attack scenarios.**
3. **[Optional] Monitoring Dashboard: Creation of a dashboard which summarizes the results of the analytics suite in a user-friendly manner (potentially a Splunk dashboard).**

Prior experience with pen-testing, attack analysis, and Splunk is a plus.

Contact: Thomas Grübl, gruebl@ifi.uzh.ch

University of Zurich[UZH]

Department of Informatics

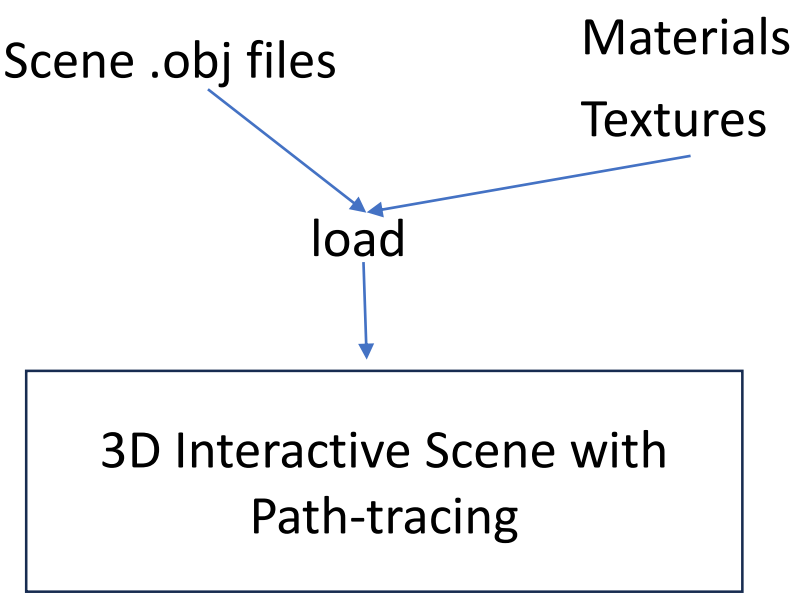
Liburn Gjonbalaj:
Implementation of an interactive path-tracing algorithm

Implementation of an interactive path-tracing algorithm

Programming Languages and Libraries:

- C++
- OpenGl
- Cuda (OptiX and Embree)

- Task:



- Supervisor: Luciano A. Romero Calla, romero@ifi.uzh.ch;

VMML Group

- Participants: Liburn Gjonbalaj, liburn.gjonbalaj@uzh.ch;

- Start date: February, 2024
- Projected end date: June, 2024

University of Zurich[UZH]

Department of Informatics

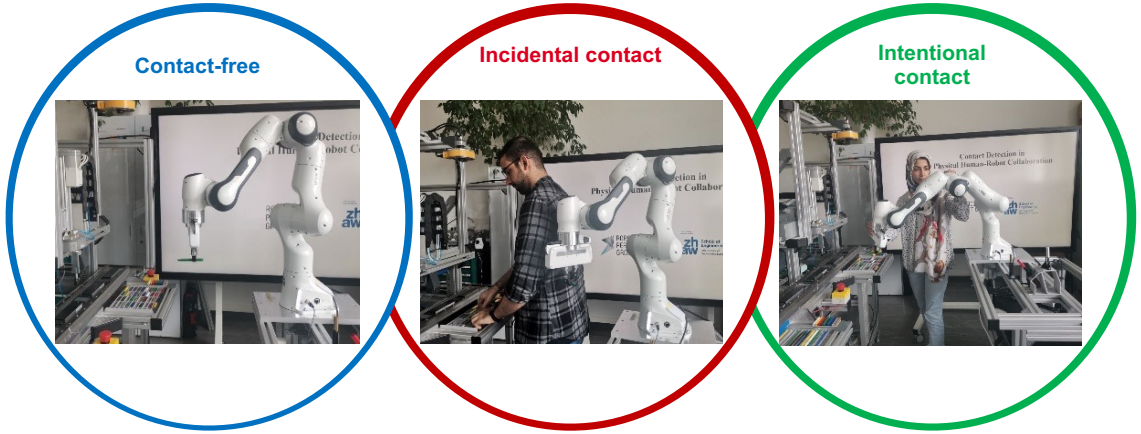
Maryam Rezayati:
Developing AI-Based Tactile Gestures for Human-Robot Communication in Industrial Assembly Tasks

Developing AI-Based Tactile Gestures for Human-Robot Communication in Industrial Assembly Tasks

Institute of Mechatronics systems (IMS)
Zurich university of Applied Science (ZHAW)

Objective:

The primary goal is to design and implement AI-based tactile gestures that enable nonverbal communication between a human operator and a collaborative robot during the assembly of a pneumatic valve. The focus is on enhancing the efficiency and safety of industrial tasks.

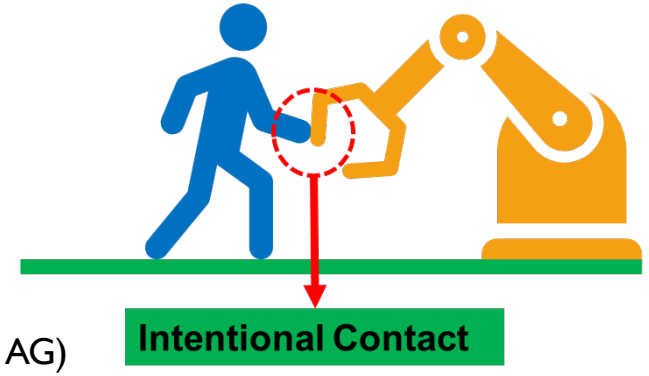


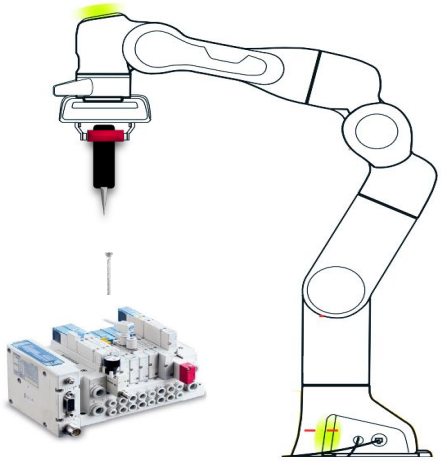
Project Steps:

- Literature review
- Scenario specification
- Hardware and software setup
- Data collection
- Training and testing
- Integration and validation
- Documentation and report

What you experience:

- Getting familiar with human-robot collaboration field of research
- Robot programming (ROS, Frankapy)
- Training AI models (Tensorflow or pytorch)
- Deploying and integrate AI models into a real-world application (SMC AG)





Maryam Rezayati, PhD Candidate, maryam.rezayati@uzh.ch, rzma@zhaw.ch

University of Zurich[UZH]

Department of Informatics

Maryam Rezayati:
Sim-to-real Transfer: Human-Robot Contact Detection

Sim-to-real Transfer: Human-Robot Contact Detection

Institute of Mechatronics systems (IMS)
Zurich university of Applied Science (ZHAW)

Objective:

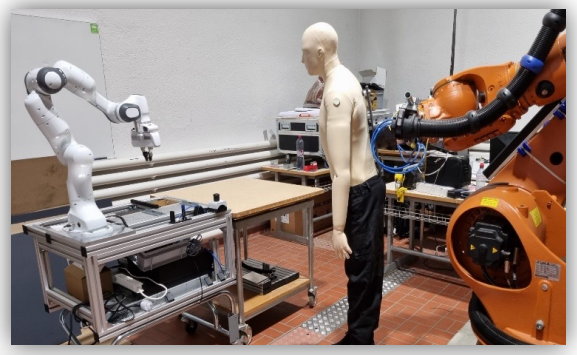
The primary goal is to investigate and develop techniques for transferring contact detection capabilities from simulation (sim) to real-world (real) environments. The focus is on improving the ability of robots to recognize and respond to **physical contact** with humans or objects in real-world settings based on training in simulated environments.

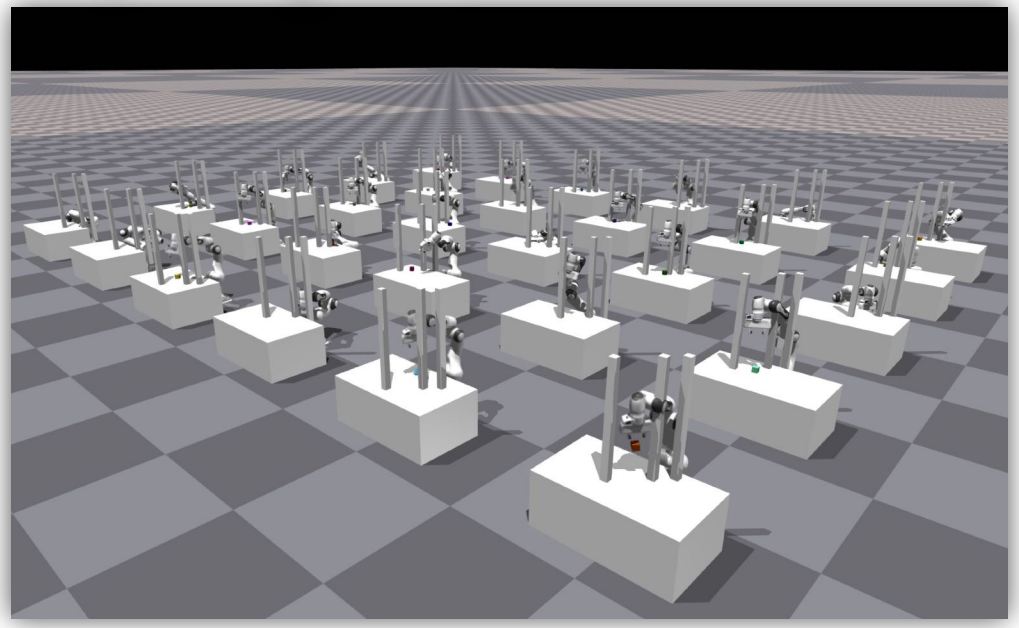
Project Steps

- Literature Review
- Simulated environmental setup
- Data generation in simulation
- Sim-to-real transfer techniques
- Training and testing
- Integration and validation
- Documentation and report

What you experience:

- Getting familiar with human-robot collaboration field of research
- Robot (simulation) programming (Isaac gym, Isaac sim, ROS, Frankapy)
- Training AI models (Tensorflow or pytorch)
- Deploying and integrate AI models into a real-world application (SMC AG)





Maryam Rezayati, PhD Candidate, maryam.rezayati@uzh.ch, rzma@zhaw.ch

University of Zurich[UZH]

Department of Informatics

End of Master's Project presentations

Interested in a project? Talk to representatives and form groups!

http://t.uzh.ch/yi

The slides will be uploaded tonight.

Good luck with your Master's Project!