



Master's Project Market · Spring 2025

Nathan Labhart, Academic Coordinator

Projects and presentations by:

Ibrahim Al Hazwani, Jana Sedlakova, Julian Croci, Krzystof Gogol, Ksenia Beloturkina,
Madeleine Soukup, Manuel Günther, Marcia Nissen, Maria-Flavia Taras, Mariia Lapaeva,
Mark Christopher Ballandies, Martin Lacayo, Nimra Ahmed, Yu Gao.



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.

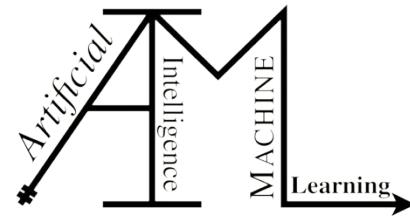
The screenshot shows a web-based discussion forum titled "Informatics Master's Project (15 ECTS)". The top navigation bar includes links for "Kurse", "Gruppen", "Autorenbereich", "Fragenpool", and "Informatics Ma...". A "VERÖFFENTLICHT" button is visible. The main content area displays a list of discussion topics:

Typ	Diskussionsthemen	Autor	Letzte Änderung	Markiert	Neu	Beiträge
QUESTION	Looking for teammate: benchmarking machine learning models on gene data	Yi, Ming	03.03.2023, 13:40	0	1	1
QUESTION	Hello, We're looking for a teammate for a employee training system	Staub, Leoni Fabiola	23.02.2023, 10:10	0	1	1
QUESTION	Looking for teammates/Social computing group	Beloturkina, Ksenia	23.01.2023, 14:58	0	1	1
QUESTION	Looking for a teammate / Project: medical image processing in USZ (six months, middle January 2023)	Yi, Ming	24.12.2022, 03:29	0	1	1
QUESTION	Looking for a teammate - "Self-Supervised Gate Detection for Drone Racing" (Feb 2023)	Pétursson, Agnar	07.12.2022, 13:42	0	1	1
QUESTION	Agent-Based Model/Smallholder Farmers in Tanzania - one more teammate needed	Kübler, Ann-Kathrin Hedwig Sabina	05.12.2022, 14:19	0	1	1
QUESTION	Looking for colleges who are also interested in explainable AI for news recommenders	Zhang, Yiqin	04.12.2022, 09:39	0	3	3
QUESTION	Looking for teammates of master project(Federated Learning)	Shang, Qiyue	25.11.2022, 10:27	0	1	1
QUESTION	Looking for a teammate (Master's Project with SIPLAB, ETH) [Closed]	Liu, He	27.10.2022, 21:56	0	1	1
QUESTION	Looking for teammates for Master project of Gabor wavelets	Bao, Siqi	03.10.2022, 15:01	0	2	2



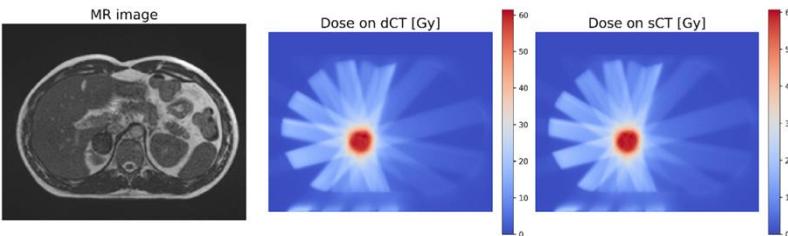
Department of Informatics

DL-based anomaly detection for MR-only radiotherapy by synthetic CT generation

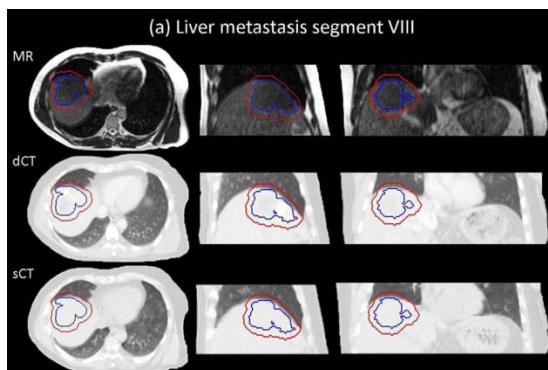


Background

- Cancer treatment at USZ

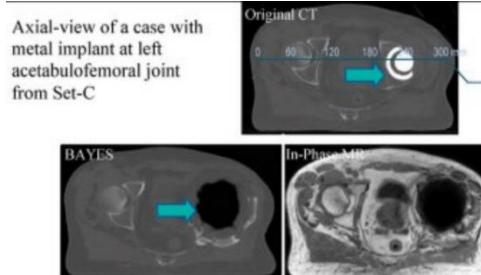


- MR to sCT image translation via CycleGAN

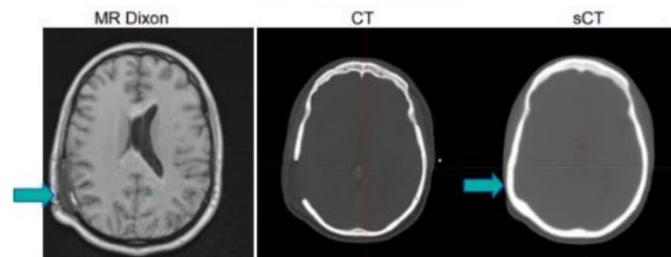


Examples of Failure

Metal Implants



Bone Operation



Approaches

- Out-of-Distribution Detection
 - via Cycle-GAN
 - Using other anomaly detection methods
- Detect and classify OOD categories
 - Implants, artifacts, rare anatomical structures

Learn more:



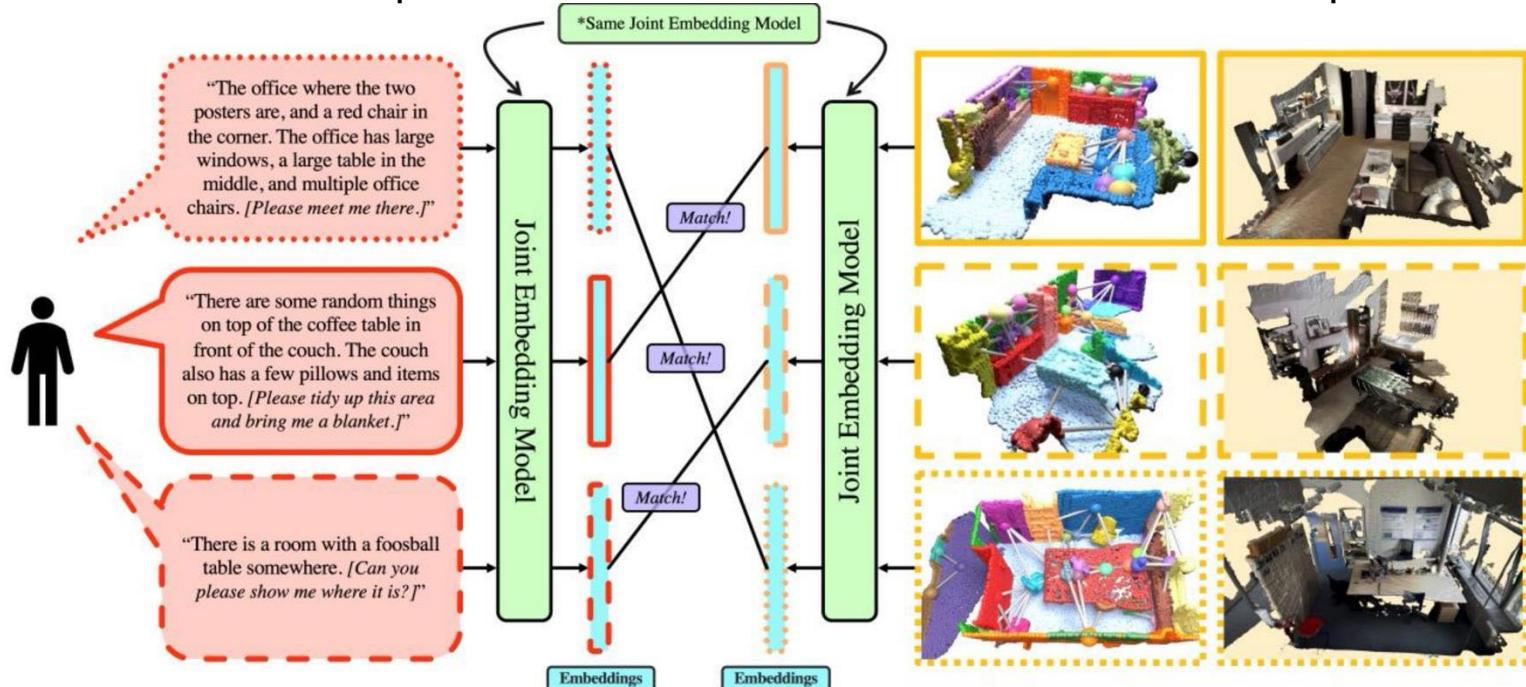


Department of Informatics

Localization in a 3D Scene Graph via Language Queries



Scene Description



Goals

- Localization in 3D environment with 6 DoF
- Interpreting textual description of arrangements of objects

Possible Tasks

- Literature review
- Comparison of Scene Graph with 3D Meshes and Floorplans
- Text to 3D Scene mapping via CLIP
- 6 DoF pose estimation
- Training data capturing strategies
 - Open-Source data?
- Evaluation metric design
 - User study?

Previous Code



Contacts:

Manuel Günther
guenther@ifi.uzh.ch
Daniel Béla Barath
danielbela.barath@inf.ethz.ch

AI Agents in Blockchain Gaming

Design, deploy, and train AI agents that play blockchain games (or trade crypto)

- | | |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| - Understand game logic and crypto incentives in blockchain-based games | Play-to-Earn / GameFi in games on Ethereum Rollups (Base, Optimism, Arbitrum, Starknet) |
| - Model agent behavior in games or DeFi | Reinforcement Learning (RL) frameworks |
| - Build and curate a training dataset from on-chain activity | Ready-to-use AI libraries for blockchain interaction |

Sandbox / Virtual World



Massive Multiplayer Online Game



Trading Card Game



Role Playing Game



Multiplayer Online Battle Arena



Miscellaneous



Racing



Sports



Reach out for more info to gogol@ifi.uzh.ch

Security and Scalability of Smart Contracts in Decentralized Finance

Setup:

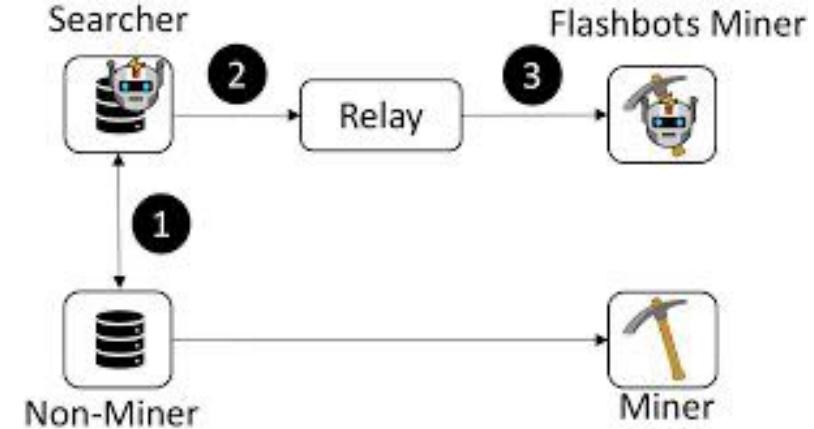
- Decentralized Exchange : Uniswap (v4)
- Ethereum Rollups (e.g. BASE, Unichain)

Focus:

- **MEV attack vectors**
 - transaction reordering, front-running

Prototype:

- **Extend smart contracts** with hooks to defend against MEV attacks



AI in Weather and Tokenomics



Background:

- Weather Forecasting is a billion dollar market¹, currently disrupted by AI²
- Decentralized physical infrastructure networks (DePIN) have enabled the collection of large volumes of sensor data through token incentives³

Challenge:

- Big data has no value, only high-quality data has³
- Large quantities of weather data of unknown quality are collected
- Unclear how to value the contributed data

Idea:

- Identify how much a piece of data contributed to a model forecast via AI explainability/ transparency methods⁴, and incentivize accordingly

You will:

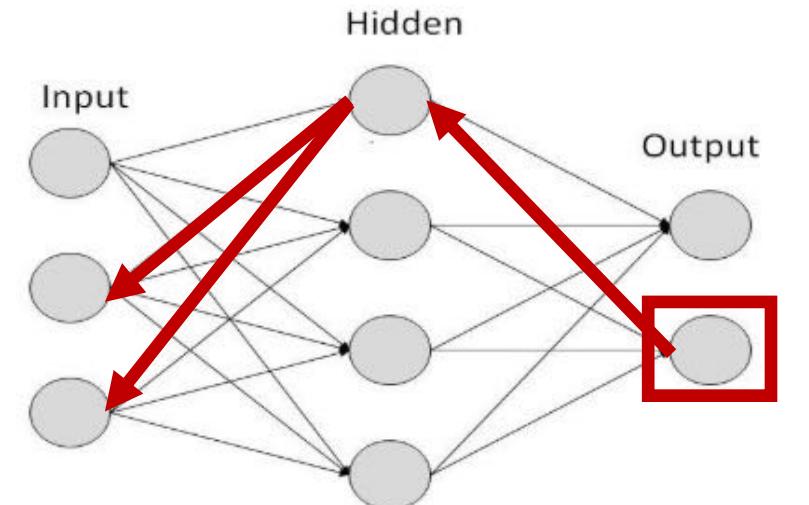
- Deploy state of the art AI weather models from Google & co.
- Apply and improve AI explainability methods to quantify data value by identifying its contributions to model forecast
- Engineer a high-performance pipeline on the Science Cluster utilizing multiple GPUs (A100s)

1: The \$17 billion industry improving weather forecasting. CNBC: <https://www.youtube.com/watch?v=Q5rgua9e0uY>

2: Zhang, Y., et al., J., 2023. Skilful nowcasting of extreme precipitation with NowcastNet. Nature, 619(7970)

3: Chiu, M.T. et al., U.V., 2024. DePIN: A Framework for Token-Incentivized Participatory Sensing.

4: Lundstrom, DD et al., 2022, June. A rigorous study of integrated gradients method and extensions to internal neuron attributions. In International Conference on Machine Learning (pp. 14485-14508). PMLR.

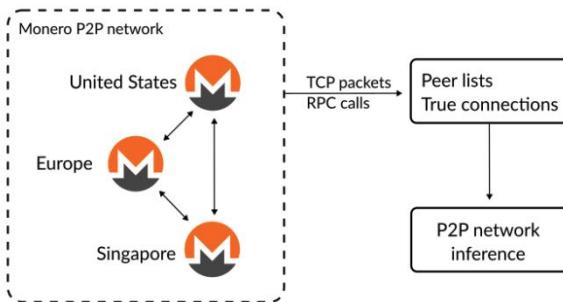


Explainability method, e.g. integrated gradient⁴

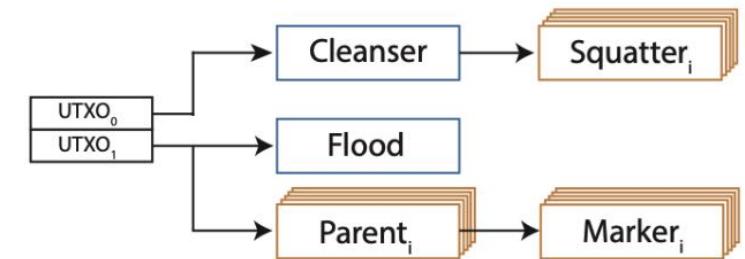
DLT P2P network detection

P2P network in DLT:

- Topology unknown
- Neighbour inference
- Passive & Active methods



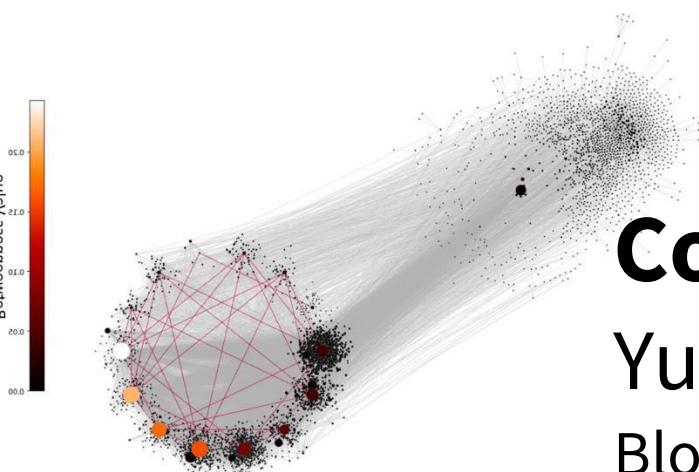
(a) P2P data collection passive method



(b) P2P data collection active method

Requests:

- Blockchain basic knowledge
- Engineering skills:
 - Programming
 - Tx injection, TCP traffic monitoring



Contact
Yu Gao
Blockchain & DLT Group,
yugao@ifi.uzh.ch



Universität
Zürich^{UZH}

UZH
Blockchain
Center

Blockchain & DLT
Research Group

Enhancing the CyMe App – Menstrual Health & Sports Performance

⚠️ **The Problem:**
Menstruation impacts sports performance, but research & data are lacking!



💡 **Our Solution:**
Integrating menstrual & sports tracking into the CyMe App to empower users & advance research!

🔥 Key Features:

- ✓ Track menstrual cycles & workouts in the iOS App CyMe
- ✓ Get personalized, evidence-based training recommendations
- ✓ Contribute anonymized data to research in Digital Female Health

📊 Why It Matters?

- gMaps Only 6% of sports research focuses on women¹
- ⚡ Over 76% of menstruating athletes report negative impact on performance²

🚀 Who We Need?

We're looking for 1-2 tech-focused team members (Swift) to help bring this to life!
Contact: maria-flavia.taras@uzh.ch, madeleine.soukup@uzh.ch

¹ Cowley et al. (2021). "Invisible sportswomen": the sex data gap in sport and exercise science research.

² Jones et al. (2024). Menstrual cycles and the impact upon performance in elite British track and field athletes: a longitudinal study.



Implement an Analysis Guide for Longevity Research

Send your CV and motivational letter to Dr. Jana Sedlakova: sedlakova@ifi.uzh.ch

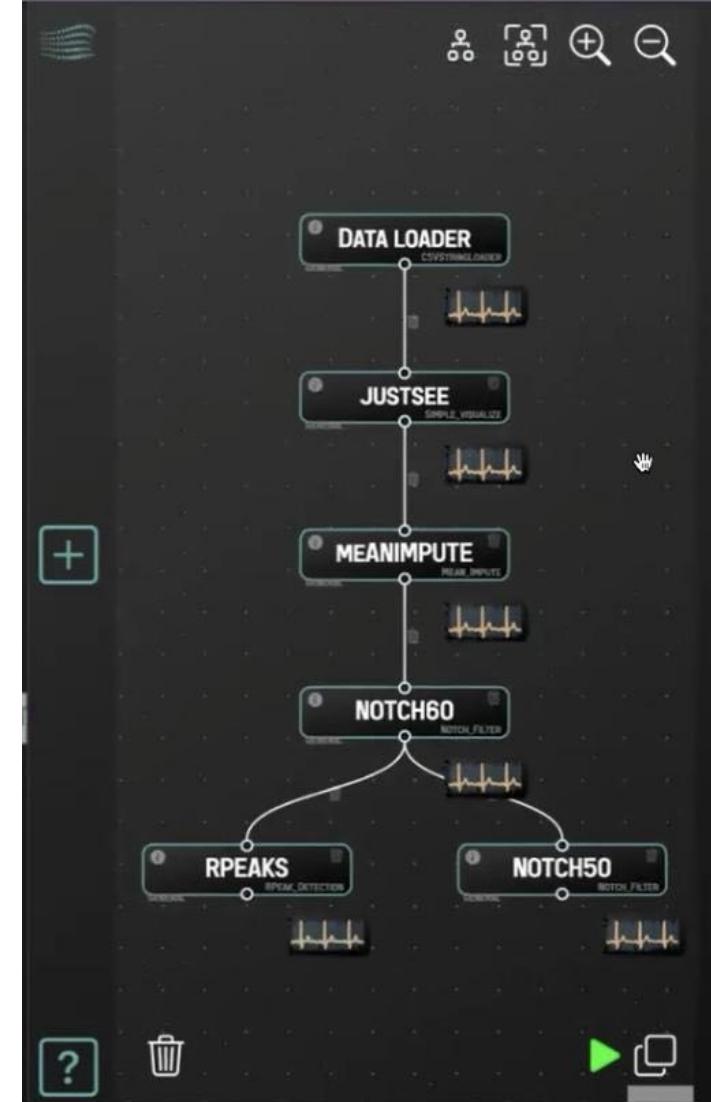


Build an interactive visual analytics pipeline

Guide longevity researchers in the pre-processing, interpretation, and reporting of their data analysis

We're looking for:

- Experience developing interactive visualizations
- Skills in full-stack web development (across the team)
 - Front-end development (React, ReactFlow, FastAPI), data science workflows (Python), relational data management (SQL)
- Background in machine learning, data processing, sensor or timeseries data analysis
- Interest in healthcare and healthy aging



SCROLLYPOI 2.0

to the paper about
scrollyPOI 1.0 and
interest form



ScrollyPOI is an **interactive explainable recommender system** that enables users to discover new points of interest (POIs) in Zürich based on their previous experiences. The system aims to provide personalized recommendations while offering transparent explanations for its suggestions.

GOALS

- Enhance the **narrative** approach used to **overcome the cold-start problem**.
- Design and develop new **data humanism visualizations** for input and output **explanations**.
- Update the **recommendation algorithm** to incorporate BERT or a larger natural language model.
- Expand the system to connect previously seen POIs in one city to **new recommendations in a different city** (e.g., using experiences from Zürich to make recommendations for Lisbon).
- Integrate new **explainability goals** like scrutability.

SKILLS: next.js, d3.js (or p5.js), python, html, css

EXTRA: preference for a group of 3 people.

REACH OUT TO: alhazwani@ifi.uzh.ch

Distributed Architecture for Visual Analytics

Problem:

- **Scalability** as user and data pool grows
- **Sustainability** of infrastructure

Tasks:

- **Compare** different architectures
- **Identify requirements** for visual analytics
- **Design and develop** a hybrid architecture
- **Validate** the architecture in a user study

Martin Lacayo

Interactive Visual Data Analysis Group

mlacayo@ifi.uzh.ch

Which architectures scale?
How sustainable is the architecture?

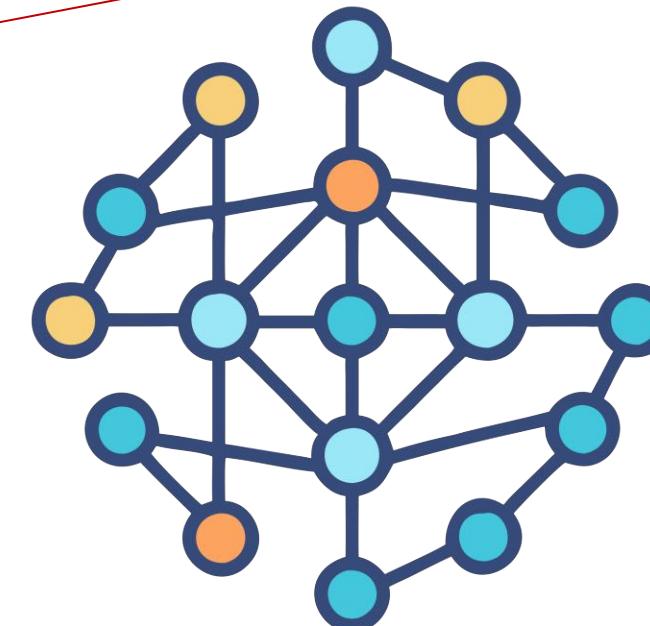


Figure source: Vecteezy.com

Social Network for Collaborative Open Science

Problem:

- **Complexity** varies across domain
- **Messages** contain implicit and explicit feedback
- **Transparency** essential

Tasks:

- **Compare** existing protocols
- **Identify requirements** for open science
- **Design and develop** a social network
- **Validate** the social network in a user study

Martin Lacayo & Michael Blum

Interactive Visual Data Analysis Group

mlacayo@ifi.uzh.ch

Which protocols can support open science?
How can the communication be summarized?

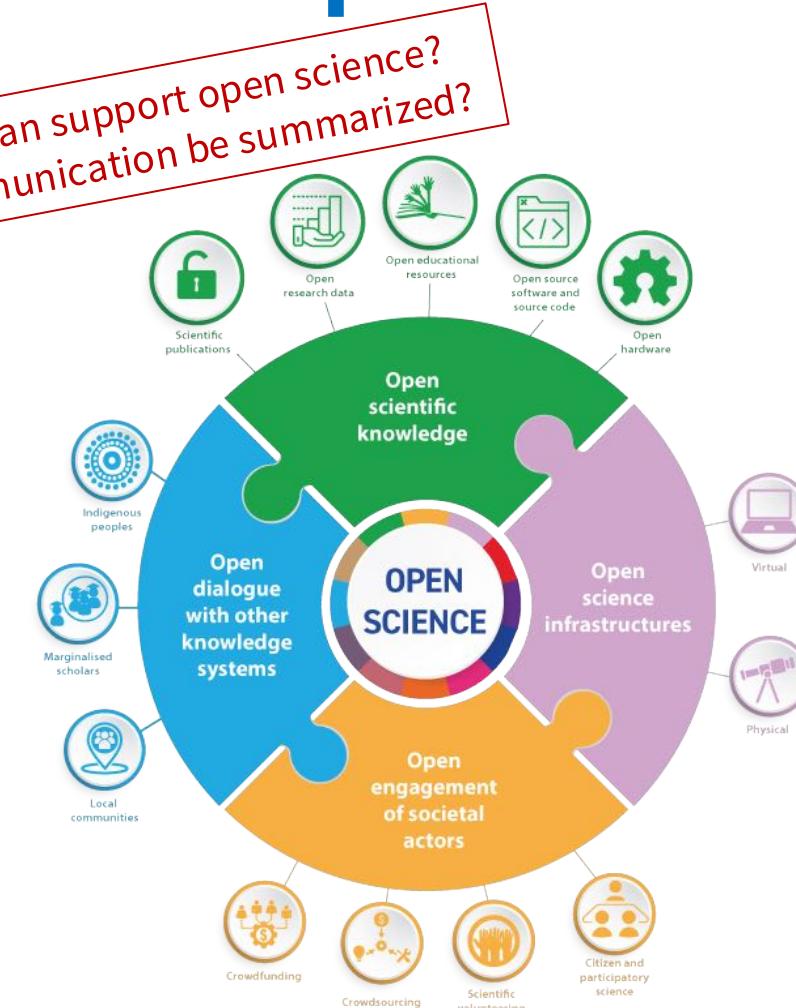


Figure source: Wikipedia.org

Rich Metadata with Generative AI and LLM

Problem:

- **Abstraction** inherently domain specific
- **Application** of novel characteristics non-trivial

Tasks:

- **Assess** the capabilities of generative AI
- **Identify requirements** for metadata
- **Design and develop** a tool
- **Validate** the tool in a user study

Martin Lacayo & Gregor Bachmann

Interactive Visual Data Analysis Group

mlacayo@ifi.uzh.ch

What metadata can generative AI derive?
How can novel metadata be applied?

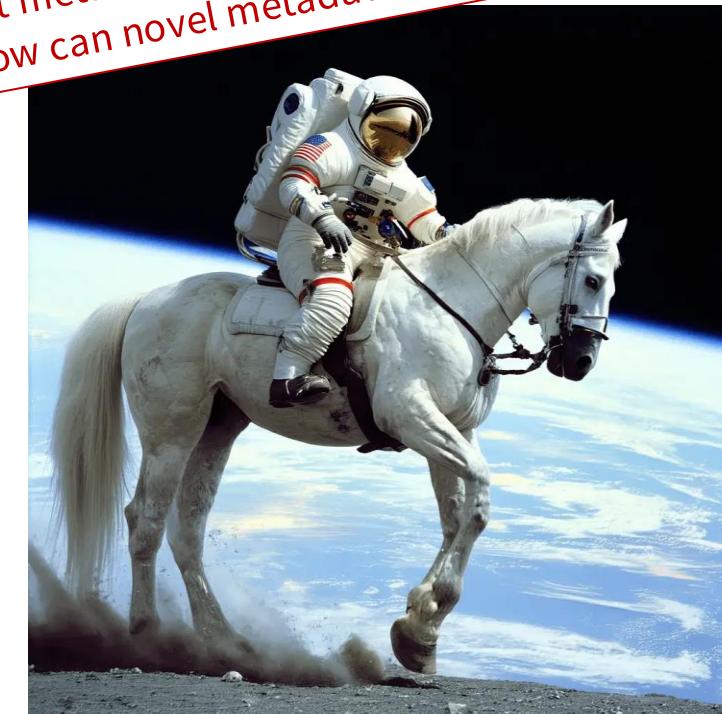
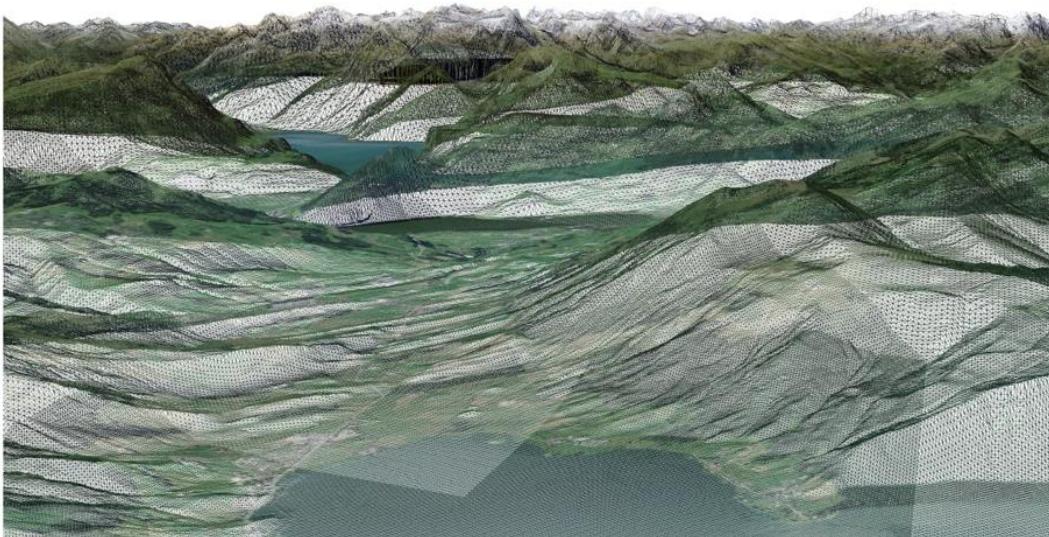


Figure source: Wikipedia.org

Terrender 2.0: Web Assembly and WebGPU



Terrender (terrender.ifi.uzh.ch)

Apply cutting edge **web technologies** to **cutting edge** Terrain rendering!

- Work with web assembly (**Wasm**) and **WebGPU**
- Sharpen your **programming** and **software engineering** skills
- Benchmark and profile **real-time graphics** applications
- Improve algorithms to create smooth **high quality** renderings
- Help displaying the world as beautiful as it is



TrailView (current project with Terrender)

PREGNANCY INFORMATION NEEDS AND HEALTH MONITORING PRACTICES

Motivation: Integrating sensing technologies into prenatal care has the potential for early detection of risks during pregnancy. To improve these technologies and their adoption, we need to understand the needs and concerns of all stakeholders, including midwives.

You will explore:

- information needs of expectant parents
- health monitoring procedures
- perception and use of sensing technologies during pregnancy from the midwives' point of view

Start after May 15

Goals

Qualitative study:
interviews with midwives

Requirements

- HCI course
- Have experience in conducting interviews



ZPAC
People and Computing Zurich

BELOTURKINA@IFI.UZH.CH

Co-Designing an Interactive Exhibition of LGBTQ+ Digital Experiences

We are co-designing an interactive exhibition that shares LGBTQ+ digital experiences through storytelling and awareness. In collaboration with queer individuals and activists, the project explores how digital technologies shape identity, visibility, and safety—both empowering and harming. The exhibition invites the public to engage with the complexities of LGBTQ+ life online and offline.

🛠 What You'll Learn & Do

This project blends design justice, storytelling, and activism.

Methods & Approaches you'll use:

- *Interviews & Focus Groups with LGBTQ+ individuals*
- *Participatory & Activist Design Methods*
- *Storytelling & Narrative Design*
- *UX/UI Design and Prototyping*
- *Interactive Data Visualization*
- *Game Design (e.g., role-play mechanics or mini games)*
- *AI-based Interaction (e.g., chatbots)*
- *Evaluation Techniques (e.g., pre/post surveys, reflection walls, mixed-method analysis)*
- *and more (depending on what you decide! :)).*

Nimra Ahmed
People and Computing Lab
nimra@ifi.uzh.ch

Prof Dr Elaine Huang
People and Computing Lab
huang@ifi.uzh.ch

⌚ This project is ideal if you're:

- Passionate about social justice, design justice, or digital activism
- Looking to build a creative and socially impactful portfolio
- Wanting hands-on experience in UX/UI design, research, prototyping, and digital storytelling





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!

For administrative questions: studies@ifi.uzh.ch