Master Project Market · HS 2018

Nathan Labhart
Academic Coordinator
Master’s Project: Rules

• The Master’s Project is a **group project**: at least 2 members needed.
  → Chance of denial for individual projects: 99%

• The Master’s Project can only be started **after** all members have successfully completed their Master’s Basic Module (only for Major).
  → Best time: During semester break; max. 1 year to complete.

• The Master’s Project must be done **with an IfI professor**.

• The Master’s Project yields 18 ECTS Credits.
  → Submit a **final report** that concludes your work.
Master’s Project: Procedure

1. Find a project (e.g., here at the Master Project Market, on IfI group pages http://www.ifi.uzh.ch/en/department/open-positions.html, in OLAT http://t.uzh.ch/yi, …)

2. Build groups (find peers here, in OLAT, …)

3. Meet with supervisor and submit the application form.

4. Start.
Master’s Projects
STREAM PROCESSING: THE MATRIX REVOLUTION CONTINUES

Contact: dellaglio@ifi.uzh.ch, pernischova@ifi.uzh.ch
PRIVACY VIOLATION

“CAMBRIDGE ANALYTICA IS JUST THE TIP OF THE ICEBERG”: WHY THE PRIVACY CRISIS IS BIGGER THAN FACEBOOK

The Guardian
Facebook can track your browsing even after you've logged out, judge says

Fortune
Facebook Engineer Accused of Stalking Women Online Using Company Data

HackRead
Google collects Android location data even if location service is off

The Wall Street Journal
Cybersecurity Startup Tanium Exposed California Hospital’s Network in Demos Without Permission

The Guardian
Roomba maker may share maps of users’ homes with Google, Amazon or Apple

New York Post
Why millennials will learn nothing from Facebook’s privacy crisis
Can we explain to people without a technical background:
• the importance of privacy?
• what a privacy violation is?
• how Differential Privacy works?

The project will be presented at Scientifica (September 2019)
• Week-end to show Zurich citizens what we do

We want you! 2+ members interested in
1) making the project and
2) presenting it at Scientifica (in German!)

Are you the right one? Yes! And even better if you have some experience in:
• Statistics
• HCI or Data Visualization

Contact: ashena@ifi.uzh.ch
Giving away data about real users is dangerous
• Can we generate a synthetic population which preserves the features of the real population?

Topcoder’s Differential Privacy Synthetic Data Challenge
• Improving already provided algorithm or proposing new solution

We want you! 2+ members interested in participating to the challenge

Are you the right one?
• Yes, if you are ready to start as soon as possible!
• Even better if you have some experience in statistics

Contact: ashena@ifi.uzh.ch
Linking Web Data Sets

Cristina Sarasua <sarasua@ifi.uzh.ch>

https://www.wikidata.org
Data Analytics Group @ IFI

Mission Statement
Our mission is the development of new tools to extract knowledge from noisy, time-stamped, and high-dimensional data from across the sciences.
Problem Statement

The landscape of data science courses across faculties at UZH is complex! **Students need support** to understand which data science-related courses exist and how they are related.

Project Goals

The goal of this Master Project is a fully documented prototype of a web-based UZH Data Science Explorer with the following functionality:

1. automated mining of data science related courses from the UZH course catalogue
2. inference of relations between courses based on course description, lecturer, prerequisites, etc.
3. rich HTML5/d3js visualisation of courses and their relations in a responsive web application
4. support to build a custom curriculum and check for compliance with IFI study regulations
The UZH Data Science Explorer

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Sparse Computing of Best Responses in Large Auctions

Combinatorial Auctions
- Many goods sold simultaneously
- Buyers have complex preferences
- The space of possible bids is huge

Motivation
- Want to compute optimal bids for buyers
- Large areas of bidding space are often irrelevant
  - Cut away irrelevant areas
  - Focus on relevant areas

Project
- Implement branch and bound algorithm
- Test it in a variety of settings
- Make it as fast as possible

Prerequisites
- Required
  - Good programming skills (project is in Java)
  - Knowledge of data structures & algorithms
- Helpful
  - Mathematical background
  - Basic economic theory

Supervisors: Prof. Sven Seuken, Vitor Bosshard.
Contact: bosshard@ifi.uzh.ch

Computation and Economics Research Group.
www.ifi.uzh.ch/ce
MSc Project: Machine Learning-powered Auctions

Motivation
- Bidding in large auctions is often too complex
- Auction designs for large settings provide bidders with support for their bidding
  - Combinatorial Clock auction (currently used in multi-billion-dollar domains): support via ask prices
  - Pseudo-VCG Mechanism: support via proxy agents equipped with machine learning (ML) algorithms
- However,
  - Are ask prices/ML algorithms providing bidders with proper support?
  - How can bidders profit by playing strategically in these large auction?

Project Goal
- Create a good graphical interface and simulation framework to understand the effect of the different auction designs, in particular the new one based on machine learning

Approach
- Implement different graphical interfaces
- Play and test them

Prerequisites
- Good programming skills
- Experience with Java programming
- Experience with modern Frontend Frameworks (e.g., Angular, visual libraries like D3.js, …)
- Experience with WebSockets
- Experience with machine learning (desirable but not required)
- Experience with game theory (desirable but not required)

Supervisors: Prof. Sven Seuken, Gianluca Brero
Contact: brero@ifi.uzh.ch
Computation and Economics Research Group. www.ifi.uzh.ch/ce
Forests & Buildings

Vegetation height dataset

3D buildings dataset


Supervision: Prof. Dr. Renato Pajarola
Alireza Amiraghdam (assistant)

Contact: amiraghdam@ifi.uzh.ch
Interacting with GeoTable

Projector

Relief

Computer

Depth Camera

Infrared Hand Tracker

OR


Supervision: Prof. Dr. Renato Pajarola
Alireza Amiraghdam (assistant)

Contact: amiraghdam@ifi.uzh.ch
Removing Shadows

Supervision: Prof. Dr. Renato Pajarola
Alireza Amiraghdam (assistant)

Contact: amiraghdam@ifi.uzh.ch

Interaction in VR

HTC Vive

Scientific Visualization

Interaction

Teleporting

Direct Manipulation

Branching Menus


Supervision: Prof. Dr. Renato Pajarola
Contact: Alireza Amiraghdam (assistant)
amiraghdam@ifi.uzh.ch
Master projects starting early 2019 at

OpenCHI.org

Glancable

Typing in the air

Social Newsroom
OpenCHI.org

A website and a survey of open research materials in HCI publications at the CHI conference

Web dev  Interview  Survey

Research materials are software, hardware, datasets, and documents that are created in the course of a research project. Our survey of CHI 2018 (a premiere conference in HCI) shows that many materials that are related to the claims made in research papers are not available for public to be built upon.

To encourage publishing research materials, we wish to create a website on which researchers can make the availability of their research materials publicly known.

In this project, you will:
1. Interview HCI researchers about how they distribute their research materials
2. Implement the OpenCHI.org website that index public research materials (HTML, Javascript, TypeScript, CSS)
3. Conduct a survey of research material availability for CHI 2019

Suitable for a team of 2-3 students as a master project

Supervisor: Prof. Dr. Chat Wacharamanotham
Suitable for a team of 3–4 students as a master project
Supervisor: Prof. Dr. Chat Wacharamanotham

You will:
1. Design an interaction that combines gaze, hand, and pen motion to aid common reading tasks
2. Use our interactive gaze-sensitive augmented-reality desk to develop a reading application (API available in Javascript)

This project aims to narrow the gap between digital reading and physical reading with an augmented reality system. Plus, we will explore how to leverage readers’ gazes on the reading material to provide an interactive reading experience.

Glancable: Augmenting paper reading on gaze-sensitive interactive desk

Info: zpac.ch/projects
Typing in the air

Eyes-free and keyboard-free touch-typing

In situations such as virtual reality environments or mobile environment, it may be cumbersome to use physical or on-screen keyboards. Previous research shows viability of typing on flat surface without seeing keyboard or typing in midair with a visual feedback of the keyboard.

You will:
1. Develop a software for capturing motion data of typing from Sensoryx digital glove (Unity)
2. Conduct a lab study to collect and analyze data of mid-air typing behavior
3. Design and implement an interaction technique to aid mid-air typing

Suitable for a team of 2-3 students as a master project
Supervisor: Prof. Dr. Chat Wacharamanotham

Info: zpac.ch/projects
Suitable for a team of 3–4 students as a master project
Supervisor: Prof. Dr. Chat Wacharamanotham & Prof. Dr. Anne Scherer

You will:
Build upon our existing server and mobile apps by:
1. Porting the existing mobile app (in React Native) to iOS
2. Implementing a social network functionality (friends, following, liking, sharing) in both there server (PHP, Laravel) and the mobile app
3. Expanding the existing user interactions logging
4. Implement an experimental manipulation functionality
5. Conducting a small-scale field study on the effect of likes in news reading

Through social networks, individuals participate in the diffusion of today’s news. Yet many share news without fully reading them.

How does social network affect the tendency to like without reading?

Understanding the effect of social-likes in news reading

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FlexiSketch 2.0
Crossplatform FlexiSketch
A flexible editor for diagram sketching, runs on Android + iOS + Mac + Windows

Created with the 2D game framework Corona SDK and the scripting language Lua

Includes multi-user support

Where we are
➢ Integration of text documents
➢ Make it pretty

Where we want to go

Done

Find videos and more on www.flexisketch.org

Contact: Dustin Wüest, wueest@ifi.uzh.ch
Code review su*k*s!

What challenges are developers facing?
How does it influence their productivity?

Build a web platform and allow people to share their experience

Gather data

Analyse devs behavior
Dark Patterns and How to find them

Automatically detect UI dark patterns in mobile web applications

contacts:
Prof. Alberto Bacchelli (bacchelli@ifi.uzh.ch)
Linda Di Geronimo (digeronimo@ifi.uzh.ch)
Dr. Fabio Palomba (palomba@ifi.uzh.ch)
Giovanni Grano (grano@ifi.uzh.ch)
Gamification for code review

Transform code review into a game

contacts:
Prof. Alberto Bacchelli (bacchelli@ifi.uzh.ch)
Dr. Fabio Palomba (palomba@ifi.uzh.ch)
Enrico Fregnan (fregnan@ifi.uzh.ch)
Untangling changes in Pull Requests

Automatically separate related modifications in a pull request

contacts:
Prof. Alberto Bacchelli (bacchelli@ifi.uzh.ch)
Dr. Fabio Palomba (palomba@ifi.uzh.ch)
Enrico Fregnan (fregnan@ifi.uzh.ch)
Master Project Presentations

Fall 2018
GitLabCI-Odor: Continuous Integration Smells Detector

- Slow Builds
- Broken Release Branch
- Late Merging
- Skipped Tests
- Other anti-patterns

Contact:
vassallo@ifi.uzh.ch
proksch@ifi.uzh.ch
PTConf: Performance Test (Re)Configuration

How are tests configured?
Java/JMH Projects

What are the factors that influence test quality?

- Investigate source-code changes
- Predict test-quality changes with ML

Dynamic (Re)Configuration
Goal: preserve test-result quality

- Configuration based on prediction
- Dynamic execution stoppage
- CI integration

Contact: Christoph Laaber laaber@ifi.uzh.ch

(maybe developer survey)
More Details...

http://seal.ifi.uzh.ch » Teaching » Master » Master Projects

- Concrete Project Proposals
- More Projects
Project IANVS

Master Project Market

**Keywords:** Domain Specific Language, Data Modelling & Visualization, Data Versioning, Relational Databases, Reporting.

Dr. Pedro Fonseca: pfonseca@systemorph.com
Dr. Roland Buergi: rbuergi@systemorph.com

October 31st, 2018
About us

- **Headquarters:** Zurich, Switzerland (but we have offices around the world)

- **What we do:** Systemorph develops **Enterprise Data Management** solutions that revolutionize actuarial & risk functions in financial services companies. We create powerful tools for streamlined **Enterprise Data Management** and synthesis of even inconsistent data of varying granularity. The Solutions conduct **multi-dimensional versioning**, **data dependency tracking**, and **data lookups** of authentic data of **mixed granularity**. The result is more consistent data to drive informed risk management and actuarial decisions.

- **Our team:** IT professionals with deep expertise in risk management, enterprise systems, mathematical modelling, information management and enterprise capital management.
Description

• **Goal**: creation a web-based platform to manage reference data, parameters, as well as to handle data import and reporting. The project will be based on Systemorph Vertex, a platform enabling rapid development of data management solutions.

• The solution should be able to import raw financial data, e.g. a bond portfolio, as input. A **domain specific language** will be created to implement business rules and to prepare the input data for **reporting**. The business rules will be applied both in the data import stage as well as at report generation. All data will be kept on a **relational database**.

• As part of **data visualization**, the user should be able to do data manipulation and should be able to get the report at the desired granularity (using a **slice and dice feature**).

• The project’s aim is to highlight and train the following skills: Creation of a domain specific language, use of Relational Databases, Data Modelling & Visualization, Data Versioning.
List of tasks

1. Conceptual Data Management
   1. identification of the dimensions
   2. identification of relations between dimensions
   3. creation of a consistent data model
2. Conceptual Schema Creation
3. Conceptual design and identification of the problem
4. Creation of a Domain Specific Language that facilitates data transformations, e.g. calculations, without divulging C# code (e.g. in a xlsx file), so the (nontechnical/business) end-user can easily adjust the model based on his/her needs.
5. Data import manipulation
   1. Data parser
   2. Data modelling
   3. On the fly calculation during the import
6. Report creation
7. Slice and dice features that show consistent data at different granularity
Requirements

1. Use of **C#** and **.NET** technologies
2. The solution should work as a plug-in built on top of Systemorph’s platform using proprietary software (as an API) for a better integration
Final Remarks
Interested in a project? Talk to representatives and form groups!

http://t.uzh.ch/yi

Good luck with your Master’s Project!