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Geoinformation Group

Topics

The following topics are currently available at the Geoinformation Group. This topics cover only a minor field of interest and should be also considered as an inspiration.

We welcome your own ideas!

Die folgenden Themen sind momentan verfügbar an der Geoinformation Gruppe. Diese decken nur einen kleinen Teil unserer Interessen ab und sollten für Sie auch als Inspiration dienen.

Ihre eigenen Ideen sind sehr willkommen!

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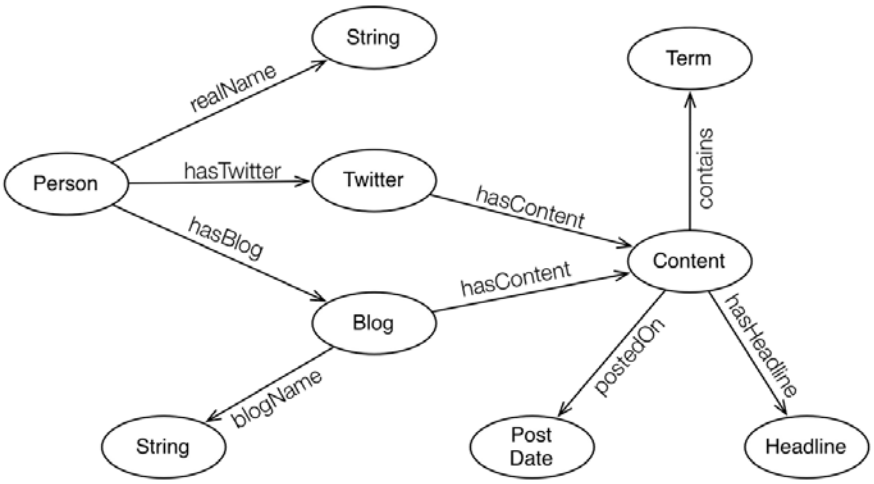
Grundbuch als Linked Data

Für mehr Informationen, kontaktieren sie bitte: Dr. Gerhard Navratil (gerhard.navratil@geo.tuwien.ac.at)

Zusammenfassung

Das Semantic Web ist eine Erweiterung des derzeit bekannten Internet. Neu ist, dass neben den Daten auch die Bedeutung der Daten (die Semantik) in maschinenlesbarer Form bereitgestellt wird. Realisiert wird das Semantic Web durch Linked Data (Datentripeln, z.B. TU Wien IS A Universität). Diese Tripel können zu Graphen kombiniert und dann auch wieder angefragt werden.



(The Oracle Alchemist)

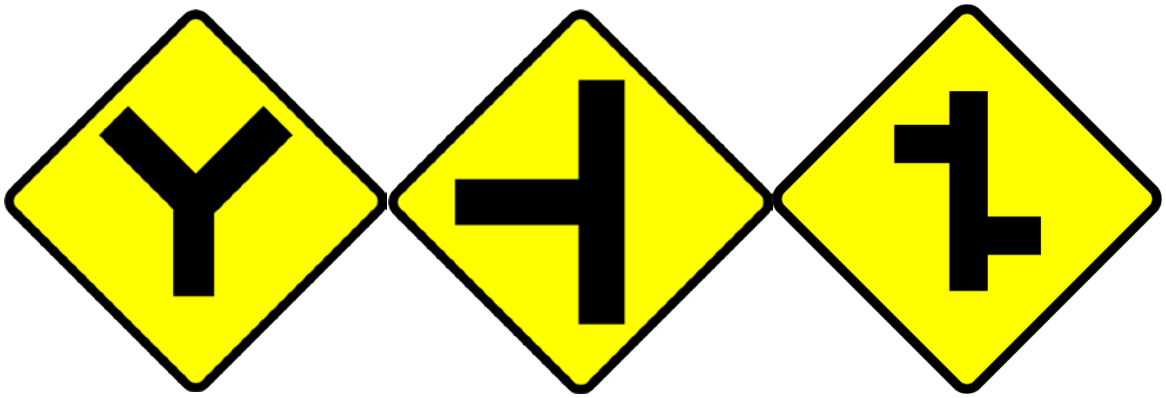
Das Grundbuch dokumentiert in Österreich die Rechte an Grund und Boden. Dazu gibt es das Hauptbuch mit den Grundbuchseinlagen, in denen die Grundstücke aufgelistet werden und die Rechte samt Berechtigten angeführt werden. Ziel der Arbeit ist es, einen beispielhaften (fiktiven) Ausschnitt des Grundbuchs als Linked Data zu modellieren und zu zeigen wie die Standard–abfragen (nach Person, Grundstück und Grundbuchseinlage) funktionieren.

Intersections of Our World

For more information please contact: geoinfo@geo.tuwien.ac.at

Abstract

The increase of Volunteered Geographic Information (VGI) is one of the main reasons that many places around our planet have been already registered and mapped (e.g., Open Street Maps). This provides us with the ability to extract region specific data and analyze them in order to make inferences about several types of spatial structures, e.g., the intersections of a region. The Geoinformation group developed a tool that provides functionalities to extract the intersection nodes of any area on our planet.



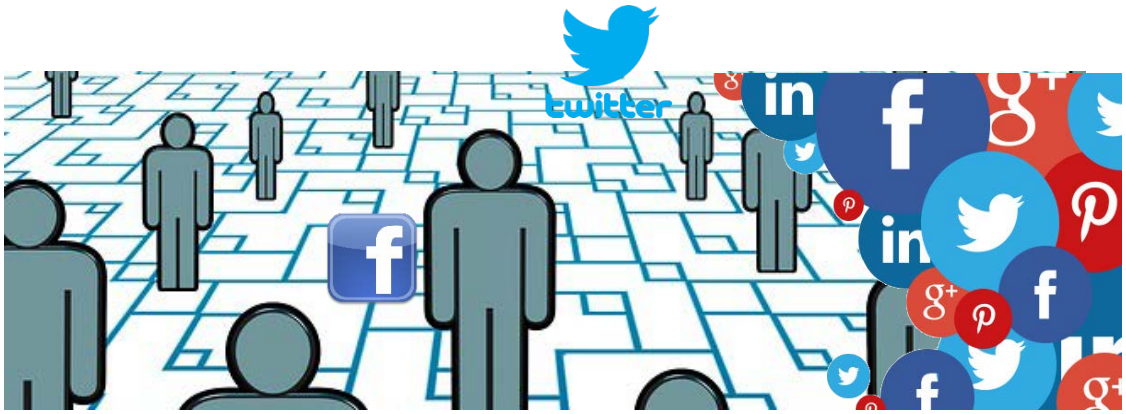
The student will have to perform a thorough literature review on the area and come up with possible solutions to extend this tool by adding spatial clustering functionalities. The implemented solutions will have to be evaluated and validated.

Local Social Media Feeds For Disaster Management

For more information please contact: geoinfo@geo.tuwien.ac.at

Abstract

Many people engage regularly in social media such as twitter and facebook, sharing their current status, events as well as many other types of information. Some of these posts are geotagged, often relating a specific piece of information with a given location. Exactly these posts can be of immense importance when it comes to a disaster management. Humans can inform and help each other based on geotagged posts.



The student will perform a thorough literature review on the area and implement a mobile application that is able to collect social media posts based on user spatial proximity. The user should be able to receive either posts that were send from other users within a certain radius or posts that were remotely tagged with a location within a certain radius of the user. An empirical user evaluation should be performed in order to investigate the benefits of such an application.

Supporting Human Self-Localization

For more information please contact: geoinfo@geo.tuwien.ac.at

Abstract

Self-localization is one of the main processes during navigation. A wayfinder has to be able to localize himself in order to be able to successfully reach the desired destination. Research has revealed several problems during this process, often leading to wrong localizations. One of the most common problems during aided wayfinding occurs during the matching process, where the wayfinder tries to match the information perceived from the environment to the information provided by the digital aid, e.g., an interactive map.

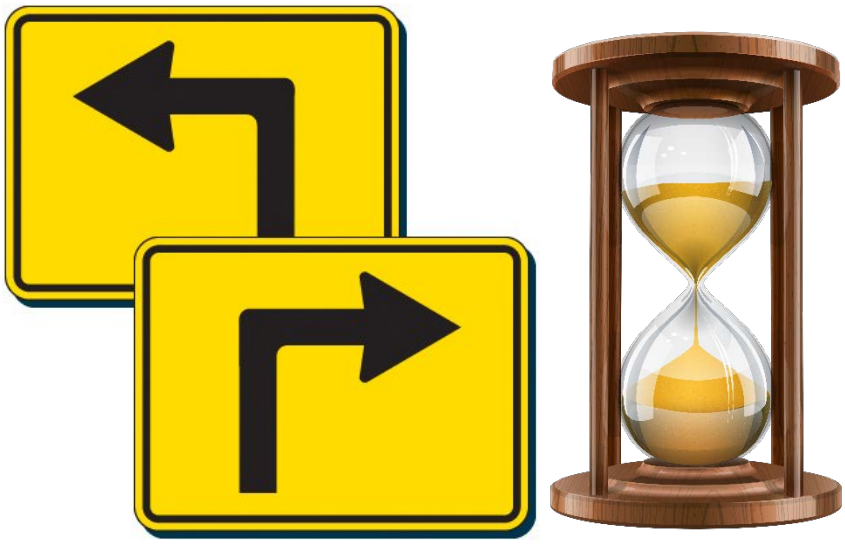
The student will perform a thorough literature review on the area and come up with possible solutions in order to design a system that can be used to assist wayfinders during the process of self-localization. A prototype of the solutions will be implemented and empirically evaluated.

The Impact of Optimal Timing of Pedestrian Navigation Instructions on User Experience

For more information please contact: geoinfo@geo.tuwien.ac.at

Abstract

During pedestrian navigation in outdoor urban environments we often utilize assistance systems to support decision-making. These systems help wayfinders by providing relevant information within the context of their surroundings, e.g., landmark-based instructions of the type "turn left at the church". Next to the instruction type and content, also the timing of the instruction must be considered in order to facilitate the wayfinding process.



Does an optimally timed instruction affect the user experience during wayfinding?

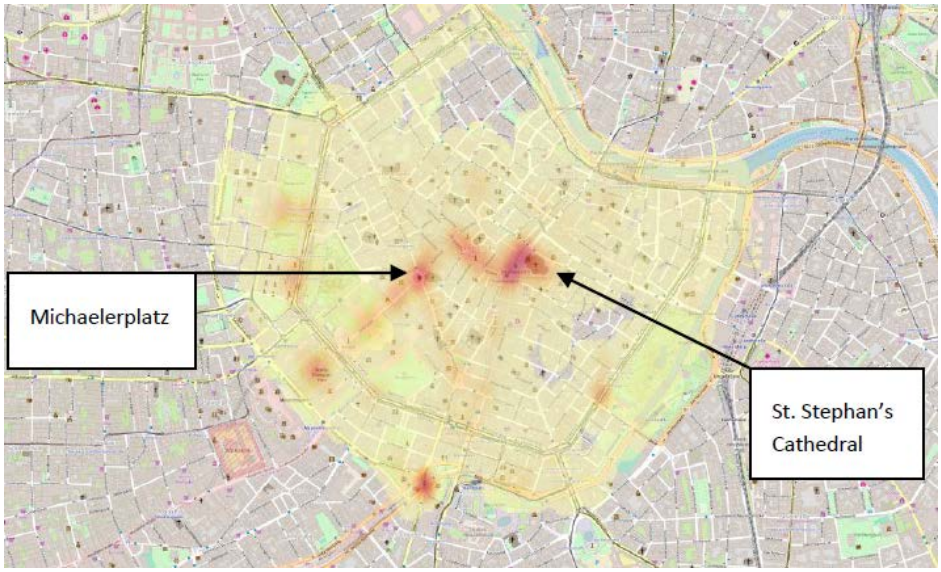
The student will design and perform an empirical user experiment in order to assess the impact of pedestrian navigation instruction timing on user experience.

Extraktion Touristischer Orte

Für mehr Informationen, kontaktieren sie bitte: Dr. Gerhard Navratil (gerhard.navratil@geo.tuwien.ac.at)

Zusammenfassung

In der Diplomarbeit Kmen wurde eine Methode entwickelt, um mittels Flickr-Bildern die Attraktivität von Orten zu beurteilen.



(Kmen, 2017)

In der Bachelor-Arbeit soll, unter Verwendung der entwickelten Skripte, derselbe Ansatz verwendet werden, um touristisch attraktive Orte zu detektieren. Die Arbeit teilt sich in folgende Schritte:

1. Download der Bilder
2. Klassifikation der Bilder um unerwünschte Bilder auszuscheiden
3. Erstellen einer Heatmap mit QGIS
4. Analyse der Heatmap und Vergleich mit bekannten Touristen-Hotspots

Blockchain Technology for GI-Services

For more information please contact: Marvin Mc Cutchan (marvin.mccutchan@geo.tuwien.ac.at)

Abstract

With the rise of crypto-currencies such as Bitcoin, Blockchain technologies became more knowledgeable to the public as the backbone technology of these currencies. However, Blockchains can be used for other tasks as well, such as ensuring the integrity of cadastral data, validating authenticity of geographical objects or verifying the presence of an object in space within a defined area. Nevertheless, Blockchains remain a novel technology within the domain of Geographic Information Science (GIScience) with a promising set of uses-cases. For this purpose, the integration of a major aspect of GIScience with Blockchains shall be investigated first, namely spatial relationships.

The scientific question of this work is: Can spatial relations be embedded in Blockhains?

The student is required to assess the current state of Blockchain technology within the domain of GIScience, secondly classify types of relevant spatial relationships and thirdly aim at embedding them into a Blockchain. Finally based on this outcome, the potential for modeling spatial relationships with blockchains will be assessed.

Enhancing Land Cover Classification with Geospatial Semantics

For more information please contact: Marvin Mc Cutchan (marvin.mccutchan@geo.tuwien.ac.at)

Abstract

It is natural for humans that geospatial objects have meanings, such as "a store", "a music store" or even less precise, solely "a building". In contrast, common machine learning algorithms do not possess the ability to grasp or derive these meanings, called geospatial semantics. Therefore, it is expected that geospatial semantics improve land cover classification procedures with its auxiliary knowledge.

Developments in the Web 3.0 have let to the creation of an open global knowledge graph called the Linked Open Data Web. This graph stores semantic information within various domains, among others geoinformation, enabling to provide geospatial semantics such as "this is a street, but also a bridge".

The student is required to answer the scientific question: Can geospatial semantics improve land cover classification? For this purpose, geospatial semantical data has to be derived as well as remotely sensed imagery. Secondly, the student has to investigate the influence of geospatial semantics on land cover classification using different machine learning strategies.

Predicting Human-Enviroment Interactions with Geospatial Semantics

For more information please contact: Marvin Mc Cutchan (marvin.mccutchan@geo.tuwien.ac.at)

Abstract

How humans interact with their environment depends on the aim of their current task but of also on the environment itself. Several features of the environment are identified which influence the state of a human while interacting with it. Nevertheless, the impact of the meaning of specific features is unknown. As such, the state of a human could be predicted differently once passing by a “music-store” then solely a “store”.

The meaning of these features can be presented by geospatial semantics which can help to describe the classes of a feature. A feature could be a street, but also a bridge at the same time. This additional information is expected to advance the prediction of the state of a human.

The student is expected to design an urban virtual environment and perform experiments in our geoHCI Lab. The main tasks will be to record human interactions with a virtual urban environment and to process the data by machine learning algorithms in order to improve the prediction of human state while actively interacting with the environment.

Augmented Reality for Geoinformation Analysis

For more information please contact: Dr.-Ing. Paolo Fogliaroni (paolo.fogliaroni@geo.tuwien.ac.at)

Abstract

Augmented Reality is a cutting-edge technology that allows for bringing virtual information into the real world by integrating digital information with the user's environment in real time. Unlike virtual reality, which creates a totally artificial environment, augmented reality enhances the existing environment by overlaying further elements. Recently, research in the AR domain has witnessed a huge boost, with dedicated projects in a number of different disciplines (e.g., automotive, medicine, engineering design and urban planning, and fine arts). At our research group, we are interested in the integration of AR with Geoinformation.

The student will study the relevant literature on Augmented Reality and Human Computer Interaction and will suggest and implement novel ways of interacting with Geographic Information via AR headsets. The student will be given access to our brand new Augmented Reality Lab and will have the possibility to be working with the new AR headset Meta2.

Augmenting the City

For more information please contact: Dr.-Ing. Paolo Fogliaroni (paolo.fogliaroni@geo.tuwien.ac.at)

Abstract

Over the last 20 years, we have witnessed a continuous transformation in the use of information technology: from stationary office and desktop computing, through social media and location-based services, to so-called ubiquitous computing. Ubiquitous computing aims at bringing information technology at the fingertips of users anytime and everywhere. One of the most innovative technologies to support ubiquitous computing is Augmented Reality (AR).

This thesis work will focus on the integration of standard positioning techniques with AR. The student will study the relevant literature on Augmented Reality, location based services, and geo-positioning techniques and will implement a novel system to position and align user generated pictures in the real urban space. The student will be given access to our brand new Augmented Reality Lab and will have the possibility of working with the new AR headset Meta2.

Whom Should I Ask for Directions? A P2P Approach for Direction Recommendations

For more information please contact: geoinfo@geo.tuwien.ac.at

Abstract

Humans engage in wayfinding tasks on a daily basis, trying to reach a destination in environments they are unfamiliar with. In order to reach their destination, wayfinders often make use of assistance systems that guide them through the environment. Although these systems are very helpful, sometimes wayfinders have problems with one or more steps of the wayfinding process. For instance, it may be difficult to interpret a given instruction or the destination cannot be recognised. In these situations, wayfinders tend to ask other pedestrians in their surroundings for help. One of the questions that arises is "whom should I ask for directions?". Not everyone has the information a wayfinder is seeking for, thus, randomly asking other pedestrians for help can result in losing a lot of time. Moreover, the given instructions might be of poor quality or even incorrect.

The student will perform a thorough literature review on the area and come up with possible solutions in order to design a system that can be used to get directions from an optimal pedestrian in the surrounding environment. A prototype of the solutions will be implemented and empirically evaluated.