

Sažeci predavanja - ABSTRACTS

Networks and factors of migration flows: unifying methods and evidence explaining migration network formations in Europe - Postdoc research proposal presentation

Speaker: **Dino Pitoski**, PhD, YUFE Postdoc at The Center for Artificial Intelligence and Cybersecurity, University of Rijeka, AIRI - UNIRI

Abstract

Network-scientific research on migration has recently gained momentum, with novel studies identifying characteristic network structures of European countries, abstracted from fine-grained data on inter-settlement migration flows. At the same time, novel, visualization-supported systematic reviews mapping the current migration drivers emerged, providing clearer insights on the potential factors that drive migration in different countries and regions*.

Both strands of research – on migration networks and on migration drivers - can deliver useful and needed policy support tools. Network analyses explain the network formations through the computed parameters for the node and link hierarchies, network structure, and network growth, which parameters can be deployed for informing, controlling and management purposes, as well as for estimating the wider structure of the migration network. At the same time, the knowledge on particular factors that underlie the network traced for any particular geographical domain, serves as a direct input for controlling and managing migration, as affecting the essential migration drivers (/deterrents) is likely to stir migration to behave in a desired way.

Very little effort, however, is invested by science, and subsequently very little information is given to the policy, with regards to: i) estimating the wider network of human settlements going across country borders, while adding new country network analyses to the portfolio with the aim to obtain more precise network node, link and structural parameters, ii) listing and ordering the migration factors for particular regions, while adding new evidence on their effect in the under-investigated regions (particularly in Europe), and iii) unifying the two domains of research - migration flows and migration factors, particularly in methodological terms, but also in terms of applications, that serve to verify, advance, and fine-tune the methodology.

The 3-year postdoc research proposal that will be presented in this research class addresses all three above actions and the agenda for their realization.

*Studies mentioned are author's published works available at:

<https://doi.org/10.1145/3447539>

<https://doi.org/10.1186/s40649-021-00093-0>

https://doi.org/10.1007/978-3-658-32182-6_17

<https://doi.org/10.3390/socsci10010021>

Find interactive visualizations following the above works at:

[Migration network of Croatia \(2018\)](#)

[Migration network of Austria \(2018\)](#)

[Human migration drivers' map](#)

RNN with pyramidal embeddings

Speaker: **Karlo Babić**, PhD student at the Faculty of Informatics and Digital Technologies, University of Rijeka

Abstract

The omnidirectional recursive training method is a method for training a neural network for text representation by constructing a pyramidal hierarchy for text input. Each higher level of this constructed pyramid has higher-level representations of the input text abstracting it from letters or subwords to words, phrases, and eventually perhaps sentences, paragraphs, and entire documents.

At each level of the pyramid, the method encodes each successive pair of representations into a higher-level representation. This representation is then used for two tasks: decoding the representation into the pair of representations it was encoded with (encoder-decoder module), and predicting the representations to the left and right of the encoded pair of representations (regression module).

Training a generative neural network (e.g., using LSTM) could be easier with those pyramidal representations instead of token-level representation methods. In this research class, I will explain why that might be so, and present the results of such an implementation while comparing it with an equivalent implementation that is using fastText for token embeddings.

Graph neural networks: introduction and applications

Speaker: **Milan Petrović**, PhD student at the Faculty of Informatics and Digital Technologies, University of Rijeka

Abstract

Graph neural networks (GNNs) have recently attracted much attention in the research community. This interesting area of research, which is a combination of deep learning and graph theory, has shown significant results in areas such as recommender systems, computer vision, behavior analysis in social networks, fraud detection in financial networks, brain networks, algorithmic reasoning, and many others. Although the application itself gave a different insight into solving these problems, there is currently a significant effort to understand the problems solved by Deep Learning, and GNNs are just one part of this group called geometric Deep Learning. In this talk, we will first give an introduction to the areas of geometric Deep Learning. Then we will continue with the basics of Deep Learning on graphs and their fundamentals. After that, we will introduce basic approaches to working with graphs such as Graph Convolution Networks and Graph Attention Networks. Then we will talk about the types of graph representations. After that, we will present use cases that can be solved with GNNs: Node Classification, Link Prediction and Graph Classification. In the last part of the talk, we will present an experiment comparing GCN and MLP in binary classification of nodes in the network of following users on Twitter.