Zeitplan und Programmübersicht Sommerschule Armenien 2022

Tag 1 (Mittwoch, 17. August 2022):

10:00 - 11:00 Welcome, short presentation of AUA and UDE, and Goals of the summer school (Prof. Hajian, PhD, Dean Akian College of Science and Engineering AUA; Prof. Schiele, Head of the German-Armenian Cooperation at UDE Faculty of Engineering)

11:00 - 11:15 Questionnaire about students' expectations and suggestions (Chao Qian)

11:15 - 12:15 Researching and Studying at the UA Ruhr – Vielfalt der Menschen und Universitäten (Prof. Vinck, Prof. Zesch)

13:15 - 14:45 Artificial Neural Networks and Deep Learning: from single neurons to learning systems (Prof. Keryan)

15:00 - 16:30 Lab: first steps with AI programming (Prof. Schiele, Chao Qian)

17:00 – 19:00 Reception and "Dialogue: Studying and researching in Germany – impressions and experiences (Prof. Baloian, DAAD Alumnus, Dr. Harutyunyan AvH Fellow) (Moderation: Prof. Luther)

Tag 2 (Donnerstag, 18. August 2022):

09:00 - 10:30 AI failures and the commodity myth: data preprocessing, learning rate, overfitting, and other pitfalls (Prof. Schiele)

10:45 - 12:15 Choosing the right deep learning architecture for your task: natural language processing and beyond (Prof. Zesch)

13:15 - 14:45 AI in Smart Cities: Using AI via web services – an experience with OpenALPR (Dr. Biella)

15:00 - 16:30 Lab: Image recognition (Prof. Zesch, Dr. Biella)

17:00 – 18:30 Documenting the genocide Leopold Fleischhacker, a Jewish sculptor in Nazi-Germany – a virtual Khatchkar museum documenting expulsion and genocide (Prof. Baloian, Prof. Luther, Dr. Biella)

Tag 3 (Freitag, 19. August 2022):

09:30 - 10:30 Computer Science at the UDE: an introduction (Prof. Luther, Prof. Schiele)

10:45 - 12:15 On the impact of information theory for artificial intelligence research (Prof. Vinck)

Conversational AI

13:15 - 14:45 AI-based hate speech detection approaches (Prof. Zesch)

15:00 - 16:30 Lab: Quickstarting a state-of-the-art prediction model with transfer learning (Prof. Zesch, Marius Hamacher)   Lab: Prompt-based Conversational Utterance Understanding

17:00 -18:30 Ein Blick in die deutsche Gegenwartsgeschichte mit LeMO - Lebendiges Museum Online (Dr. Biella)

Tag 4 (Samstag, 20. August 2022):

Excursion: Visit of the Armenian genocide memorial in Yerevan and of an Armenian-German/European cooperation project for digitalization in the Yerevan area (to be determined). Negotiations are ongoing to visit Dilijan Mineral Water Plant, fourth largest Armenian mineral and pure water exporter to the Russian market and supported by the European Union. Prof. Keryan was general director of Dilijan Mineral Water Plant.

Tag 5 (Sonntag, 21. August 2022):

Free time in Yerevan

Tag 6 (Montag, 22. August 2022):

09:00 - 10:30   Funding opportunities in Germany (together with DAAD, enterprises, and German foundations, GIZ in Yerevan, Dr. Yervant Zorian CEO Synopsys in Armenia (angefragt) (Moderation: Prof. Vinck)

10:45 - 12:15   Uncertainty modeling in AI applications (Prof. Luther)

13:15 - 14:45   Resource optimization techniques for embedded deep learning (Prof. Schiele)

15:00 - 16:30   Lab: embedded deep learning (Prof. Schiele, Chao Qian)

19:00   Dinner and Networking Session

Tag 7 (Dienstag, 23. August 2022):

09:00 - 10:30   Insecurity modeling for smart cities: crime prediction, public transportation modelling and preparedness for emergencies (Prof. Baloian)

10:45 - 12:15   Ethics in AI (Prof. Zesch)

13:15 - 14:45   Round table (with students, professors and dean AUA CSE): Expectations and opportunities of a study and internship stay in Germany (Moderation: Prof. Luther)

14:45 - 15:15   Abschluss, Verabschiedung und Evaluation

Kurzübersicht Vorträge

Researching and Studying at the UA Ruhr – Vielfalt der Menschen und Universitäten

Description pending The University Alliance Ruhr (UA Ruhr) was funded in 2007 and is a close cooperation between three large universities in the Ruhr area: the University of Duisburg-Essen, the Ruhr-University Bochum und der Technical University Dortmund. This talk provides an overview of the alliance and its universities as well as the geographical region they are located in.

Artificial Neural Networks and Deep Learning: from single neurons to learning systems

Artificial neural networks (ANNs) and deep learning are important current trends in AI research. The goal of this presentation is to give an overview of the main concepts, algorithms and techniques used in this area, including different ANN topologies and models, activation and cost functions, as well as learning algorithms. The talk will provide basic knowledge on which the rest of the summer school will build upon.

AI failures and the commodity myth: data preprocessing, learning rate, overfitting, and other pitfalls

AI algorithms are prone to inaccurate or plain wrong results if they are not used carefully. This is especially true for pretrained models that are reused in another context. This talk provides an overview of how AI can fail and what are possible reasons for it. Examples include wrongly chosen architectures or learning rates, overfitting, signal noise, etc.

Choosing the right deep learning architecture for your task: natural language processing and beyond

In the fast-moving field of deep learning, new architectures are often proposed. Deciding which architecture fits a given task is a core competence that requires an overview of architectures and selection criteria. The talk provides that overview based on the use case of natural language processing covering tasks like sentiment detection, image captioning, or machine translation.

Using AI via web services – an experience with OpenALPR

The talk addresses existing AI solutions that are already available as software-as-a-service (SaaS) or that can be used via a web service in own applications to control actors. The focus is on OpenALPR (Open automatic license-plate recognition) but also addresses common challenges in implementing smart image-based pattern recognition in applications.

Documenting expulsion and genocide: Leopold Fleischhacker, a Jewish sculptor in Nazi-Germany - a virtual Armenian Khatchkar museum

The talk deals with the conception and realization of two virtual indoor and outdoor museums on sepulchral art in Nazi Germany and historical Armenia. Damaged or completely destroyed tomb-stones and Khatchars are reconstructed and placed in their original environment, standardized metadata collected allowing a classification of the artwork. The information generated by specialists will be made available at the current locations of the stones via QR codes.

Computer Science at the UDE: an introduction

This talk gives an overview of the computer science department, its study programmes and research areas at the UDE as well as specific opportunities to study and research at it. This is meant as a short introduction for the participants of the summer school.

On the impact of information theory for artificial intelligence research

Information theory is all about storing, quantifying, and communicating information, e.g. with respect to robustness and efficiency. Deep learning relies on large amounts of information, e.g. to train ANNs. Therefore, information theory can support AI researchers to work better with information, including compression of intermediate results or weight quantization. This talk provides an overview of such opportunities and bridges both fields. s

AI-based hate speech detection systems

Fighting online hate speech increasingly relies on AI-based systems to flag problematic content. In this talk, we are going to have a look at various AI models that are used in that task including multi-modal systems that can analyze memes by processing text and image together.

Ein Blick in die deutsche Gegenwartsgeschichte mit LeMO - Lebendiges Museum Online

This interactive lecture uses the LeMo online museum (see https://www.dhm.de/lemo) and its time beam to explore with participants contemporary German history and culture. Participants can select and study epochs and events, leading to discussions with the German participants.

Funding opportunities in Germany

This discussion round will bring together representatives from different entities that can offer support for studying and researching in Germany like the DAAD, Armenian enterprises and German foundations, and GIZ in Yerevan, to discuss funding opportunities and to allow participants to discuss with them and ask questions.

Uncertainty modeling in AI applications

We introduce various forms of uncertainties and their representation in computer-oriented process models and look at recent work on Bayesian Neural Networks. Then, we give an overview of our use cases specifying the application area, reliability requirements and optional uncertainty features.

Resource optimization techniques for embedded deep learning

Local and embedded deep learning is a research area with huge implications for future AI systems. Local learning allows to use deep learning in application areas that require low latency reactions, high reliability and privacy, e.g. autonomous objects, smart production machines (Industry 4.0) and medical systems. This talk provides an overview of optimization techniques to realize such efficient local learning, e.g. quantization, compression, in memory computation, and pruning.

Insecurity modeling for smart cities: crime prediction, public transportation modelling and preparedness for emergencies

We introduce the Depster Schafer uncertainty theory and give examples how we have used it in crime prediction, public transportation demand prediction, supporting collaborative decision making in the scenario of preparing plans for facing an emergency situation in a city caused by the occurrence of a tsunami.

Ethics in AI

AI systems are widely applied and can have considerable real-world consequences. Hence, AI researchers and developers should be aware of the social implications of deploying a particular AI. The talk encourages students to behave ethically in their future research and enables them to participate in the discourse on ethical issues in AI by introducing the main terminology and by giving and overview of when an AI system conforms with ethical principles.