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Institut für Elektrotechnik und Informationstechnik
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Liebe Kolleginnen und Kollegen der ITG-Fachgruppe „Signalverarbeitung und maschinelles Lernen“,

hiermit lade ich Sie zur nächsten Sitzung der

ITG-Fachgruppe „Signalverarbeitung und maschinelles Lernen“

ein, die am Freitag, dem 15. Oktober 2021 aufgrund der aktuellen Situation online stattfinden wird.

Unsere Gastgeber wird unser langjähriger Fachgruppenleiter, Prof. Bin Yang, von der Universität Stuttgart sein, der ein sehr interessantes Programm für uns zusammengestellt hat. Man findet dieses auf den nächsten Seiten – überzeugen Sie sich selbst.

Wie auch beim letzten Mal bedauern Bin Yang und ich natürlich, dass wir uns nach wie vor noch nicht in Präsenz treffen können. Ich glaube, gerade Bin Yang wäre sehr froh gewesen, alle Mitglieder der Fachgruppe zum gemütlichen Beisammensein am Vorabend begrüßen zu dürfen (ich aber natürlich auch). In dieser Hinsicht haben wir aber der Vernunft (gerade auch in Verbindung mit den immer noch geltenden Einschränkungen an unseren Universitäten) gegenüber dem „Herzen“ den Vorrang gegeben.

Sollte jemand planen, einen Kurzvortrag zu halten, so wäre ich dankbar, wenn Sie dies bis zum 31.07.2021 durchgeben könnten. Sie können dies mittels Rücksendung per Fax der letzten Seite dieser Einladung oder via E-Mail (hier reicht ein kurzer Text an Frau Petra Usinger (pku@tf.uni-kiel.de)) tun. Bitte melden Sie sich frühzeitig an, damit die Organisatoren besser planen können und Sie den online-Zugang rechtzeitig erhalten.

Ich würde mich freuen, Sie im Oktober 2021 online willkommen heißen zu können.

Viele Grüße aus Kiel

Gerhard Schmidt

Anmeldeformular

Bitte bis spätestens 31.07.2021 (falls ein eigener Vortrag geplant ist)
an folgende Adresse senden (per Mail, Fax oder Post):

Frau
Petra Usinger
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Ich nehme an der Sitzung der ITG-Fachgruppe „Signalverarbeitung und maschinelles Lernen“ am 15.10.2021 online

□ teil
□ nicht teil.

Im Rahmen des Tagesordnungspunkts

- Kurzbeiträge aus der Fachgruppe

möchte ich ein Kurzreferat (etwa 15 Minuten) mit folgendem Thema halten:

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Absender:

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(und ja, es reicht eine kurze Nachricht per E-Mail)

72. Sitzung der ITG Fachgruppe “Signalverarbeitung und Maschinelles Lernen”

Online (Webex), Freitag 15.10.2021, Universität Stuttgart

Programm

09:00 Prof. G. Schmidt

Welcome

09:05 Prof. B. Yang

Introduction to ISS: “The only constant in life is change”

Medical application

09:30 Karim Armanious

An MRI-based iterative framework for brain biological age estimation

10:00 Marc Fischer

Contrastive learning for self- and semi-supervised medical image segmentation

10:30 *Coffee break*

Speech application

10:45 Sherif Abdulativ

Time-frequency speech denoising based on attention models and metric discriminators

Automotive application

11:15 Chenmin Jiang

Adversarial interference mitigation for automotive radar

11:45 Robert Marsden

Unsupervised domain adaptation in semantic segmentation using CLST

12:15 *Lunch break*

Semiconductor application

13:15 Yiwen Liao

To select or not to select: Visit feature selection from a deep learning aspect

Methodology research

13:45 Alexander Bartler

MT3: Meta test-time training for self-supervised test-time adaption

14:15 Felix Wiewel

Continual learning: A closer look at rehearsal

14:45 *Coffee break*

15:00 Mario Döbler

State representation learning for deep reinforcement learning

15:30 Bin Yang

Causal learning: The next step towards human-level intelligence?

16:00 End

72. Sitzung der ITG Fachgruppe "Signalverarbeitung und Maschinelles Lernen"

Online (Webex), Freitag 15.10.2021, Universität Stuttgart

Abstract

Karim Armanious

An MRI-based iterative framework for brain biological age estimation

The concept of biological age (BA) - although important in clinical practice - is hard to grasp mainly due to the lack of a clearly defined reference standard. This is because various organ systems may exhibit different aging characteristics due to lifestyle and genetic factors. As such, no prior methodology exists for the estimation of BA nor for the definition of its ground-truth labels. In this work, we introduce a novel iterative framework based on state-of-the-art deep learning architectural components for the estimation of the BA while relying solely on readily available chronological age (CA) labels. The introduced frameworks aim to segregate atypically-aging patients from a given population to more accurately approximate the true BA behavior. We hypothesize that the remaining population should approximate the true BA behavior. A statistical and visualization-based analysis has provided evidence regarding the potential and current challenges of the proposed methodology.

Marc Fischer

Contrastive learning for self- and semi-supervised medical image segmentation

To this date, successful deep learning approaches rely on large annotated datasets. This is especially true for challenging medical imaging data. To avoid associated annotation costs by radiological experts, we leverage domain-specific cues and incorporate contrastive strategies to learn distinctive patch-level representations. These representations allow us to employ powerful self- and semi-supervised schemes, significantly decreasing annotation requirements to perform a semantic segmentation.

Sherif Abdulativ

Time-frequency speech denoising based on attention models and metric discriminators

Recent years have seen a surge in the number of available frameworks for speech enhancement (SE) and recognition. Whether model-based or constructed via deep learning, these frameworks often rely in isolation on either time-domain signals or time-frequency (TF) representations of speech data. In this work, we introduce a framework based on a novel combination of adversarial frameworks and attention modules to achieve state-of-the-art results in SE by relying on both the time-domain signals and the TF representations.

Chenmin Jiang

Adversarial interference mitigation for automotive radar

With the development of autonomous driving and drive assistance system, radar is massively applied to increase the ability of vehicles for environment sensing. However, different radars in traffic may interfere each other and decrease their performances. Thus, interference mitigation has become a key issue for automotive radar. Over the last decades, many approaches have been proposed to solve this problem in time domain, frequency domain and space domain. These methods are mostly model-based and suffer from inaccurate modeling. In this work, we propose to use convolutional neural network with an adversarial framework called conditional generative adversarial network (cGAN) for suppressing interference between automotive radars. The performance of this method is evaluated and compared with existing signal processing-based methods quantitatively and qualitatively

Robert Marsden

Unsupervised domain adaptation in semantic segmentation using CLST

Deep convolutional neural networks have considerably improved state-of-the-art results for semantic segmentation. Nevertheless, even modern architectures lack the ability to generalize well to a test dataset that originates from a different domain. To avoid the costly annotation of training data for unseen domains, unsupervised domain adaptation (UDA) attempts to provide efficient knowledge transfer from a labeled source domain to an unlabeled target domain. To align the correct semantic categories across domains, we propose a contrastive learning approach that adapts category-wise centroids across domains. Furthermore, we extend our method with self-training, where we use a memory-efficient temporal ensemble to generate consistent and reliable pseudo-labels. We validate our approach on two domain adaptation benchmarks: GTA5 --> Cityscapes and SYNTHIA --> Cityscapes.

Yiwen Liao

To select or not to select: Visit feature selection from a deep learning aspect

This talk presents our recent study on feature selection (FS) from a deep learning (DL) aspect. First, we introduce feature selection and show the challenges: A generic FS framework is presented, which is often used in existing DL-based feature selection methods. Then, we discuss our recent methods and key applications, e.g. post-silicon validation and anomaly detection. Finally, we show the new challenges within the DL-based feature selection and the promising future research directions.

Alexander Bartler

MT3: Meta test-time training for self-supervised test-time adaption

Deep neural networks have dramatically improved the results in a wide range of applications. However, after deployment, the distribution of test data may be very different compared to the training distribution. This often leads to a large drop in performance. If the model were able to adapt to the new test conditions, this would help to prevent such performance drops. In this work, we therefore propose a novel training procedure to enable the adaptation of the trained model during test-time using only one unseen test sample. With making use of meta-learning and self-supervised learning, our approach Meta Test-Time Training (M3T) learns during training to adapt at test-time to unknown test distributions using only a self-supervised loss. Our approach is able to improve the classification result with one gradient step even under strong unknown image distortions.

Felix Wiewel

Continual learning: A closer look at rehearsal

Rehearsal is an effective technique for incremental class learning with DNNs. It effectively prevents catastrophic forgetting during sequential training on a sequence of tasks. But storing only a limited amount of data from previous tasks for rehearsal leads to a shift in the distribution of the training data. This shift can be modeled by using Dirichlet Prior Networks, which ultimately leads to an increased performance when compared with standard rehearsal.

Mario Döbler

State representation learning for deep reinforcement learning

There has been tremendous progress in Representation Learning, especially in the image domain. Many state-of-the-art methods are based on self-supervised contrastive learning. We use contrastive methods to improve the learning of an agent from pixels. Learning explicitly representations, which are utilized for the agent's decision making, can improve sample efficiency and leads to better robustness. This is demonstrated on the common Atari benchmarks.

Bin Yang

Causal learning: The next step towards human-level intelligence?

Deep learning has recently achieved great success in many areas and is currently the core of AI. At the same time, some fundamental limitations become visible, e.g. lack of explanation, sensitive to adversarial attacks and poor cross domain generalization. This talk gives a short introduction into the emerging research area of causal learning, an attempt to integrate causality into deep learning. It explains the structural causal model (SCM), interventional and counterfactual inference, causal discovery and shows both the potentials and limitations of causal learning.