THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

Department of Computing
電子計算學系

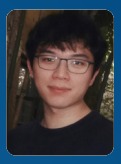
COMP RESEARCH STUDENT SEMINAR

Date : 11 December 2024 (Wed)
Time : 3:00 pm - 4:00 pm
Venue : HJ304 (Face-to-face)

Compositional Inversion for Stable Diffusion Models

Abstract

Inversion methods, such as Textual Inversion, generate personalized images by incorporating concepts of interest provided by user images. However, existing methods often suffer from overfitting issues, where the dominant presence of inverted concepts leads to the absence of other desired concepts. It stems from the fact that during inversion, the irrelevant semantics in the user images are also encoded, forcing the inverted concepts to occupy locations far from the core distribution in the embedding space. To address this issue, we propose a method that guides the inversion process towards the core distribution for compositional embeddings. Additionally, we introduce a spatial regularization approach to balance the attention on the concepts being composed. Our method is designed as a post-training approach and can be seamlessly integrated with other inversion methods. Experimental results demonstrate the effectiveness of our proposed approach in mitigating the overfitting problem and generating more diverse and balanced compositions of concepts in the synthesized images. The source code is available at https://github.com/zhangxulu1996/Compositional-Inversion.



Mr Xulu ZHANG
PhD candidate
Department of Computing

About the Speaker

Mr Xulu ZHANG received his bachelor's degree in Computer Science from Sichuan University in 2019 and completed his master's degree there in 2022. He is currently a PhD student in the Department of Computing at The Hong Kong Polytechnic University, under the supervision of Prof. Li Qing. His research interests focus on image synthesis and personalization.

Beyond Mimicking Under-represented Emotions: Deep Data Augmentation with Emotional Subspace Constraints for EEG-based Emotion Recognition

Mr Zhi ZHANG
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Department of Computing

About the Speaker

Mr Zhi ZHANG is currently working toward the PhD degree with the Department of Computing, The Hong Kong Polytechnic University, Hong Kong. His research interests mainly include abnormal event detection and EEG analysis.

Abstract

In recent years, using Electroencephalography (EEG) to recognize emotions has garnered considerable attention. Despite advancements, limited EEG data restricts its potential. Thus, Generative Adversarial Networks (GANs) are proposed to mimic the observed distributions and generate EEG data. However, for imbalanced datasets, GANs struggle to produce reliable augmentations for under-represented minority emotions by merely mimicking them. Thus, we introduce Emotional Subspace Constrained Generative Adversarial Networks (ESC-GAN) as an alternative to existing frameworks. We first propose a reference paradigm, utilizing well-represented emotions as references to inform under-represented subspace. Then, we introduce diversity-aware and boundary-aware losses to constrain the augmented subspace. Here, the diversity-aware loss encourages a diverse emotional subspace by enlarging the sample difference, while boundary-aware loss constrains the augmented subspace near the decision boundary where recognition models can be vulnerable. Experiments show ESC-GAN boosts emotion recognition performance on benchmark datasets, DEAP, AMIGOS, and SEED, while protecting against potential adversarial attacks. Finally, the proposed method opens new avenues for unbiased and secure EEG-based emotion recognition.

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COOPER: Coordinating Specialized Agents towards a Complex Dialogue Goal

Abstract

In recent years, there has been a growing interest in exploring dialogues with more complex goals, such as negotiation, persuasion, and emotional support, which go beyond traditional service-focused dialogue systems. Apart from the requirement for much more sophisticated strategic reasoning and communication skills, a significant challenge of these tasks lies in the difficulty of objectively measuring the achievement of their goals in a quantifiable way, making it difficult for existing research to directly optimize the dialogue procedure towards them. In our work, we emphasize the multifaceted nature of complex dialogue goals and argue that it is more feasible to accomplish them by comprehensively considering and jointly promoting their different aspects. To this end, we propose a novel dialogue framework, COOPER, which coordinates multiple specialized agents, each dedicated to a specific dialogue goal aspect separately, to approach the complex objective. Through this divide-and-conquer manner, we make complex dialogue goals more approachable and elicit greater intelligence via the collaboration of individual agents. Experiments on persuasion and emotional support dialogues demonstrate the superiority of our method over a set of competitive baselines.

Mr Chak Tou LEONG
PhD candidate
Department of Computing

About the Speaker

Mr Chak Tou LEONG is a thrid-year PhD student at the Hong Kong Polytechnic University (PolyU), advised by Prof. Maggie Wenjie Li. Before that, he received his BEng degrees from the School of Computer Science, Wuhan University, in 2022. His primary research focus is on uncovering mechanistic insights to enhance the safety alignment of Large Language Models (LLMs). He also has broad interests in LLM alignment, improving their reasoning capabilities, and developing more effective interactions between LLMs, humans, and the environment.