Multimodal learning for studying convergence between interlocutors during conversations and its brain basis

Aix-Marseille University
Laboratoire d'Informatique et Systèmes
Laboratoire Parole et Langage

We offer a 3-year PhD fellowship in Computer Science at Aix-Marseille University (France). This interdisciplinary project proposes to apply multimodal and deep learning approaches for the study of human interaction and its brain basis.

Description

During conversation, many studies have shown that interlocutors tend to progressively converge by adopting similar verbal and non-verbal behaviors. We also know that the level of alignment between participants can be correlated with the success of the interaction, the quality of information transfer and inter-mutual comprehension. The question is to know whether alignment is a consequence of our perception of other's behavior, with a certain control and intention in doing that, or whether it is a deeper spontaneous mechanism, based on the fact that both participants form a unique system and behave synchronously in an equal manner during the interaction. In the first case, each participant has his/her own language model used in production and perception and tries to decode the other production from this model. In the second case, the hypothesis is that both participants share the same model and generate the same predictions at the same time, the speaker producing the message and the hearer inhibiting it. This second options is based on the predictive coding hypothesis, which can be observed at the brain level.

This Phd will address this question by investigating the different hypothesis. In a first step, it will consist in evaluating during conversation whether one unique model performs better than two separate. These models will be built in two different manners: 1/ on the basis of pre-trained models, fine-tuned thanks to existing conversational datasets, 2/ with multimodal models, taking into account all verbal and non-verbal features. A unique model based both speakers production will be compared with separate model by participant. In a second step, a model of alignment between participants will be built, based on the different features extracted from our datasets. Multimodal learning methods will be applied, focusing in particular on the question of feature interaction and modalities fusion. A correlation between the level of alignment and the behavioral prediction will be analyzed. In collaboration with neuroscientists, we will finally analyze the dynamics in the brain signal, looking for traces of synchronization predicted by our models.

Selection Criteria

  • A master's degree in Computer Science, Artificial Intelligence, Computational Linguistics, or a related field
  • Knowledge of deep learning architectures, specifically Transformer models
  • Skills in natural language processing, multimodality and interaction
  • Interest in interdisciplinary work
  • Good research skills
  • Good writing and presentation skills
  • Good programming skills

Information Enquiries can be made to Leonor Becerra leonor.becerra@lis-lab.fr and Philippe Blache blache@ilcb.fr

Applications
To apply for this vacancy, please send an email to leonor.becerra@lis-lab.fr and blache@ilcb.fr. Please ensure that you upload the following additional documents:
  • Resume
  • Application letter, including your applicability to aforementioned selection criteria
  • Grade list (preferably for both bachelor's degree and master's degree)
  • Examples of Scientific Writing (e.g., scientific publication or master's thesis)
  • Reference letters

Only applications received before May 15th, 23:59 can be considered

APPLICATION DEADLINE: May 15th, 2023
ENVISAGED STARTING DATE: October 1st, 2023
ENVISAGED DURATION: 36 months
WORK LOCATION(S): Aix-Marseille University, Marseille, France