CSE 6369-001 Special Topics Advanced Intelligent Systems – Human Computer Interaction
10/12/2021 Guest Lecturer presentation Due: 10/26/2021 11:59 pm
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Summary of Presentation by Dr. Tsiakas

In this presentation by Dr. Tsiakas, titled "Designing Explainable AI and Interactive ML," he started by giving a background on his journey from completing his Ph.D. at UTA to Yale School of Medicine and to his current position as a Postdoctoral Researcher overseas in the Netherlands. Dr. Tsiakas then gave an outline of his presentation showing four main sections.

In the first section, he introduced ML stages explaining that the goal of HCI is to persuade users to adopt a product. He discussed ML for interactive learning agents which involves a workflow of "Sense," "Plan," and "Act" stages in that order. In more detail, these three stages involve input processing modules, interaction management, and output processing modules respectively. Examples of each include for Sense, voice recognition, for Plan, robot behavior, and for Act, perform gesture or trajectory.

In the second section, he discussed what interactive ML (IML) is by contrasting it with regular ML in that in the latter, only user input is fed into the ML system while in the former, user input and guidance may be fed into the ML system which in turn provides transparency to the user. He reviewed multiple approaches based on a case study on document classification. In the traditional ML approach, the major issue is that it is very difficult to provide labels and annotations. In the IML approach, the traditional ML approach is used initially to cluster documents then the user evaluates clusters via feedback. Finally, re-clustering occurs based on user feedback. Re-clustering may be repeated until the user is pleased. In a Human-in-the-Loop approach, a human interactively and iteratively guides clustering. Three IML approaches are learning from demonstration, from guidance, and from feedback. He detailed several applications of IML including interactive image segmentation, combining basic shapes, social robot tutor perceiving user engagement and adapting accordingly in language acquisition, informative behavior to increase engagement in TAMER framework, and robot-assisted physical therapy for children as well as in a part of his Ph.D. Dissertation where both explicit and implicit feedback were elicited from the user. He gave examples of feedback interfaces and summarized this section of his talk.

In the third section, Dr. Tsiakas introduced explainable AI (XAI) and why we need it. It aims to make the black box aspect of ML, where users do not know how decisions are made, more transparent. Providing transparency often takes the form of providing explanations to the user. He explained AI versus XAI. The difference is that the output from XAI adds explanations, visualizations, and transparent models and data to the output of AI. He gave a simple example of XAI, where output to user included which characteristics of a product that caused its classification into a certain class. For transparency in XAI, in an example in speech recognition, the system shares the level of certainty with which it acts.

XAI collects explanations. For example, in a game, users explain their actions then a learning algorithm maps actions to explanations. An example of visualization and transparency of XAI is a biofeedback game where the user gets visualization of his/her own breathing and controls breathing appropriately to be able to continue to play the game. Explainable recommendations and open learner models are used by students to regulate self-learning. XAI can augment human perception both firstly of user's perception and understanding of his/her own behavior and secondly of user's self-perception of the decision-making process of the system.

Dr. Tsiakas in the last section of his talk discussed XAI in education, assessment, and training which is his current research. He gave three classes with regards to user autonomy and AI game-based learning namely, no user autonomy, AI adapts to user input (his Ph.D. Dissertation), and AI enhances user (meta)cognition. He gave several applications of human-AI interaction in education, healthcare, and game-based learning such as Activate Test for Embodied Cognition (ATEC), interactive learning and adaptation for robot-assisted cognitive training, BrainHood, FutureMe and concluded with concepts involved in designing XAI and IML.

Dr. Tsiakas is an interesting speaker who engaged the audience and got several questions. I asked him three questions in class, and I was enlightened by his responses.