

Methods and Problems of New Technology in Cognitive Science^{*}

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Abstract. This is an introductory text to a collection of selected essays from the tenth annual Cracow Cognitive Science Conference, which was held in Cracow, Poland, on the 12th and 13th of May, 2018. It consists of short summaries of selected papers and some observations about the event and its future.

Keywords: Affective computing · Artificial intelligence · Virtual reality · Cognitive Science.

1 Introduction

The tenth annual Cracow Cognitive Science Conference (CCSC) focused around two closely connected themes: (1) problems connected to the use of new technologies and (2) methods and studies in cognitive science that involve new technologies. Both themes attracted significant attention from a wide range of disciplines in recent years and have been the subject of interdisciplinary research. The CCSC brought together researchers from human-computer interaction studies, psychology, artificial intelligence, cognitive neuroscience, ethics, and philosophy from across Europe. The present volume is a collection of selected papers from the conference, which are organized according to the two themes.

2 Problems

Nick Novelli's "Psychopathic Killer Robots! A Pragmatic Approach to AI Ethics" offers an analysis of the problem of moral standing for highly sophisticated artificial intelligence embodied in robots, which is grounded in the robot's having

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phenomenal consciousness. Novelli then argues that a reasonable way forward in attributing moral standing in such cases are observable differences in behavior that are tied to differences in phenomenal consciousness.

Rafał Michalczak’s and Maciej Próchnicki’s “What Should We Know When Interacting with Machines? A Critique of Daniel Dennett’s Idea” critically assesses the proposal that it should be considered a crime to hide limits, shortcomings, and deceptions of an artificial intelligence system, including that it is an artificial intelligence. They argue that this idea conflicts, at least in Poland, with criminal and civil law.

Amelia La Torre’s “A more human side of a chatbot. Analysing anthropomorphism in conversations with a virtual agent depending on the level of elicited agent knowledge” reports on an experiment with 32 participants, which examined anthropomorphizing tendencies with respect to conversational artificial agents (chatbots) using questionnaires. The paper offers a brief discussion of the background assumptions behind the study, but unfortunately does not report on any of the findings.

Eryka Probiez’s and Anna Pindych’s “Problematic Internet Use in the Context of Perceived Social Support and Self-esteem among Network Users Aged 15-26.” reports on an experiment with 543 participants, which aimed to examine the relationship between problematic internet use and self-esteem and social support. Results indicate a positive correlation between low self-esteem and problematic internet use and a negative one between perceived social support and problematic internet use.

Izabela Skoczeń’s and Aleksander Smywiński-Pohl’s “Investigating cross-linguistic differences in the pragmatics of scalar terms” report on experiments that examine Polish speakers’ treatment of quantifier scope ambiguity. Results indicate a significant difference in the way that speakers of Polish deal with it compared to English speakers. The authors hypothesize that this difference may be due to the Polish speakers’ bias in applying implicatures from full-knowledge contexts to partial knowledge contexts.

3 Methods

Karolina Zmarzły’s “Virtual Reality as A Therapeutic Tool in Case of Psychological Disorders” examines possible the ways in which virtual reality technology can be used for treatment of psychological disorders, such as social phobia, autism, eating disorders, and delusional beliefs. The author suggests future paths for implementation of therapy regimens, but also research into the effectiveness of virtual reality methods for treatment of psychological disorders.

Maartje Hendriks’ and Lisa Rombout’s “Towards Attention-based Design of Mental Health Interventions in Virtual Reality” reports on a pilot study that aimed to shed light on how biofeedback and image quality can differentially influence anxiety in a virtual reality environment. Results of the pilot indicate several trends, such as: wide range in individual responses to attention management and strong deep breathing patterns.

Barbara Giżycka’s “Using Affective Loop as Auxilliary Design Tool for Video Games” reviews how emotionally significant physiological information, as well as human behavior, can be used as dimensions of interaction with video games and how that interaction impacts design. Giżycka conducted several pilot studies with heart-rate and galvanic skin response information used as biofeedback signals for a video game. Preliminary results are promising.

Kamila Gajdka’s “Combination of Automated Language Analysis with Machine Learning and its Application to Early Diagnosing of Psychotic Disorders” reviews recent methods of machine learning and automated language analysis and proposes they can be used as a method of diagnosis of formal thought disorder in patients suffering from psychosis. The review includes an analysis of a recent study that uses this combination of methods to predict psychosis with an 83 percent accuracy rate and discriminates speech of recent onset psychotics with a 72 percent success rate.

Konrad Zielinski’s, Ryszard Szamburski’s, and Ewa Machnac’s “Artificial voice perception in the context of novel voice restoration technique for laryngectomees” proposes a new method of voice restoration for laryngectomees, which takes advantage of electronic devices that can predict speech from selected face and neck areas responsible for speech. The paper offers a review of the of technologies ready to be used to this effect and a discussion of the potential impact of such voice restoration.

Mariana Rachel Dias da Silva’s, Marie Postma-Nilsenova’s, and Frouke Hermens’s “Wandering Mice, Wandering Minds: Using Computer Mouse Tracking to Predict Mind Wandering” is a report of an experimental study on 183 participants, which used the SPAN task with random probes to investigate whether the trajectory of mouse movements can be a predictor of task-unrelated thoughts. It turned out that latency of button presses is an indicator of task-unrelated thoughts.

4 Conclusions

The range of problems and methods on display in the selected papers, as well as posters and papers not selected for publication, is large. One can nonetheless discern a theme and a general direction of the work presented at the conference. The theme is the intersection of cutting-edge technology and cognitive sciences that aims to address real-life problems of individuals and societies. The interaction between the philosophy of mind, psychology, and data driven artificial intelligence on display here suggests that future work on this theme is likely to have positive impact on our lives.