

# Multimodal Analysis of Impressions and Personality in Human-Computer and Human-Robot Interactions

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## CCS Concepts

•Human-centered computing → Human computer interaction (HCI); •Computing methodologies → Computer vision; *Machine learning*;

## Keywords

Multimodal interaction, social signal processing, personality traits, impressions, human-computer interaction, human-robot interaction, computer vision, machine learning

## ABSTRACT

Personality traits such as extroversion, agreeableness, and openness to experience, are tightly coupled with human abilities and behaviour encountered in daily lives: emotional expression, success in interpersonal relationships and tasks, leadership ability, general job performance, and academic ability. Personality traits also affect how people interact with technology. Users tend to anthropomorphise computers, virtual agents and robots, treating them as social beings, and interpreting their behaviour similarly to daily human-human interactions. However, both the common everyday technology including smart phones, and the more sophisticated systems people use nowadays, such as assistive technologies, embodied virtual agents, and social robots, lack the capability of understanding and predicting their human user's personality, and adapting appropriately for an engaging and personalised interaction.

This talk will focus on automatic prediction of impressions and inferences about traits and characteristics of people based on their observable multimodal behaviours in the context of human-virtual character and human-robot interactions. The first part of the talk will introduce and describe the creation and evaluation of the MAPTRAITS system that enables on-the-fly prediction of the widely used Big Five personality dimensions (i.e., agreeableness, openness, neuroticism, conscientiousness and extroversion) from

a third-vision perspective [6], [5], [4]. A novel approach for sensing and interpreting personality is through a wearable camera that provides a first-person vision (FPV) perspective and therefore enables the acquisition of information about the users' true behaviours and intentions. Accordingly, the second part of the talk will introduce computational analysis of personality traits and interaction experience through first-person vision features in a human-robot interaction context [3].

The perception of personality is also crucial when the interaction takes place over distance. Tele-operated robot avatars, in which an operator's behaviours are portrayed by a robot proxy, have the potential to improve interactions over distance by transforming the perception of physical and social presence, and trust. However, having communication mediated by a robot changes the perception of the operator's appearance, behaviour and personality. The third and last part of the talk will therefore present a study on how robot mediation affects the way the personality of the operator is perceived, analysed and classified, and will discuss the implications our research findings have for autonomous and tele-operated robot design [1], [2].

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## 1. REFERENCES

- [1] P. Bremner, O. Celiktutan, and H. Gunes. Personality perception of robot avatar tele-operators. In *ACM/IEEE International Conference on Human-Robot Interaction (HRI) Proceedings*, pages 141–148, 2016.
- [2] O. Celiktutan, P. Bremner, and H. Gunes. Personality classification from robot-mediated communication cues. In *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) Proceedings*, 2016.
- [3] O. Celiktutan and H. Gunes. Computational analysis of human-robot interactions through first-person vision: Personality and interaction experience. In *IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN) Proceedings*, pages 815–820, 2015.

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- [4] O. Celiktutan and H. Gunes. Automatic prediction of impressions in time and across varying context: Personality, attractiveness and likeability. *IEEE Trans. Affective Computing*, 2016.
- [5] O. Celiktutan, E. Sariyanidi, and H. Gunes. Let me tell you about your personality!: Real-time personality prediction from nonverbal behavioural cues. In *IEEE International Conference on Automatic Face and Gesture Recognition Proceedings*, 2015.
- [6] J. Joshi, H. Gunes, and R. Goecke. Automatic prediction of perceived traits using visual cues under varied situational context. In *International Conference on Pattern Recognition (ICPR) Proceedings*, pages 2855–2860, 2014.



## SHORT BIOGRAPHY

Hatice Gunes is an Associate Professor (Senior Lecturer) in the Computer Science Department at University of Cambridge, UK. Prior to that she led the Affective and Human Computing Lab at Queen Mary University of London, UK. Her research expertise is in the areas of affective computing and social signal processing that lie at the crossroad of multiple disciplines including computer vision, signal processing,

machine learning, multimodal interaction and human-robot interaction. She has published over 90 papers in these areas (Google scholar citations 2260, H-index=22). Dr Gunes pioneered research on multimodal behaviour and affect analysis proposing novel machine learning models and pushing the state of the art to real-time, dimensional and continuous prediction and recognition of head gestures, facial and bodily affect, and personality, and received awards for Outstanding Paper (IEEE FG'11), Quality Reviewer (IEEE ICME'11), Best Demo (IEEE ACII'09) and Best Student Paper (VisHCI'06). Her recent work focuses on Digital Personhood through the EPSRC Humans and Robots in Public Spaces Project that aims to produce greater social cohesion and integration for humans and robots in public spaces, and increase access to public spaces in robot proxy forms.

Dr Gunes is the President-Elect of the Association for the Advancement of Affective Computing (AAAC), she serves on the Executive Committee and the Management Board of AAAC and the Steering Committee of IEEE Transactions on Affective Computing. She is also an Associate Editor of IEEE Transactions on Affective Computing, IEEE Transactions on Multimedia and Image and Vision Computing Journal. She is the Program Co-Chair of the IEEE Conference on Automatic Face and Gesture Recognition (IEEE FG 2017), and has acted as the main organiser and chair of Emospace Workshop series (2011-2015) organized in conjunction with IEEE FG, as a workshop chair for ACII'15, doctoral consortium chair for IEEE FG'15, as grand challenge chair for ACM ICMI'14 and ACM ICMI'16, as an Area Chair for UMAP'16, IEEE RO-MAN'16, ACM Multimedia'15-14, ACII'13, ACM ICMI'13 and IEEE ICME'13, and as a panel organiser for the panel on Emotional and Signals in Multimedia (ACM MM'14). She has also edited Special Issues in International Journal of Synthetic Emotions, Image and Vision Computing, and ACM Transactions on Interactive Intelligent Systems. Dr Gunes is a Senior Member of the IEEE.