

Tárgyleírás

Tárgy neve: Affective Computing

Tárgyfelelős neve: Dr. habil. András Lőrincz

Tárgyfelelős tudományos fokozata: CSC

Tárgyfelelős MAB szerinti akkreditációs státusza: AT

Az oktatás célja angolul / Aim of the subject:

Knowledge

- Students will gain comprehensive theoretical and practical knowledge of the current achievements, methods and implemented applications of *affective computing*, both from the computer science side and from the related frontier of behavioural analysis and psychology.
- Students will have detailed knowledge and high-level understanding of the professional vocabulary, expressions and terminology of the *affective computing* field in English.

Abilities

- Ability to communicate in written and oral English with a high level of professional vocabulary in the field, to participate in debates, to prepare reports, to process and use scientific and technical material (books, papers, etc.) in a creative way.
- Ability to use official information sources professionally, to extract, critically interpret and evaluate the knowledge needed to solve the problem.

Attitude

- Committed to lifelong learning and open to learning new computer science-related skills and acquiring professional competences.
- Accept and enforce the ethical principles of work and organisational culture and of scientific research in information technology.
- Share knowledge and attach importance to communicating professional achievements in the computer science/artificial intelligence research areas.
- Open to proactive collaboration with professionals in information technology and domain experts of other scientific fields.

Autonomy, responsibility

- Students take responsibility for the professional decisions they make in their computer science-related activities.
- Students take responsibility for meeting and enforcing deadlines.

Az oktatás tartalma angolul / Major topics:

Affective Computing is an interdisciplinary subject, with motivation from psychology, cognitive science and a strong relevance and practical use in computer science. The terms and name of the topic originated with **Rosalind Picard's** paper [1] from 1995.

[1] Picard, R. W. (2000). *Affective computing*. MIT press. //Google Scholar: same as the M.I.T Media Laboratory Perceptual Computing Section Technical Report No. 321 from 1995//

One of the goals of affective computing studies is to show useful designs and applications for measuring and adapting to humans' behaviour and methods for interpreting people's emotional states. Other important task is to investigate appropriate ways for machines to respond people's emotions.

Besides the insight of this specific field, the students will be introduced to the current benchmark datasets and the usage of the related *state-of-the-art* deep neural network tools.

The main topics are the followings:

- theory of human emotions,
- facial expression fundamentals, facial action units, FACS,
- eye tracking, blinking, eye movements,
- human body pose and challenges,
- detecting stress and drowsiness in driving scenarios,
- smart applications and other devices to measure human parameters,
- emotional human-computer interactions, communication models.

A számonkérés és értékelés rendszere angolul / Requirements and evaluation:

Mixed assessment, exam

Irodalom / Literature:

Compulsory literature

[1] Picard, R. W. *Affective Computing*. MIT Press, 2000. ISBN: 9780262661157.

[2] Cohn, J. F., Ambadar, Z., & Ekman, P. (2007). Observer-based measurement of facial expression with the Facial Action Coding System. *The handbook of emotion elicitation and assessment*, 1(3), 203-221.

[3] Rastgoo, M. N., Nakisa, B., Rakotonirainy, A., Chandran, V., & Tjondronegoro, D. (2018). A critical review of proactive detection of driver stress levels based on multimodal measurements. *ACM Computing Surveys (CSUR)*, 51(5), 1-35.

[4] Seneviratne, S., Hu, Y., Nguyen, T., Lan, G., Khalifa, S., Thilakarathna, K., ... & Seneviratne, A. (2017). A survey of wearable devices and challenges. *IEEE Communications Surveys & Tutorials*, 19(4), 2573-2620.

[5] Alharbi, M., & Huang, S. (2020, September). A Survey of Incorporating Affective Computing for Human-System Co-adaptation. In *Proceedings of the 2020 The 2nd World Symposium on Software Engineering* (pp. 72-79).

Recommended literature

[A] Pantic, M., Sebe, N., Cohn, J. F., & Huang, T. (2005, November). Affective multimodal human-computer interaction. In *Proceedings of the 13th annual ACM international conference on Multimedia* (pp. 669-676).

[B] Yoo, C., Kang, S., Hwang, I., Min, C., Kim, S., Kim, W., & Song, J. (2019, June). Mom, I see You Angry at Me! Designing a Mobile Service for Parent-child Conflicts by In-situ Emotional Empathy. In *Proceedings of the 5th ACM Workshop on Mobile Systems for Computational Social Science* (pp. 21-26).

[C] Akçay, M. B., & Oğuz, K. (2020). Speech emotion recognition: Emotional models, databases, features, preprocessing methods, supporting modalities, and classifiers. *Speech Communication*, 116, 56-76.

Tools for practice

1. <https://github.com/naxingyu/opensmile>

Eyben, Florian, Martin Wöllmer, and Björn Schuller. "Opensmile: the munich versatile and fast open-source audio feature extractor." *Proceedings of the 18th ACM international conference on Multimedia*. 2010.

2. <https://github.com/TadasBaltrusaitis/OpenFace>

Baltrusaitis, Tadas, et al. "Openface 2.0: Facial behavior analysis toolkit." 2018 13th IEEE International Conference on Automatic Face & Gesture Recognition (FG 2018). IEEE, 2018.

3. <https://nlp.stanford.edu/projects/glove/>

Pennington, Jeffrey, Richard Socher, and Christopher D. Manning. "Glove: Global vectors for word representation." *Proceedings of the 2014 conference on empirical methods in natural language processing (EMNLP)*. 2014.