*Doctoral School of Information and Biomedical Technologies Polish Academy of Sciences*

**Linguistic summarization of speech signal for mental disorders monitoring**

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**PhD supervisor:** Prof. dr hab. inż. Olgierd Hryniewicz

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**Dyscipline:** Informatyka Techniczna i Telekomunikacja

**Recruitment:** interview

**Number of positions**: 1

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**Description:** This PhD project aims at the development of computational methods for linguistic summarization of data streams derived from speech signal such as e.g., *Patients in depression speak quietly*. The motivating example for this project is monitoring sensor data related to the indirectly observed mental disorders. For example, changes in speech observed in bipolar disorder patients are suggested as measures of changing mental state. Bipolar disorder (BD) is a complex, chronic and severely debilitating illness, that characterizes with fluctuations between different mood states, ranging from depression to hypomanic/manic episodes, as well as mixed states. Early recognition of phase change is crucial to increase the patient's chance of an early intervention. However, apart from the proper detection of the mental change, novel computational methods for communicating about the change to the medical experts are needed. **The primary goal of this PhD project is the development of high-level information granules about multiple data streams.** To achieve this goal, various aggregation methods will be explored aiming at preserving the information about data structure, and at the same time, enabling efficient processing of large speech signal. This PhD project will integrate elements from computational intelligence and signal processing. Fuzzy set theory will be applied to model the linguistic terms and the uncertainty observed in sensor data. Real-life heterogeneous datasets of high medical importance will be enabled for this research (1) data collected from smartphones of bipolar disorder patients; (2) data from locomotor sensors for monitoring of psychomotor disturbances in depression. Digital data from sensors are anonymize and stored on secure servers. For more details, send an email to: k.kaczmarek@ibspan.waw.pl.

**Bibliography**

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2. Antosik-Wójcińska, A.Z., Dominiak, M., Chojnacka, M., **Kaczmarek-Majer, K.,** Opara, K., Radziszewska, W., Olwert, A., Święcicki, Ł. (2020) **Smartphone as a monitoring tool for bipolar disorder: a systematic review including data analysis, machine learning algorithms and predictive modelling**. International Journal of Medical Informatics, 138:04131.

3. **K. Kaczmarek-Majer**, O. Hryniewicz, K. Opara, W. Radziszewska, A. Olwert, J. Owsiński, S. Zadrożny (2018) **Control Charts Designed Using Model Averaging Approach for Phase Change Detection in Bipolar Disorder**, Advances in Intelligent Systems and Computing book series (AISC, volume 832), 115-123.

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