CURRICULUM VITAE

Michal Teplan

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Nationality Slovak
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Specialist focused on data analytics, data science, and measurement in a wide range of industries. Strong academic background.

Work Experience

2022/03 - present
- **AI consultant, Cognexa**

2001/09 - present
- **part-time data scientist - machine learning and artificial intelligence for industrial data science**
- **team leader in a number of measurement and data science R&D projects**
- **PhD researcher, postdoc researcher, and independent senior researcher in a leading academic institution**

Education

2001 – 2006
- **Postgraduate study in biomedical engineering at Institute of Measurement Science of Slovak Academy of Sciences, Bratislava**
  - Statistical data analysis, Artificial neural networks, Genetic algorithms, Dynamical systems and Chaos, Biophysics and physiology
  - Dissertation: „Audio-visual stimulation and relaxation. Linear and nonlinear EEG measures"

1993 - 1998
- **Master in mathematical and theoretical physics**
  Faculty of Mathematics and Physics at Comenius University, Bratislava

  - Physics, Computer physics, Experimental data analysis, Numerical methods in physics, Mathematical methods in physics

Skills

- joint expertise: measurement + data science + advanced data analytics
- multidisciplinary scope with a scientific and interdisciplinary background
- mathematical modeling, predictive analytics, image processing
- theory of measurement, experimental design, hypothesis testing, numerical analysis and scientific computing, advanced statistics, nonlinear systems
- development of measurement strategies, data visualization, advanced data processing, interpretation of results
- project management: planning, proposal writing, team management, communication, promotion
- technical consulting: measurement specification, data design, ML and AI model design
- industry experience: healthcare, chemical, physical, biomedical, energy, mining

Technical skills

- **Machine learning and AI** - Matlab, Python, C, R
- **Data processing** - NumPy, Pandas, Scikit-learn

Project experience

- **Chemical, energy, and mining industries**

  - **Applied data analysis in petrochemical industry:** Assessment of pollutants exposure at worker stations (Slovnaft refinery).
  - **Predictive analytics in energy industry:** Application of machine learning and neural networks for predicting time-series of electricity load (Tangent works).
  - **Monitoring for mining industry:** Multivariate data analysis of parameters of vehicles and sensors for surface mine vehicles. Proposition of methodology focused on constructing new measures/features together with alerts (iTrack).
  - **Event detection in chemical industry:** Detection and explanation of abnormal behaviour at chemical production plant from multidimensional time-series (Datapac).

- **Physical and biophysical industries**

  - **Nuclear facility - regression analysis and assessment of the signal period:** Determination of betatron tune from beam trajectory registration (Joint Institute for Nuclear Research in Dubna, Russia).
  - **Optical measurements - statistical analysis:** biomolecular measurement data, namely electrical spectral characterization of tubulin and microtubules in GHz region. Conception and application of an approach with statistical testing for discerning and interpreting of differences in measured curves (Czech Academy of Sciences).

- **Healthcare industries**

  - **Health technology assessment:** Covering biomedical, physical, engineering, statistical, and psychological aspects. For more information see here.
  - **Monitoring tools for hospitals:** Prediction analytics of intracranial pressure based on the invention of completely new methodology. Data pre-processing and analysis, feature

definition, clustering, and application of Gaussian mixture model (Vienna hospital - traumazentrum AUVA).

- ○ **Image processing - cells:** Multiple object segmentation and tracking. Procedure for optimization of decoloring and segmentation in 4D parametric space.
- ○ **Image processing – subcellular structures:** Development of original approaches for image and video processing together with analysis. Creation of new statistical measures.
- ○ **Neurophysiology - brain data analysis:** Signal processing, analyses of complex and multichannel EEG time series by traditional and nonlinear (chaos) approaches, development of a new mathematical methods for EEG processing, application of feature selection process from over 500 features by means of artificial neural networks, classification, feature selection.
- ○ **Neuroscience - Brain-computer interface:** Medical biofeedback system with robot-assisted training for neurorehabilitation. EEG recording, lab maintenance, patient handling, improvement of research methodology.
- ○ **Cardiovascular medicine - heart signal analysis:** Definition of new features from spatial potential ECG maps, statistical insights into image morphology, feature space reduction, and classification tasks.
- ○ **Wavelet applications in medicine:** Wavelet techniques for ECG and EEG signal analysis (Institute of Computer Science, Academy of Sciences of the Czech Republic).
- ○ **Analytics in animal studies:** Time-series analysis of cardiovascular parameters in rats, use of non-equidistant spectral analysis (Faculty of natural sciences, Comenius University).

- ○ **Biomedical industries**

  - ○ **Biomedical imaging - data analysis and statistical testing:** Biogenic iron in MRI diagnostics.
  - ○ **Data analysis of electro-magnetic influence on cells:** Data analytics and statistical testing, contributions to the methodology and measurements in the context of monitoring of low frequency magnetic and pulsed electric field biological effects on yeast cells by using biological autoluminescence (Institute of Photonics and Electronics, Academy of Sciences of the Czech Republic).
  - ○ **Signal analysis of cell manipulation by electric field:** Signal analysis, quantification by a variety of measures, statistical tests in the context of cell and tissue electroporation by pulsed electric fields (Institute of Physics, Academy of Sciences of the Czech Republic and University of Ljubljana).

- ● **HW measurement systems and electronics**

  - ○ **Experimental platform and analytical tools**: Measurement of low frequency electromagnetic field effects on biological systems - approach conception, HW and SW development, methodology of measurement, data analysis.
  - ○ **Impedance analysis of acupuncture points and pathways:** designed study, performed experiments, analyzed results. Co-authored hardware development – a multichannel device for vector impedance spectroscopy (cooperation with Greifswald University, Germany).

Awards

- ● **Award of the Literary Fund:** For the number of citations published by the author cited in 2015 – 2017, section for Scientific Literature, 3-year scientific response during 2015 - 2017.

- ● **Award of the Presidium of Slovak Academy of Sciences:** For a scientific publication with an extraordinarily large number of citations obtained during the years

2013 - 2015, which, according to the parameters of the database Essential Science Indicators Web of Science, is among the so-called Highly Cited Papers.

Publications

- see at [Google scholar](#)
- journal papers: 26
- conference contributions: 42
- citations: >780 (WOS), >310 (SCOPUS), >2500 (google scholar)
- H-index: 10 (google scholar)