Quantum Machine Learning for analyzing multi- and hyperspectral satellite images

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Agenda

1. Education
2. Skills and additional qualifications
3. Achievements
4. Feature aspirations

Education

Econophysics

- Bachelor of Science - "Time Series analysis with ARMA and ARIMA processes. Application in SAS"
- Master of Science - "Geometrical and topological methods in a classical and quantum field theory"

Ph.D

Accelerator neutrino oscillations and their non-standard interactions - prof. Marek Zrałek.

In the fields of:

1. Statistics
2. Data Analysis, Programming
3. Physics

Scientific research

Universitates

- University of Silesia in Katowice (cooperation 2014 - 2018)
- University of Warsaw (2013 - 2014, 2019)
- Cardinal Stefan Wyszynski Univeristy in Warsaw (2015-2019)
- SGH Warsaw School of Economics (2019)

Publications

1. 8 publications on neutrino interactions and discreete, family symmetries for lepton masses and mixing in SM and Beyond. *Physical Review D, Symmetry, Phys. of Atomic Nuclei, Acta Physica Polonica B*
2. 2 publications on topological characteristic for RNA and protein structures *Nature Scientific Reports, Nucleic Acids Research*

Scientific research

Publications

3. 1 publication on connections between statistics and (classical) physical models. *Physica Status Solidi B*
4. 3 monographies on AI and Machine Learning methods (feature selection, modeling) in credit scoring and Real time data analysis. *Oficyna wydawnicza SGH* (In preparation *Quantum Machine Learning for Business*)

seminars, posters

- Neutrino physics - NOW (2018), Discrete (2018), Neutrino (2018) ...
- Topology of RNA - Summer Conference on Topology and its Applications (2018 USA), Category Theory in Physics, Mathematics and Philosophy (2017).
- Data Science - Data Science Summit ML edition (2021), Advanced Analytics and Data Science with SAS (2020) ...

Private sector work, Achievements

Work

- Data Analysis Expert (2017-2019), Data Science Engineer (2019-2021), MLOps Expert in Risk Department (2021)...
- free Advanced Scorecard Builder Python library, stocking optimization, influence of new data on model quality, model implementation in the cloud environment ...

Certificates

9 certificates with SAS Institute, more than 10 with Kaggle, Udemy, IBM

QPoland 2019

QPoland is organized by quantum computing researchers and educators from Poland.

- Workshops and First in Poland Qchallenge with IBM and Paribas
- Moderator on mettup with Washington DC, Toronto QC ...

Research plan

1. Preparing a benchmark dataset with data and metadata - GiGo
2. Automize study of different data vector representations.
3. benchmark from classical ML and DL (ANN, CNN) algo for classification problem (SVM, XGB, Tree, Forest). Topological data analysis - Quantum Persistent homology.
4. Feature selection (QPCA) and XAI methods for data reduction.
5. hybrid QSVM, full QSVM - automaze hyperparameter tuning. (Hyperopt python package)
6. Verification and confrontig best models with other data and other models - time and accuracy, confusion matrix...

- Connecting QSVM with QFT methods
- Quantum Neural Networks

Summary

Thanks for Your Attention!

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