PhD research topic proposal
BME, Doctoral School of Mathematics and Computer Science

Name and degree of supervisor :

Attila Lovas, PhD.

Are you willing to supervise Stipendium Hungaricum applicants?

Yes

Title of the topic:

Compositional data analysis methods in information geometry and data science

Short description:

Multiplying a likelihood function with a positive number makes no difference in Bayesian statistical inference, therefore after normalization the likelihood function in many cases can be considered as probability distribution. This idea led to the born of the field what we call today compositional data analysis (CoDA). Aitchison defined a vector space structure on the probability simplex in 1986, and a statistically relevant scalar product was introduced on this space in 2001 by Pawlowsky-Glahn and Egozcue, endowing the probability simplex with a Hilbert space structure. For several decades, Information geometry and CoDA were fields, that have been developed parallel to each other, such that they have ignored each other so far. Independently, both have found powerful descriptions that led to a deeper understanding of the geometric relationships between their respective objects of interest: probability distributions and compositional data.

The applicant is supposed to study how the Eucledian CoDA perspective can be implemented in information geometry and vica versa, how CoDA can profit from the rich structures that information geometry can offer. Apart from building a bridge between theories, the candidate is intended to work on new CoDA motivated algorithms in data science.

Requirements:

Linear algebra, matrix analysis, probability theory, and a good command of at least one scientific programming language.

Contact:

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Place of work:

Department of Analysis, Institute of Mathematics, BUTE