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Data processing for complex medical investigations.

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Dementia, particularly Alzheimer's disease, is a growing global medical and economic problem, exacerbated by increasing life expectancy and an aging population. This requires effective methods for processing biomedical research data, in which the number of observations is less than the data dimension. This article describes a comprehensive data processing pipeline, including dimensionality reduction and clustering. The methodology is based on the combined use of principal component analysis (PCA) and uniform manifold approximation and projection (UMAP) to reduce dimensionality followed by clustering with optimized parameters. The study demonstrates how these methods can mitigate problems such as sparsity of data and the curse of dimensionality by providing information about potential biomarkers for early diagnosis of neurodegenerative diseases. This study provides a foundation for experts in the field to explore new hypotheses and improve examination tools.

Authors: BOGDANOV, Alexander (St. Petersburg University St. Petersburg, Russia); BELIKOVA, Margaryta (Russia); SHCHEGOLEVA, Nadezhda (Saint Petersburg Electrotechnical University "LETI"); Ms ZALUTSKAYA, Natalia (Federal state budgetary institution «Bekhterev National Medical Research Psychiatry and Neurology Center»); TONKA, Petr (Federal State Budgetary Educational Institution of Higher Education "Saint-Petersburg State University")

Presenter: BOGDANOV, Alexander (St. Petersburg University St. Petersburg, Russia)

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