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Health Insurance Fraud Detection using Claim-Based Profiling

Medical claim expenses are inherently compositional, as fraud-relevant patterns often emerge from the relative allocation of costs across categories rather than from total expenditure alone. We propose a claim-level fraud screening framework based on compositional profiling, using the Aitchison distance to compare new claims with a historical reference distribution. Statistical significance is assessed via bootstrap resampling. Simulation results under a multivariate normal setting demonstrate effective false positive control, increased sensitivity to meaningful profile deviations, and robustness to scale-only changes. The framework offers an efficient, interpretable, and practically relevant approach to anomaly detection in healthcare expenditure data.

Special/ Invited session

Classification

Both methodology and application

Keywords

Fraud detection; Healthcare claims; Medical expenses; Claim-level profiling; Compositional data analysis; Aitchison distance; Anomaly detection; Bootstrap;

Primary author: Prof. BERSIMIS, Sotiris (University of Piraeus, Greece)

Co-authors: MICHELAKIS, Charalampos-Panagiotis (University of Piraeus, Department of Business Administration); BIRIS, Panagiotis (University of Patras); ECONOMOU, Polychronis (University of Patras)

Presenter: Prof. BERSIMIS, Sotiris (University of Piraeus, Greece)

Track Classification: Statistics in Pharma / Healthcare