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Multivariate data analysis on the example of healthcare services in European Union Member States

Topic 7 – Better statistics for a globalised world

Keywords: multivariate analysis, aging, healthcare services

Introduction

Increase in the number of seniors living in countries results from longer lifespans and a demographic slump that leads to higher population share of seniors. According to forecasts presented by the European Commission, population aged 65 plus will double from 87.5 million in 2010 to 152.6 million in 2060 in countries of the European Union. A triple increase may be expected in the population of 80 plus, i.e. from 23.7 million do 62.4 million. Therefore, it is possible to ask a question if at present European countries are organizationally prepared or adapted to provide efficiency healthcare system. The main driving force behind those serious demographic shifts is, apart from poor fertility rates, longer life expectancy which is conducive to greater ageing of current population. Longer life expectancy is the new reality. According to different estimations, current population may be living 10 to 15 years longer, pushing life expectancy past the 80 years old mark. This situation will force to adapt to the changed the social structure, structure of health care. Thus, demographic changes will drive changes in health care. The first changes can already be observed in EU Members State. Date collected by the European Commission, Directorate ? General for Health and Consumers was used for purposes of this paper (Special Eurobarometr).

Methods / Problem statement

Efficiency of healthcare system in any given country could be objectively assessed using multivariate data analysis. This paper presents how taxonomic measure of investment attractiveness (TMAI) was used to shortlist EU countries where healthcare systems are most safe and efficient. This paper uses Hellwig's method of linear ordering to select EU countries with best efficiency and safety. Hellwig's method allows to create a "ranking" of objects in terms of several variables. Objects are ordered based on their distance between a given object and the reference object. The closer Hellwig's measure to one, the closer is analysed object from the reference object. Another multivariate method used for the research was clustering based on agglomeration algorithm, collecting objects into increasing clusters, using a measure of similarity and distance. One of clustering methods is hierarchical cluster analysis. Hierarchical cluster analysis enables creating classes of objects similar in terms of several variables, based on the distance matrix. The result of the method is dendrogram i.e. binary class tree, where clusters are represented by the nodes, whereas leafs are classifiable objects. An optimum number of clusters return highest ratio of between-groups variance and within-group. variance

Conclusions

Presented in this paper methods of multivariate data analysis (factoring in multi-thread and multi-faceted nature of blood donation situation) may be used for benchmarking which helps identifying similar countries using praiseworthy systems to draw from. In order to make the healthcare system successful (and mitigate

consequences of identified risks), each EU Member State is recommended to select a country for benchmarking purposes i.e. a "role model" in ageing society.