

Study of multidimensional signals using fuzzy space-time windowing. Principle and example with the lane change maneuver

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Abstract: Human control experimental studies often yield many data sets which are large due to the presence of several factors and variables. This paper proposes the study of a large database of multidimensional signals using two main tools: fuzzy windowing (FW) and multiple correspondence analysis (MCA). Such a pair of tools may help the data analyst to see the more salient phenomena (and data imperfections, if there are any). One example concerning an experimental study about lane change using a driving simulator is considered to illustrate this. This article shows how FW allows quantitative and qualitative scales to be studied together and how MCA may draw nonlinear relationships. The possibility of considering data sets as supplementary points may help the data analyst to understand the effects of the factors. The discussion states both the disadvantages and advantages of the proposed approach.

Keywords: fuzzy windowing, space windowing, time windowing, multiple correspondence analysis, lane change, driving behavior.
