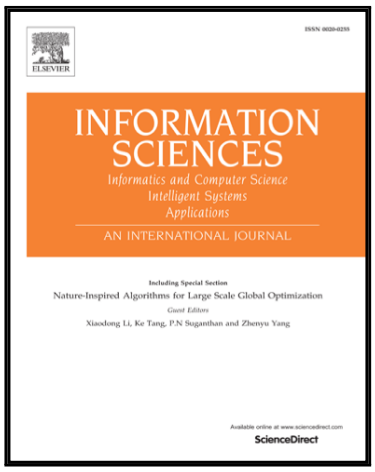

A New Method for Calibrating the Fuzzy Sets Used in fsQCA

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A New Method for Calibrating the Fuzzy Sets Used in fsQCA

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ABSTRACT

This paper provides a new methodology for calibrating the fuzzy sets that are used in fsQCA, one that is based on clearly distinguishing between a linguistic variable and the linguistic terms for that variable, and that allows for uncertainties about those terms to be included in the calibration method. Each resulting fuzzy set, called an *approximated reduced-information level 2 fuzzy set* (RI L2 fuzzy set), is equivalent to a standard type-1 fuzzy set, but is for the linguistic variable, and, it has an S-shape, the kind of shape that is so widely used by fsQCA scholars, and is so important to fsQCA. This new calibration methodology is applied to Ragin's Breakdown of Democracy example, using new data provided by him, and demonstrates that his earlier solutions are also obtained using our approximated RI L2 fuzzy sets, something that should be reassuring to fsQCA scholars. Additionally, because the S-shaped membership functions are derived from footprints of uncertainty for all of the linguistic variable's terms, this paper shows how to obtain more precise statements of fsQCA causal combinations for their best instances, something that may be of added value to practitioners of fsQCA. Finally, we explain how different data-driven calibration robustness studies can be performed, something that may also be of great value to fsQCA practitioners.

Keywords: Breakdown of Democracy example, calibration of fuzzy sets, centroid, fsQCA, HMA, interval type-2 fuzzy sets, level 2 fuzzy sets

1. Introduction

As is stated in [29]: Fuzzy Set Qualitative Comparative Analysis (fsQCA), developed by the social scientist Charles Ragin [33–35, 38, Ch. 5], is a methodology for obtaining linguistic summarizations from data that are associated with cases[1]. Unlike more quantitative methods that are based on correlation, fsQCA seeks to establish logical connections between combinations of causal conditions (*conjunctural causation*) and a desired outcome, the result being rules that summarize the sufficiency between subsets of all of the possible combinations of the causal conditions (or their complement) and the desired outcome. The rules are connected by the word OR to the desired

[1] In the rest of this paper we use the words: *variable*, *terms*, *causal conditions*, *causal combinations* and *desired outcome*. A *variable* is something that can be measured. Each variable is linguistically described by one or more *terms*. The terms for each variable that are used as the antecedents of fsQCA rules are called *causal conditions*. In fsQCA the antecedents are combined using the word AND that is modeled using the minimum operation. Such a combination of causal conditions is called a *causal combination*. The term that is used as the consequent of the fsQCA rules is called *desired outcome*.