

1 **I. Introduction**

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3 **I-1. Background and Content**

4 There seems to be something called fsQCA in the world, and I was asked to understand its
5 content and write an explanation. After studying a bit and gaining a basic understanding, I
6 decided to write the explanation.

- 7 1. First, using the data on the maintenance of democracy in interwar Europe, which is
8 used in the explanatory books on QCA, I will conduct numerical analyses (such as
9 multiple regression and factor analysis, analyses using variance-covariance matrices,
10 and correlation matrices through linear algebraic operations) that are generally used.
11 This will demonstrate the effectiveness, applicability, and limitations of numerical
12 analysis. (This content corresponds to Chapter II, but it is an added chapter to
13 understand the purpose and significance of QCA. If the goal is to learn how to do
14 QCA, you can skip this part and start reading from Chapter III, then come back to
15 Chapter II.)
- 16 2. Next, I will organize the binary logic construction of QCA (Qualitative Comparative
17 Analysis), which is used in the field of sociology, in a set-theoretic manner and
18 visualize it using Boolean operations and truth tables (csQCA). As a case study, I
19 will verify Lipset's theory (modernization \Rightarrow democracy).
- 20 3. Finally, I will introduce fsQCA, which incorporates fuzzy operations into set-
21 theoretic discussions, making quantitative comparison methods of consistency
22 possible.

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58 I-2. Why fsQCA?

59 Sociologists seem to have an inexplicable anxiety. In my opinion, this anxiety is unfounded.
60 They seem to feel inferior because their work is merely descriptive and lacks analysis, thus
61 not qualifying as science. However, even if it is merely descriptive, description forms the
62 foundation of science. For example, the vast accumulation of descriptive biology led to the
63 emergence of taxonomy and genetics, which eventually connected to molecular biology.
64 Discoveries are generally made descriptively. There is no doubt that description is the origin
65 of science. It is natural that systematic and logical organization is not performed at the time
66 of description. In experimental science, even if the extraction and verification of logic from
67 experimental results are logical, the setting of experimental conditions is not necessarily
68 logical. Experimental science is not logical unless the experimental conditions are set by
69 organizing existing descriptive information. There are plenty of illogical discourses in other
70 fields as well. Regarding the anxiety that there is no basis for the correctness of discourse,
71 there is no need to feel uneasy about the fact that it cannot be proven to be an absolute truth.
72 A discourse is considered true because it has not been effectively refuted. What science
73 seeks is not absolute truth, but asymptotic truth. Seeking absolute truth is rather unscientific.
74 While it is important to show the basis of a discourse, it is not evidence of its truth. It is
75 more important to consider where the possibility of refutation lies in one's own discourse.
76 Given the current situation, overflowing with numerical explanations and mathematical
77 models, it may be understandable to feel that it lacks persuasiveness. However, the presence
78 of numbers or mathematical models does not necessarily lead to logicity.

79 Considering this, what sociologists desire is to make their analytical methods more
80 persuasive. One possible solution is for them to study linear algebra and become as
81 knowledgeable about common numerical analyses as the experts in those fields. However,
82 this is not realistic. This is because many of the phenomena analyzed in social sciences have
83 a limited number of observations relative to the number of explanatory variables (data
84 items). In other words, the sample sizes are often small. Additionally, in many cases, the
85 correlations between data items are high. Such data are not suitable for regression analysis.
86 Even if they study and become capable of using these analytical techniques, the situations in
87 which they can be applied are extremely limited.

88 Another possible solution is to fit their descriptions and analyses into a descriptive method
89 with a strict structure and organize them logically. This is an effective strategy. In the fields
90 of natural sciences and econometrics, experiments are almost always constructed and data
91 collected using formalized methods, and the analyses are conducted using these formalized
92 methods without being conscious of the validity of their own logic. In such a situation, it is

93 beneficial for sociologists to consider ways to logically verify and objectify their
94 methodologies to deepen and strengthen research in their field. Furthermore, adding the
95 concept of quantitative comparison to traditional methods is also beneficial. It presents the
96 possibility of new analytical methods for science as a whole.
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