

# using Fuzzy Set Qualitative Comparative Analysis

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## Objective

- Develop a new Computing With Words (CWW) technique to **generate rules/patterns** from data and to summarize the data so that data can be transformed into knowledge.
- A methodology called Fuzzy Set Qualitative Comparative Analysis (**fsQCA**) is used for obtaining **linguistic summarizations** from data that are associated with cases.

## fsQCA

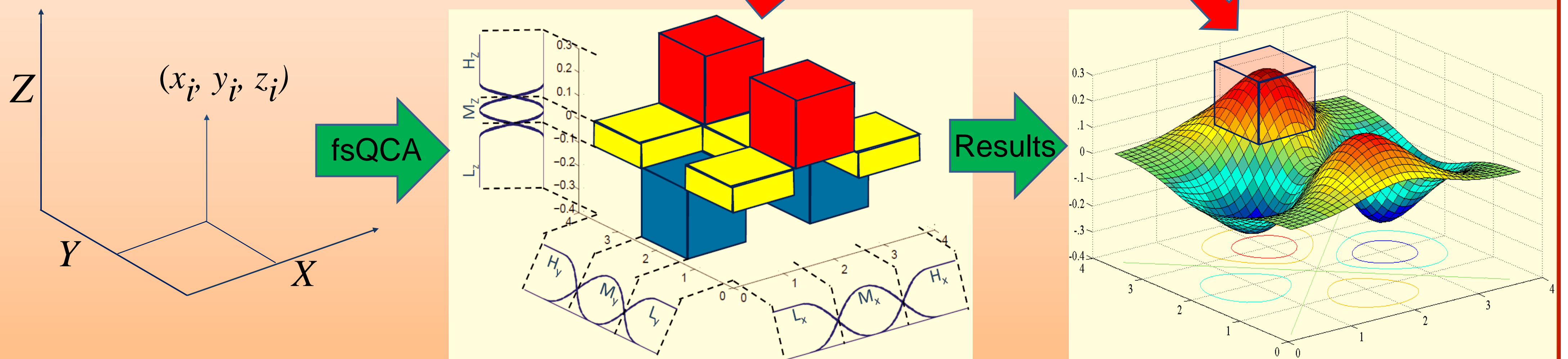
- FsQCA seeks to establish **logical connections between combinations of causal conditions and an outcome**.
- It can also be viewed as a methodology for **establishing causality**, not of a single causal condition but of combinations of such causal conditions.
- FsQCA explains information in words; therefore, aids people in making **subjective judgments**.

## Procedure

- **Preparatory Steps**  
Choose a desired outcome, causal conditions, and determine MFs
- **Processing Steps**  
Find surviving causal combinations, simplify them by including substantive knowledge using counterfactual analysis
- **Summarization Steps**  
Connect cases to the solutions, compute coverage and consistency of solutions

## Granular Description of a Function

IF  $X$  is **MODERATE** and  $Y$  is **HIGH**  
THEN  $Z$  is **HIGH**.



## Democracy

Summarize **Breakdown of Democracy** of 18 European countries between World Wars 1 and 2

- IF a country is **NOT DEVELOPED** and **NOT URBAN** and **NOT INDUSTRIAL** THEN **BREAKDOWN OF DEMOCRACY**.
- OR
- IF a country is **UNSTABLE** THEN **BREAKDOWN OF DEMOCRACY**.

## Auto MPG

Summarize causal combinations that explain **LOW MPG** cars (195 cars with model years from 1970 to 1982)

- IF **Horsepower** is **HIGH** and **Wight** is **NOT LIGHT** and **Acceleration** is **NOT HIGH** THEN **MPG IS LOW**.
- OR
- IF **Horsepower** is **NOT HIGH** and **Wight** is **HEAVY** and **Acceleration** is **NOT LOW** THEN **MPG IS LOW**.