Overview of QCA Software & Recent Developments with Kirq

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International QCA Paper Development Workshop
ETH Zürich
November 27, 2018

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QCA as both Technique and Approach

As a technique
- Measures of degree of set membership
- Subset relations measured by consistency and coverage
- Taxonomies as truth tables
- Sufficiency solutions via Quine-McCluskey minimization
- Requires software

As an approach
- Rihoux, et. al. (2009, Ch 1 of CCM)
- Ragin & Fiss (2017) Intersectional Inequality
- Doesn’t require software
Qualitative Comparative Analysis
QCA 3.0
Serial # 030B0002
© Kriss Drass 1993
Major QCA Software Packages
(see Compassss.org for a complete list)

- QCA
  (Drass and Ragin 1992)
  - TOSMANA (.NET, Mono)
    (Cronqvist 2003)
  - fs/QCA (Win, OSX)
    (Ragin, Drass, and Davey 2009)
  - QCA (R)
    (Duşa 2006)
  - fuzzy (Stata)
    (Longest and Vaisey 2008)
  - acq & Kirq (Win, OSX, Linux)
    (Rubinson and Reichert 2012)

- QCA3 (R)
  (Huang 2012)

- QCApro (R)
  (Thiem 2016)

- SetMethods (R)
  (Oana, et. al. 2013)
Current Work on Kirq: Symbolic Boolean Computation

• Strengthens and makes explicit the set-theoretic foundation of QCA
• Increases the expressiveness of QCA
  • Boolean expressions may be arbitrarily complex
  • Encourages analysis of sets, rather than individual conditions and outcomes
• Researcher can associate Boolean expressions with particular constraints to define, e.g., impossible conjunctions and theoretical expectations
• Incorporation of multivalued sets
  • by converting multivalued set to series of (disjoint) crisp sets and defining derived conjunctions as impossible:
    • \( \text{mv}\{\text{white, black, latino}\} \rightarrow \text{w}\{0,1\}; \text{b}\{0,1\}; \text{l}\{0,1\}; \text{Imp}\{\text{wb, wl, bl}\} \)
• Future directions:
  • Set-theoretic longitudinal analysis, robustness tests
  • Extend Boolean algebra implementation to accommodate:
    • Missing data (partially implemented)
    • Extended fuzzy-set operations? (partially implemented)
Current Work on Kirq: Set-theoretic Visualization

- Integrating visualizations into Kirq
  - originally designed as an independent web-application
- Interoperability with other software:
  - Using JSON for serialization (integration with R packages?)
  - Read fs/QCA output?
- Renders: LaTeX/TikZ, GnuPlot, GraphViz
- Can render visualizations locally, or by calling out to cloud.

**Visualizations**
- XY/Enhanced XY plots
  - complete
- Fiss configuration charts
  - partial
- Linear diagrams
  - complete
- Lattices & directed graphs
  - complete
- Star & radar charts
  - not begun
- Venn/Euler diagrams?
  - partial
- 2x2 tables?
- Treemaps?
- Branching diagrams?
Current Work on Kirq: Implementing QCA as an Approach

- Goals:
  - Keep Kirq’s user-friendliness and ease-of-use
  - Support and encourage retroductive, case-oriented analysis and configurational thinking
  - Improve maintainability and provide extensibility
- Design still evolving
- Cross-platform GUI application with command syntax
  - GUI still to be designed; focus is on:
    - viewing and visualizing data set
    - visualizing, comparing, and interrogating results
  - Procedures for data transformation and calibration
  - Mathematical/statistical operations
  - Integrated scripting language
- Relational data management using SQL
- File format/session history is portable and platform independent
Recommendations

- Distinguish between QCA as a technique and QCA as an approach. A good QCA embraces the approach.

- Different software packages approach QCA in different ways; each will help you think about your analysis in different ways.

- Software is just a means to an end. It automates the mundane and repetitive parts of the analysis, so that you can focus on what’s really important—getting to know your cases.

- Follow COMPASSS for updates on QCA/CCM software: http://www.compassss.org/