Revealed Preference Test and Shortest Path Problem

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Given n observations on a consumer's choices and prices of ℓ goods, we say that the data set is *rationalizable* if there exists some utility function u such that these choices are generated by the minimization problems of u under the budget constraints which is made by these prices. Afriat (1967) provided first characterizations of the date to be rationalizable with a concave, continuous and non-satiated utility function. Varian (1982) clarify the conditions and approaches of Afriat's work introducing the concept of *Generalized Axiom of Revealed Preference* (GARP). Subsequently, there are researches on the possibility that the date can be rationalizable with a particular form of utility functions; homotheticity, weak separability, additive separability, quasi-linearity, and so on (e.g., Varian (1983), Brown and Calsamiglia (2006)).

This note provides interesting relations between revealed preference tests of a data set and *shortest path problems* of a *network* (a directed graph with weighted arcs). Since the shortest path problem is a traditional topic in the literature of combinational optimization and there are efficient algorithms to solve it, we can utilize these literatures if the revealed preference tests are reduced to a particular shortest path problems.More importantly, these graph theoretic treatment clarify the interpretation of the revealed preference tests, gives us a refinement of the Afriat inequality, and an unified perspective for several form of tests and the classical utility representation problem of preferences.

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