The Structure of Nash Equilibria

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In this talk I will review the literature on the structure of Nash equilibria. Nash equilibrium is a central solution concept in game theory in analyzing strategic interaction among rational players. However, we can say little about the set of Nash equilibria of an arbitrary strategic game (Osborne and Rubinstein (1994)). Establishing the relationship between the strategic situation and the structure of Nash equilibria remains a difficult open question. The global topological structure of Nash equilibria has been studied in Kohlberg and Mertens (1986), Mertens (1989, 1991), Demichelis and Germano (2002) and Govindan and Mertens (2004). Several papers study the maximal number of Nash equilibria in generic games starting from the seminal work of Quint and Shubik (1997) on 3x3 two person games, McLennan and Park (1999) on 4x4 two person games, and Keiding (1995) and von Stengel (1999) on nxn two person games, yet the least upper bound of the number of Nash equilibria for generic nxn two person games with n>4 remains unknown. Gul, Pearce and Stachetti (1993) use the index theorem to show that if a generic n-person game has k pure strategy Nash equilibria, then the number of mixed strategy Nash equilibria is at least k-1. Sun (2019) characterizes nxn two person games that have a sandwich structure in Nash equilibria, and uses this property to provide a lower bound on the number of Nash equilibria.