

Limits of Diagonalization

Dipendra Kumar Misra
Department of Computer Science & Engineering
IIT Kanpur

The technique of *diagonalization* has been widely used in theories of computation and computational complexity for separating classes, an early example of which is found in the proof of the undecidability of the Halting problem, as given by Turing in 1936, which separates r.e. and recursive classes. It was shown by Baker, Gill and Solovay in 1970s that proofs relying solely on *diagonalization* technique will be insufficient to solve problems such as the famous P-NP problem. Researchers since then have developed a few other techniques; one such technique is *arithmetization* which was used to prove results such as $IP = PSPACE$. However, in 2007 Scott Aronson and Avi Wigderson provided a limit of this approach as well. Interestingly the proof they give is similar to the proof given for diagonalization. The talk will be aimed at discussing the applicability of such arguments and their roots in Turing's 1939 work.