Mathematical Physics Seminar at Boston University

Thu, Sep 21, 3:45pm

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Scaling in Competition and in Tournaments

MCS 149

We introduce two simple models for advancement in a competitive society: advancement/decline and single-elimination tournaments. In the former, each individual is endowed with an integer-valued fitness that changes via two offsetting processes; gain in competition and decline in the absence of competition. From a scaling analysis of the fitness distribution, we obtain a wide variety of social structures as a function of governing parameters. This theory is also applied to understand statistical features win/loss records in major sports leagues.

In the tournament model, a weaker player wins a match with upset probability $q < 1/2$ and the stronger player wins with probability 1-q, after which the loser is eliminated. We apply a scaling analysis to determine the rank of the ultimate winner as a function of the number of initial players and the upset probability. This theory successfully describes statistical features of the winner in the NCAA national basketball championship tournament.

http://math.bu.edu/research/mathphys/seminar.html

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