

Successive shortest paths

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Consider a complete graph K_n with edge weights drawn independently from a uniform distribution $U(0, 1)$. Let P_1 be the shortest (minimum-weight) path between two given vertices, P_2 the shortest such path edge-disjoint from P_1 , and generally P_k to be the shortest such path edge-disjoint from all earlier paths. It is known that the weight of P_1 is asymptotically $\ln n/n$. We show that the weight X_k of P_k is asymptotically $(2k + \ln n)/n$. Specifically, $X_k/(2k/n + \ln n/n) \xrightarrow{P} 1$ uniformly for all $k \leq n - 1$.

This is joint work with Stefanie Gerke and Gregory Sorkin.