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Extremal Behaviour, Weak Convergence and Argmax Theory for a Class of Non-Stationary Marked Point Processes

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Abstract

We formulate a random utility model where we choose from n options $1, \dots, n$. The options have associated independent and identically distributed (i.i.d) random variables $\{X_i, U_i\}_{i=1}^n$, where X_i are the characteristics of option i and U_i is its associated utility.

We use the connection between point processes and extreme value theory to analyze the statistical properties of choice characteristics X of the object with the highest utility as $n \rightarrow \infty$. We derive analytic expressions of the asymptotic distribution of choice characteristics for a range of distributional assumptions on the utilities U_i .

In our discussion section, we suggest an extension of our method to allow us to further relax our distributional assumptions. We also show how our theoretical model can be used to explain empirical patterns relating to commuting time distributions.

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