

LARGE DEVIATIONS

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1st Lecture: A general view on large deviations

Abstract

We will explore the theory of large deviations from different perspectives. As a practical need to know how small certain probabilities are. As an efficient analytical tool in high dimensions. To explore other rare events that are triggered by the occurrence of one rare event. We will illustrate these with diverse examples.

2nd Lecture: Large deviations for nonconventional sums

Abstract

Large Deviation theory allows us to estimate quantities of the form

$$\frac{1}{n} \log E[\exp[\sum_{i=1}^n V(X_i)]]$$

for a Markov Process $\{X_i\}$. We explore conditions on $\{a_i\}$ under which expressions having the form

$$\frac{1}{n} \log E[\exp[\sum_{i=1}^n V(a_i, X_i)]]$$

can be estimated and their limits evaluated. We use this method iteratively to evaluate limits

$$\lim_{n \rightarrow \infty} \frac{1}{n} \log E[\exp[\sum_{i=1}^n f(X_i, X_{2i}, \dots, X_{ki})]]$$