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Slide Title

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Theorem 1: Weak Law of Large Numbers

Let $X_1, X_2, \ldots, X_n$ be a random sample of size n from a distribution with mean μ and variance σ^2. Then, for any $\epsilon > 0$,

$$\mathbb{P}\left[\left|\frac{1}{n}\sum_{i=1}^{n} X_i - \mu\right| > \epsilon\right] \to 0 \text{ as } n \to \infty.$$

In other words, $\frac{1}{n}\sum_{i=1}^{n} X_i \xrightarrow{\mathbb{P}} \mu$.

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Definition 1: Consistency

Let $\hat{\theta}_n$ be an estimator of θ. We say that $\hat{\theta}_n$ is consistent if $\hat{\theta}_n \xrightarrow{\mathbb{P}} \theta$.

Remark 1

Theorem 1 together with Definition 1 implies that the sample mean is a consistent estimator of the population mean.

Proof of Theorem 1

Let $\epsilon > 0$. By Chebyshev's inequality,

$$\mathbb{P}\left[\left|\frac{1}{n}\sum_{i=1}^{n} X_i - \mu\right| > \epsilon\right] \leq \frac{\sigma^2}{n\epsilon^2}.$$

Since σ^2 is a constant, the result follows.

Other useful envs could be:

Example 1: Example Title

This is an example.

Lemma 1: Lemma Title

This is a lemma.

Coding

Code Listing 1: Example of Code

```
import numpy as np

def f(x):
    return x**2
```

Thanks!

Any thoughts?

Special thanks to :special-thanks: