Turn on lsp/latex by using ‘ft=tex‘ on bottom vim line (be sure preamble in place)

1 Probability

Power Set:

$$X \in \mathcal{P}(A)$$

—number of elments — = 2^k

2 union/intersection

$$A \cup B$$

$$\cup_{i=1}^{n} A_i$$

$$\bigcup_{i=1}^{n} A_i$$

$$A \cap B$$

$$\bigcap_{i=1}^{n} A_i$$

$$N_h = N * P(H)$$

$$P(A \mid B)$$

Let $\pi \in [0, 1]$ be a random variable. Then function $f(\pi)$ is probability density function (pdf) if

$$f(\pi) > 0 \quad \forall \pi$$

(write P (a-b))

$$\int_{\pi} f = 1$$

3 Measure Space

4 Compare Measure Space and Topological Space

5 Probability Space

The Axiom $P(\cup A_i) = \sum P(A_i)$ for countable unions can be viewed as can sum each indivual element of sample space.

In particular, one

One model for pdf of f is **Beta** which often used in **conjugacy** (same family of distributions for both prior and posterior, with only parameters varying)

6 Bayes

Let A, B be set of events, such that

$$A \cap B \neq \emptyset$$

Joint probability:

$$P(A \cap B) = P(A \quad and \quad B)$$

Conditional probability (show!)

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

Bayes Thm (show!)

$$P(B \mid A) = \frac{P(A|B)P(B)}{P(A)}$$

If D respresents data, and θ an unknown parameter in our model (ie hypothesis):

$$p(\theta|D) = \frac{p(D|\theta)p(\theta)}{p(D)}$$

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Axiom of Choice : Given a family of sets, how to pick ONE representative example from each set?

: Example: Suppose pool many bags of m&ms and create a family of sets in which all the browns are in one set; all the blues in another and so. Because all the elements of brown set are the same, how do we pick ONE, ie what is the rule?

: For finite sets, can create a rule (proof?). For infinite, trouble begins. Hence the need for this axiom.