Probability theory

Kristian Wichmann

August 17, 2016

This is an overview of probability theory expressed in the language of measure theory.

1 Probability spaces

Definition 1.1. *A probability space is a measure space $(\Omega, \mathcal{F}, P)$ for which $P(\Omega) = 1$. The elements of Ω are called outcomes, the elements of $\mathcal{F}$ events and $P(F)$ is the probability of the event $F \in \mathcal{F}$.*

2 Random variables

Definition 2.1. *An E-valued random variable X on a probability space $(\Omega, \mathcal{F}, P)$ is a measurable function $X : \Omega \to E$. Here $(E, \mathcal{E})$ is a measurable space. Often this measurable space is $(\mathbb{R}, \mathbb{B})$, so that $X : \Omega \to \mathbb{R}$. Such a real-valued random variable is usually simply denoted a random variable for brevity.*

2.1 Distribution

Billedmlet giver pdf

3 Statistical models

4 Likelihood