ILLC Project Course in Statistical Learning Theory

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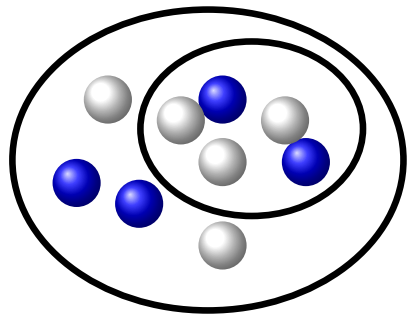
January 2015

The Hypergeometric Distribution

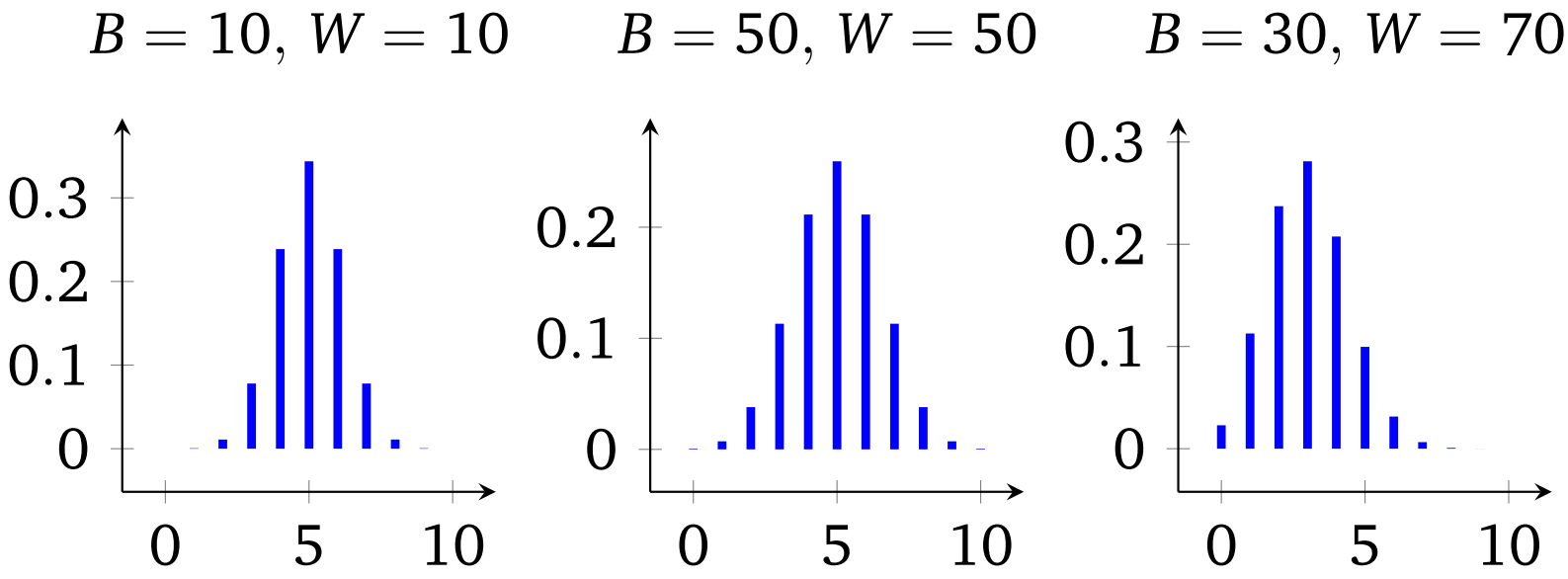
Problem

A bag contains B blue and W white marbles. I grab a handful and inspect their color.

What is the probability I get b blue and w white ones, given that $b + w$ is held fixed?



The Hypergeometric Distribution



The Hypergeometric Distribution

$$\Pr(s \mid T, t, S) = \frac{\binom{S}{s}\binom{T-S}{t-s}}{\binom{T}{t}}$$

The Hypergeometric Distribution

Theorem

$$E[s] = \frac{tS}{T}.$$

Proof.

Based on the fact that

$$\binom{n}{k} = \binom{n-1}{k-1}\frac{n}{k}.$$

□

The Hypergeometric Distribution

	Survived	Died	Totals
First-class ticket	203	122	325
Other ticket	508	1368	1876
Totals	711	1490	2201

Symmetrization