1. VC-dimension

Suppose we have a collection of sets $\mathcal{F}$. Take n many of those sets. They generate a boolean algebra. Count the number of atoms in it. There can be at most 2^n atoms, though depending on the collection there may be much less. For a given n, out of all choices of n sets, record the highest possible number of atoms generated. This is a shatter function.

Definition 1.1.

$\pi_{\mathcal{F}}(n) = \max\{\#\text{ of atoms in boolean algebra generated by } S \mid S \subset \mathcal{F} \text{ and } |S| = n\}$