Boolean Functions

1. Summary
   - LTFs
   - Central Limit Theorem
2. Q&A
3. Problems

LTFs: $f: \{-1, 1\}^n \to \{-1, 1\}$

$P(s) = \text{sgn}(a_0 + a_1x_1 + a_2x_2 + \cdots + a_nx_n)$

- Polynomial function

$P(\bar{x}) = \text{sgn}(p(x))$

- Preservation of bounded moments

Then, if $f: \{-1, 1\}^n \to \{-1, 1\}$ is an LTF,

$\Pr(s) = \Pr(S)$ when $|S| = 1$, $f(s) = s$

CLT: $a \in \mathbb{R}^n$, $s$ within our $\{-1, 1\}^n$,

$S = \frac{\sum_{i=1}^{n} x_i}{\sqrt{n}}$

$\Pr(S \approx U) - \Pr(z \approx U) = o(n^{-1/2})$

Berry-Esseen

- Fourier Analysis
- Fourier Function

Stab [Major]: $1 - \frac{2}{n} \text{arccos} \rho$

- $\rho \approx \text{p-uncorrelated}$

- $\sum_{i=1}^{n} X_i, \sum_{i=1}^{n} Y_i$ - $\rho$-correlated Gaussian

- Probability dist. Gaussian depends on distance to origin

Problem 1 - LTFs

Problem 2 - LTFs, can assume $a_0 = 0$

Problem 3 - $n$-varied by Fourier coefficients on $\phi(y)$

Problem 4 - $n$-varied by random singletons

Problem 5 - $n$-varied by random functions
Problem 1 - LIF
Problem 2 - LIF, can assume $a_0=0$
Problem 3 - pointed by Fourier coefficients on Rom 3
Problem 4 - Favor handling singleton sets
A random function