Lec10

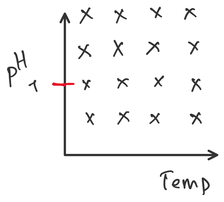
Monday, January 30, 2023 1:22 PM

Recap

- Full factorial analysis : 2-level n-factor design "spaces"
  - a) Main effect : change from low to high for all other combinations
  - b) Interaction effect : (effect of Tem, Cat = A) − (effect of Temp, Cat = B)
- exponentially large for large n values

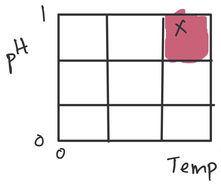
Space filling design

- space in the context of experimental design
  1. nano particle : pH, precursor conc, Temp, ...
  2. plastics out of algy : Temp (room → deg Temp)
     Pressure (atm → machine threshold)
     (2-dim space)
  3. protien rxn : orientation (angle)
     confirmation equilibrium
     on/off rate (2x times)
     (6-dim space)
- response ← design parameter (model)
- examples :



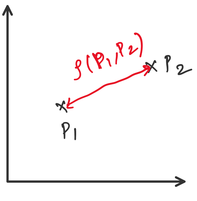
"grid design" → exponential growth
→ non-linear responses are difficult to capture
→ redundancy

- Latin Hypercube Sampling



- we make n^2 cells of our space
- randomly pick any cell and place a point within that cell
- i^{th} row and j^{th} column will not have any more points.
- T = 0.1, 0.3, 0.5, 0.6
  pH = 0.2, 0.3, 0.45, 0.7
- (0.1, 0.5) , (0.2, 0.5) , (0.3, 0.7) , . . .

Distance based design



- given a notion of a distance, we typically solve a max min problem to obtain a space filling design
- optimization techniques for solving "Max Min Diversity Problems" (MMDP)

Sobol Sampling

- generators to sample points sequentially. ← Matrices
- direction to place points such that it fills the space that has not already occupied