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STAT 404 Experiment Project Proposal: Mobile phone reception at UBC

Objectives: We aim to study the effect of location, position, level, and company on the mobile phone reception at UBC. This experiment is a randomized block design, and can be described as a $3 \times 2 \times 3 \times 2 \times 2$ factorial experiment. We will investigate four treatment factors, and one block factor.

Experimental factors and Factor levels:

Treatment Factor	Description	Levels
B	Building in different location at UBC	IONA(-1), Sauder(0), CPSC(1)
P	Position (inside/outside the building)	Inside(-1), Outside(1)
L	Level of floor	Low(-1), Middle(0), High(1)
C	Company of the mobile plan	Fido(-1), Rogers (1)

Block Factor	Description	Levels
S	System of the mobile phone	IOS(-1), Android(1)

Response variable: The response variable is the levels of reception shown on phones. Since the reception scales for different phone systems might be different, we will make the response variable the levels of reception shown on phones in terms of percentage. We will rate the reception level with a range from 0 to 1. (e.g. 0 indicates no reception, 1 indicates full reception. if a reception level is 3/5 shown on a phone, we will record as 60%).

Outline of the tentative experimental plan and analysis:

- Randomly assign experiment units (a phone) to a treatment, and record the corresponding level of reception.
- Model checking and Improvement (transformation, residual analysis)
- Introduction of the interaction effect.
- Analysis of the significance of the main effects and interaction effects using ANOVA table and interaction plots
- contrasts building and analysis of its contribution to the sum of square of the corresponding effect