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Analysis of Variance

This quarter Yeting, Lucas, and I went over the fundamental calculations of ANOVA and applications of ANOVA.

An Analysis of Variance (ANOVA), is a statistical test that informs the tester of the probability of there being a significant difference between population means (it's not just due to chance). It does this by calculating an F Statistic, which is the ratio of between group variance to within group variance. It is preferable to multiple T testing, which measures the difference between two groups, because it factors in the risk of increased type one error which occurs with multiple hypothesis testing.

1. Compute the overall (grand) mean
$$\bar{X}_{\text{grand}} = \frac{\sum X_{ij}}{N}$$

2. Compute the "Between-Groups' Sum of Squares (SS_{betwen})
$$SS_{\text{between}} = \sum_{k=1}^{g} n_k (\bar{X}_k - \bar{X}_{\text{gr.}})^2$$

3. Convert sums of squares to mean squares
$$MS_{\text{between}} = \sum_{t=1}^{g} \frac{(\bar{X}_{ik} - \bar{X}_k)^2}{n_k}$$
$$MS_{\text{within}} = \frac{SS_{\text{between}}}{g-1}$$

5. Compute the F-statistic
$$F = \frac{MS_{\text{between}}}{MS_{\text{within}}}$$

6. Compare to the F-distribution $df_1 = g - 1$, $df_2 = N - g$

where:
$\bar{X}_k$ = $mean$ of group k n_k = size for ef group k
$\bar{X}_{ik}$ = $value$ for the i-th dividual in k in group kn group k
g = number of groups
$\bar{X}_k$ = mean of group k

We then looked at applications for ANOVA. The research paper that Yeting picked was "Face Off: Implications of Visual Cues on Initiating Friendships on Facebook". It conducted a 2x3x2 Anova, on the effect of gender and attractiveness on probability of initiating friendships, and unsurprisingly, found that there are significant effects and interaction effects. Attractive people are more likely to be friend requested, and this effect is amplified by the requester being of the opposite gender. Notably, men are more desperate and always are more likely to friend a woman, whereas woman are typically neutral between male and female facebookers unless the man is very attractive.

Overall, ANOVA is a very important concept and tool for researchers, but I wish I had learned something new this quarter.