### Abstract

The analysis of salary of professors indicates that there is no significant evidence (p value 0.9946) supporting that theoretical professors making more money than professors in applied discipline vice versa. Besides, I do find there is significant evidence that female professors making different amount of money from male professors (p-value = 0.01304). The theoretical T confidence interval reveals that we are 95% percent sure that the true mean of mean of salary of male full professor is between 123592.and 1 130649.5. Simulation t confidence interval gives a similar result of 120010.0 and 133831.5. A simple linear regression model is used to investigate the relationship between salary and male professors. The outcome is the inference of beta, years.since.Phd has p value of 0.0837 and has coefficient of 0.6555 that means one additional years is associate 0.6555 \* 1000 salary increase. Bayesian statistics model is applied to research the soccer club’s winning probability distribution. For Leicester city club, I can find their winning probability distribution shifts a lot and showing that they become more likely to win the final (though they already won the champion yesterday). A comparison between Bayesian statistics and frequency statistics is conduct for graduate level percentage in population. A bootstrap is used for frequency testing and beta distribution is applied for Bayesian posterior analysis. A linear multiple regression model is used to research the relationship between ice-cream consumption and other factors. Among them, I found an interaction term of price and income. After adding, the interaction term, the model becomes better. The interaction term is significant with p value of 0.0491. The overall model is that F test small then 0.01, R-squared: 0.7411, and Adjusted R-squared: 0.698. A multiple logistic model is taken to analyze how to efficiently target customers. With compared with SVM, KNN, and use cross validation, I feel logistic regression gives relative high accuracy (0.9149254) and also high profit (low false negative).