Problem Set #1

MACS 30150, Dr. Evans
Keertana V. Chidambaram

Problem 1 Classify a model from a journal:

Part (a). The article chosen is "Impatience and Uncertainty: Experimental Decisions Predict Adolescents' Field Behavior" from the *American Economic Review*.

Part (b). Sutter, Matthias, Martin G. Kocher, Daniela Glätzle-Rützler, and Stefan T. Trautmann. "Impatience and uncertainty: Experimental decisions predict adolescents' field behavior." American Economic Review 103, no. 1 (2013): 510-31.

Part (c). The main mathematical equations given in the model are:

$$P(y_{savings} = 1|X) = \phi(\beta_0^1 + \beta_1^1 * x_{impatience} + \beta_2^1 * x_{age} + \beta_3^1 * x_{math\_grade}) \quad (1)$$

$$P(y_{smoking} = 1|X) = \phi(\beta_0^2 + \beta_1^2 * x_{impatience} + \beta_2^2 * x_{ambiguity\_aversion} + \beta_3^2 * x_{age} + \beta_4^2 * x_{gender} + \beta_5^2 * x_{math\_grade}) \quad (2)$$

$$P(y_{alcohol\_consumption} = 1|X) = \phi(\beta_0^3 + \beta_1^3 * x_{impatience} + \beta_2^3 * x_{age} + \beta_3^3 * x_{weekly\_pocket\_money}) \quad (3)$$

$$y_{BMI} = \beta_0^4 + \beta_1^4 * x_{impatience} + \beta_2^4 * x_{risk\_aversion} + \beta_1^4 * x_{gender} + \beta_1^4 * x_{weekly\_pocket\_money} \quad (4)$$

$$P(y_{conduct\_grade} = 1|X) = \phi(\beta_0^5 + \beta_1^5 * x_{impatience} + \beta_2^5 * x_{gender} + \beta_3^5 * x_{german\_grade} + \beta_4^5 * x_{math\_grade}) \quad (5)$$

Where P denotes the probability, βs the regression coefficients, and ϕ is the CDF of the normal distribution.

Part (d). Exogenous variables: Variables measuring impatience, age, gender, ambiguity aversion, risk aversion, math grade, german grade, pocket money per week.

Endogenous variables: Variables measuring saving habit, smoking, alcohol consumption, BMI (Body Mass Index), and grade for conduct at school.

Part (e). The models are static, linear, and deterministic.

Part (f). The student's socio-economic background can also be a significant determinant of risky behaviour. Hence a categorical variable indicating the family income of the student can also be added for better analysis.

Problem 2 Make your own model:

Part (a). Since the outcome is binary, a logit regression model is chosen. The output is taken as 1 if $P >= 0.5$ and as 0 if $P < 0.5$.

$$P(Marriage) = \frac{1}{1 + exp(-\beta * X)} \tag{6}$$

$$\begin{aligned} \beta * X = (\beta_0 + \beta_1 * x_1 + \beta_2 * x_2 + \beta_3 * x_3 + \beta_4 * x_4 + \beta_5 * x_5 \\ + \beta_6 * x_6 + \beta_7 * x_7 + \beta_8 * x_8) \end{aligned} \tag{7}$$

The primary assumption in the model is that you already have an SO and you are making a choice at the given point of time if you want to marry that person. The variables chosen for the model are ($x_i s$) (1) your affinity towards your SO, (2) your SO's affinity towards you, (3) your age, (4) time you've lived together with your SO, (5) sum of your and your SO's assets, (6) sum of yours and your SO's incomes, (7) your family's affinity towards your SO, (8) your SO's family's affinity towards your family.

I think the significant variables would be each person's affinity towards the other, financial stability, and age. The first two factors are frequenty cited in many online articles [1 - 4] and is influenced by observation. Third is from a data source [3] which shows a strong relation between marital status and age. There is varying opinion about the importance of the other factotors as per personal observations. Hence, I expect to see larger heterogenity in these variables and hence they may not be very significant.

A preliminary test to test the significance of the model could be to sample and survey a set of couples (married and unmarried). Diversity of the couple (homosexual/heterosexual, representation of cultural groups and geography etc.) is important to avoid biases. Then the data obtained should be split randomly into training and test set. If the model generated from the training set can reasonably predict the marriage status of the test set couples, then we could say that the model is valid.

References:

1. https://www.psychologytoday.com/us/blog/meet-catch-and-keep/201710/how-long-should-you-date-getting-married
2. https://www.thespruce.com/if-you-are-marrying-the-one-2302205
3. https://www.brides.com/story/are-you-ready-for-marriage

4. https://www.lifehack.org/articles/communication/14-questions-everyone-should-able-answer-before-getting-married.html

5. http://overflow.solutions/demographic-data/when-will-more-than-half-the-people-your-age-be-married/