Day_6_Links

1. Logistic Regression 1
2. Logistic Regression 2
3. Data Science From Scratch Ch 16, code
4. Hands on Machine Learning Ch 4, code
5. Machine Learning Pocket Reference Ch 10, code
6. Understanding Logistic Regression Coefficients | by Ravi Charan
7. FAQ: How do I interpret odds ratios in logistic regression?
8. Logistic Regression Details Pt1: Coefficients
9. Predicting Car Transmission Types
10. Predicting Extra Marital Affairs
11. Multinomial Logistic Regression
12. Predicting Fetal Heartbeat Classification
13. Predicting Glass Types

Discussion:

Question:

Can binary logistic regression be applied to a 2-level ordinal variable? Can multinomial logistic regression be applied to an ordinal variable having three or more levels?

Answer 1:

Logistic regression is the statistical technique used to predict the relationship between predictors (our independent variables) and a predicted variable (the dependent variable) where the dependent variable is binary. Binary logistic regression can be applied to a 2-level ordinal value. Logistic regression can handle any kind of independent variables including ordinal and nominal, among which There must be two or more independent variables, or predictors, for a logistic regression.

Binary logistic regression

- Outcome can have only two possible types, "0" and "1"
- For example,
    - "dead" vs. "alive"
    - "win" vs. "loss"

Link.

If we have an ordinal variable having more than 2 levels (meaning three or more) multinomial logistic regression is the correct tool to use to make predictions . There are many types of MLR models, and the exact type of MLR model you choose to use will be dependent on whether your response variable is **ordinal** or **nominal** in nature. The disadvantage of using a Multinomial Logistic Regression for an ordinal dependent variable is that the information contained in the ordering of the categories is lost.

Multinomial logistic regression

- Outcome can have three or more possible types, "0", "1", “2”, and so on
- For example
    - “cat” vs. “dog” vs. “pig” vs. “rat”
    - “small” vs. “medium” vs. “large”

Answer 2:

Binary logistic regression could be applied to a 2-level ordinal variable but we would lose our ordering, which would decrease our information, which, with two categories would not matter. See Link.

If you enter it as a reference code with contrasting dummies you are using up degrees of freedom and this could be important if you have several such predictors and/or you may be interested in interactions which will rapidly increase the degrees of freedom used.

Thus, Kelvyn Jones of Bristol University suggests using orthogonal polynomials and testing the model with a likelihood function.

It is suggested here Link to use Ordinal regression with several levels. An example is given as well: A study looks at factors which influence the decision of whether to apply to graduate school. College juniors are asked if they are unlikely, somewhat likely, or very likely to apply to graduate school. Hence, our outcome variable has three categories i.e. unlikely, somewhat likely and very likely.