Assignment 1

Any group

Abstract

Understanding coefficient and standard error estimation in multivariate regression; performing it in R through basic algebra; testing regressors' significance

Keywords: regression, OLS, covariance, vector, matrix.

In the *Hedonic* dataset from package **plm**, consider the subset of towns whose *townid* begins with the same number of your group, excluding single digits (so that for Group 1 the subset will comprise townids 10 to 19, etc.); please refer to `?Hedonic` for variable explanation.

With reference to the model $mv_i = \beta_0 + \beta_1 crim_i + \beta_2 indus_i + \beta_3 nox_i + \beta_4 rm_i + \beta_5 age + \beta_6 tax_i + \beta_7 ptratio_i + u_i$, in matrix notation $y = X\beta + u$, your group is required to :

1. construct the outcome vector y and the design matrix X
2. estimate the unknown coefficients' vector β by ordinary least squares (OLS) using matrix algebra
3. estimate the standard errors
4. briefly mention which properties of the errors guarantee the consistency of each of the above
5. perform the *t-test* for significance of each β_k
6. estimate the same model "automatically" through the `lm()` function, inspect the results and show that they are equivalent to what you obtained from the above procedure.

Please provide reasonably accurate results[1] under form of a readable document (the format is free) with a reasonable amount of comment where appropriate.

The **deadline** for this assignment is Monday, **November the 30th**.

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[1] The choice of how many digits to report is yours: but formulations like, e.g., "this is about six" are generally not acceptable.