STATS 7022 – Data Science PG Assignment 2

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**Question 2: Leave-One-Out Cross-Validation and Linear Regression**

(a).

We have: ;

So:

To prove:

We prove:

Let so can be considered as a scalar

The equation (2) becomes:

Thus:

(b).

Let and . Then:

The equation (1):

becomes:

where

(c).

We have:

From part (b), equation (3) becomes:

Because is an observation, .

Multiply both side with :

Thus:

(d).

We have:

The deletion residual is:

From part (c), the equation becomes:

Thus:

The leave-one-out cross validated estimate of the MSE () for the linear regression model is: