**Ric’s Tips**

Always a good idea to as well as doing an introduction outlining the whole paper, it is good to do an outline: i.e. a couple of paragraphs saying this is what the chapter is about.

Including interaction terms and non-linear terms:

Having a model with lots of predictors is unyielding because of overfitting and tractability (getting all this information is unreasonable) but we have interaction terms from already available predictors.

**Check if model is better by cross-validation** for extra non-linear terms.

If I can’t explain why the model is right – why would someone used it

The more you can put in tables and graphs, the easier you make it for the reader.

Ric wants a great write up of a decent method rather than a decent write up of a great method.

**Presentation:**

Week of the 24th of February: 8-minute presentation to people who don’t know anything about this type of Maths. A big mistake students do:

* Go through every single bit of maths
* Find 1 part of what I have done and introduce what it involves
* Aim is to show my understanding

**Think of them as adverts to my project and not a roadmap to the project. Use 1 chapter:**

* Give a brief explanation of how it works and how it works on my data
* Think of the maths as seasoning for the talk – more on the understanding, don’t reproduce it – intuitive maths for people to understand

Difference between poor and good answer is only 1 mark – not deep.

2 questions you get

**Poster:**

Again, an advertisement for the project. Want to give people a good sense of 1 part I have done. A bit more maths than the presentation. Try not to put in too much Maths.

Introduction and Next Steps are a nice way to frame the poster. Have a copy of the template of the poster. Difference in marks between good and bad poster is not much.

**Presentation Comments:**

RRRR - Need to explain why rank reduction is value in considering response intercorrelation – what is it doing and why do we care?

MRCE – check if it considers intercorrelation between responses – because it only seems to do it between predictors

Watch out for covariance matrix for the responses vs. covariance matrix for errors

For each model outline how the covariance response matrix is considered for each because this is a key assumption for MRR …

How my models consider response intercorrelation when making predictions:

* MANOVA Stepwise Selection – Wilks’ Lambda Test - Pooled covariance matrix in MANOVA represents the **within-group** covariance structure of the response variable

Wilks Lambda Value = |W| / |W+B|

* W = **Within-group scatter matrix (pooled covariance)**
* B = **Between-group scatter matrix**
* ∣⋅∣ denotes the determinant
* MRCE: MRCE does not directly consider Cov(Y), but since Y follows an MLR structure, response correlations naturally affect the estimated \Sigma\_E – ensuring response covariance influences coefficient estimates and affects predictions.
* RRRR: B\_Ridge = YRTYR is the unscaled covariance matrix (Cov(Y) = 1/n (YTY) and VR is the eigenvector of this so it captures the principal components of the covariance matrix
* CovRegRF – through the loss function: In the proposed random forest framework, we grow each tree with a splitting rule specially designed to maximize the difference in the sample covariance of Y between child nodes. \Sigma\_Y is in its loss function
* CovRegXGBoost - \Sigma\_Y is in its loss function
* MOGP NN - \Sigma\_Y is in its loss function

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* Focus on Mathematical justification for why Covariance XGBoost works.
* Remove coding explanations and apply theory to a simple dataset – better to explain the maths not showing understanding of code as much.