Optimal Window: Integrating Weather into Genomic Prediction

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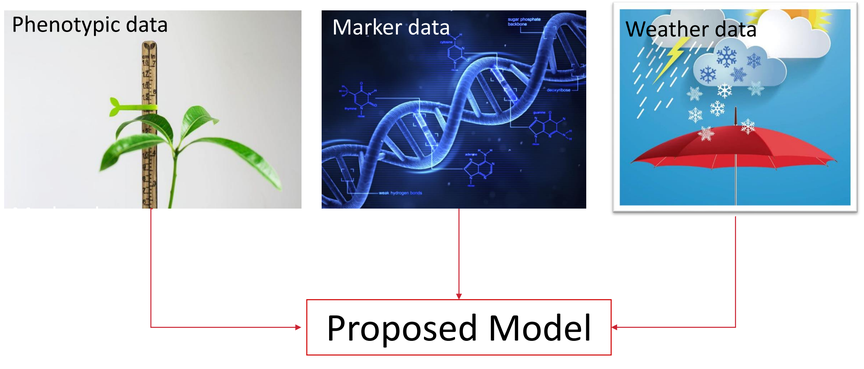
Genomic Prediction



Data Description

- Chickpea Data set with 278 lines
- Main Trait: Days to Maturity – Low / High

- Secondary Traits – 6 traits
- Weather – 4 covariates x 100 days
- Marker data – 10000 markers

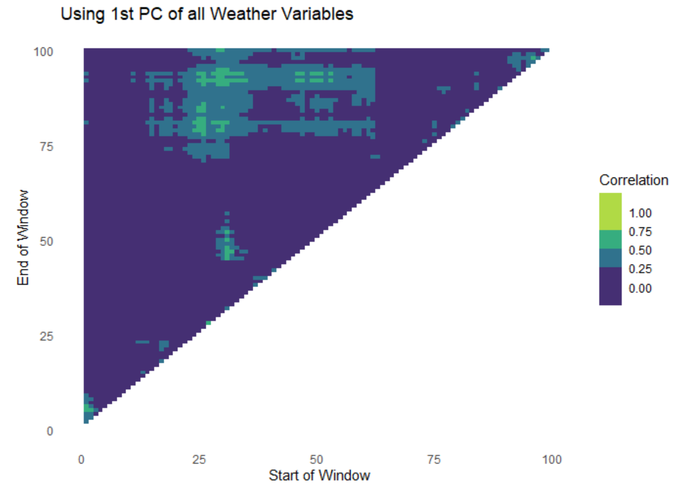
Method: Optimal window

- Finlay-Wilkinson (FW) Regression:
  - Mean response by environment $\bar{Y}_{E_1}, \ldots, \bar{Y}_{E_8}$
  - Mean of weather variable in window by environment $\bar{W}_{E_1}, \ldots, \bar{W}_{E_8}$

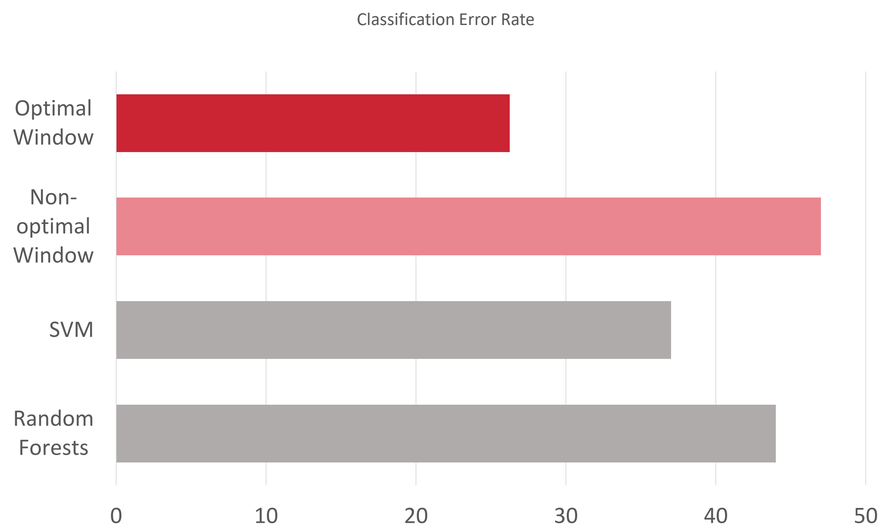
- Find window with highest correlation between the two.

Genomic Prediction Method: Steps

0. Perform FW regression to find optimal weather window
1. Obtain intrinsic effect of secondary traits
2. Perform logistic regression with forward selection
3. Determine optimal threshold for classification
4. Model evaluation



Results



Conclusions

- Promising preliminary results
  - Optimized window improves performance
  - Proposed method outperforms ML methods
- Sparse final model – 31 variables
  - RF used ~3500 variables
- Improved interpretability of weather effect for plant breeders

Questions?

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