Surrogate Modeling

Xin HUANG

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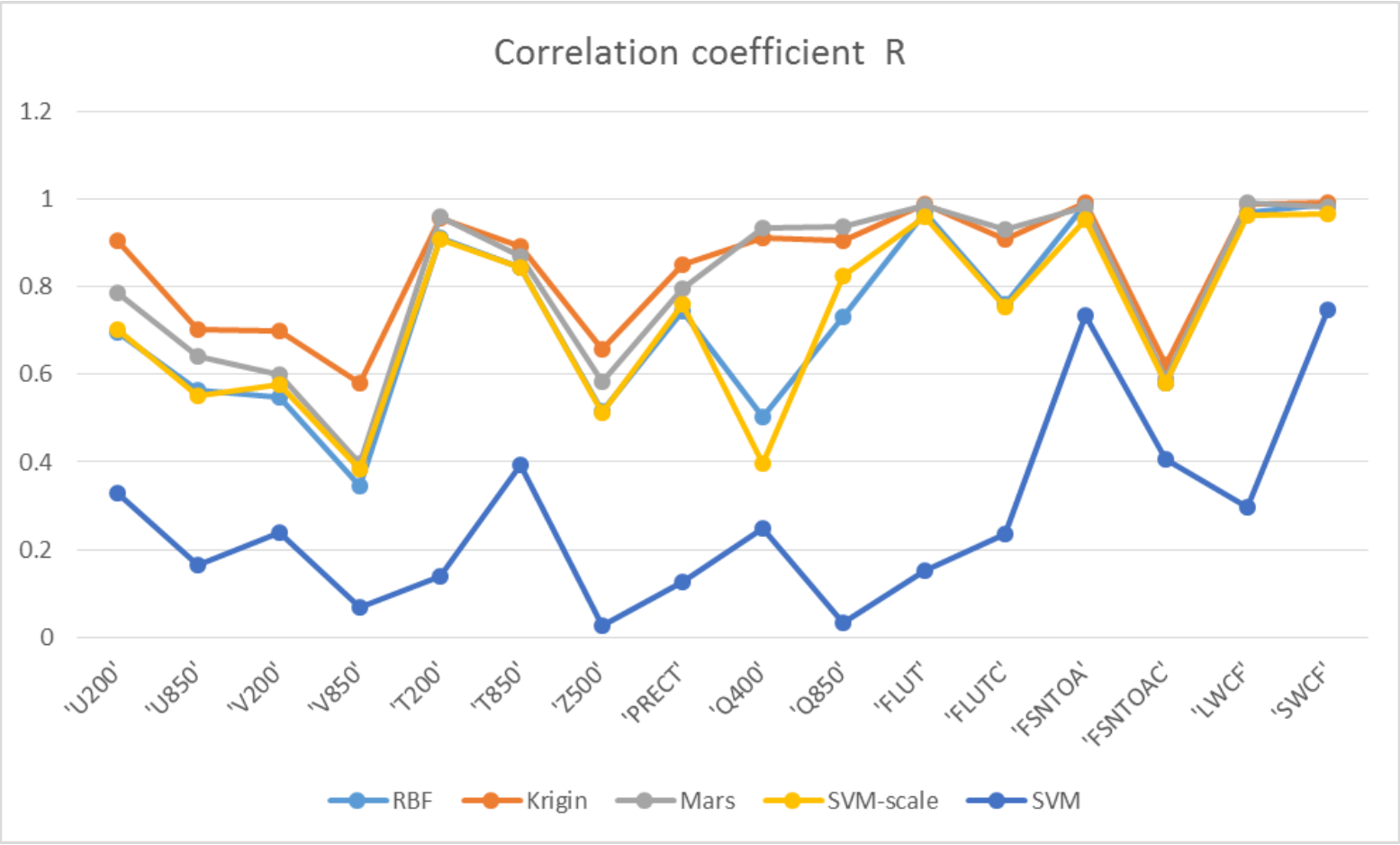
Surrogate Model Types

- Multivariate adaptive regression (MARS)
- Radial basis function model (RBF)
- Kriging (Gaussian Process)
- SVM
- Polynomial models

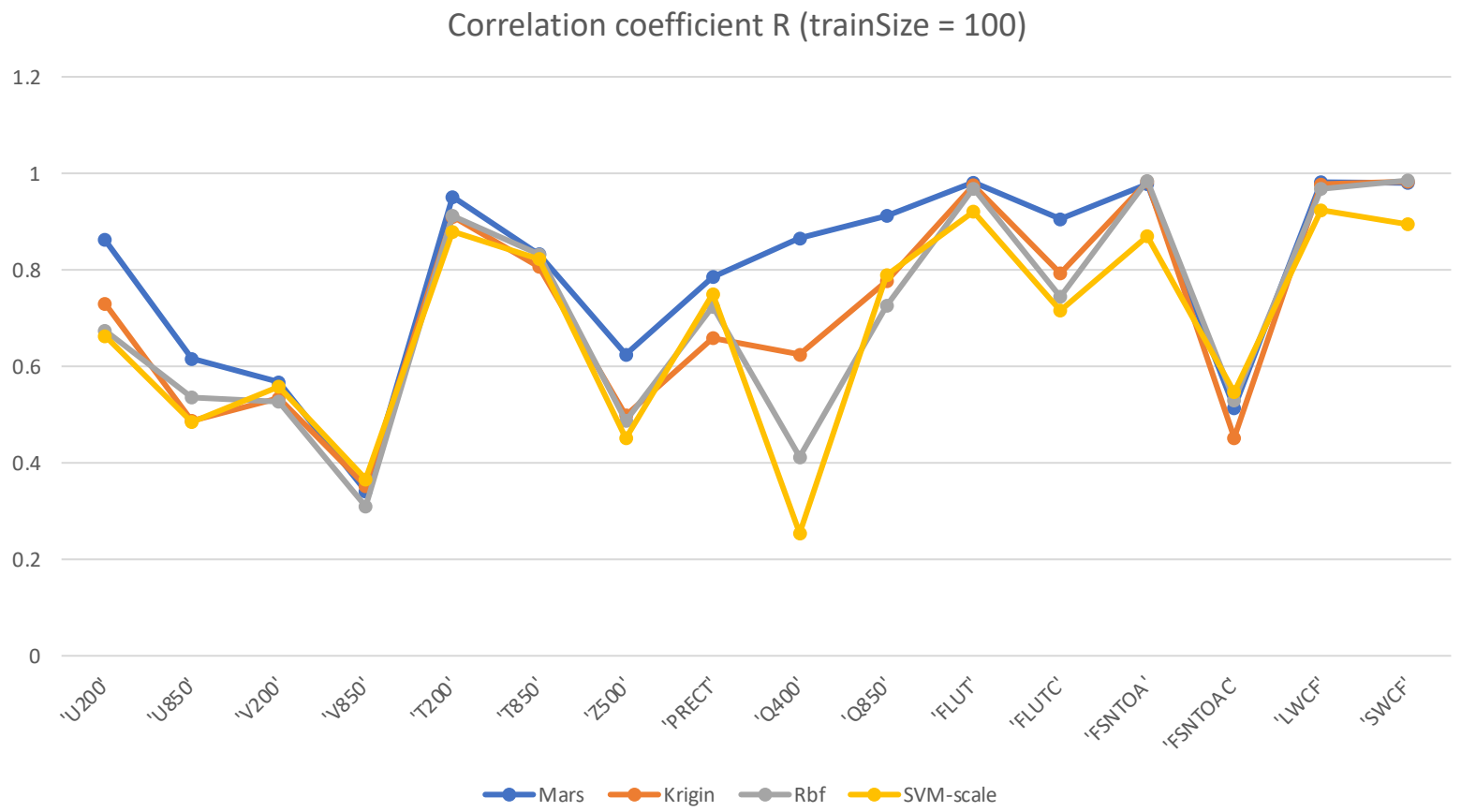
Comparison of surrogate models with 400 initial samples



X: coefficient R
Y: output variables of GAMIL2 model

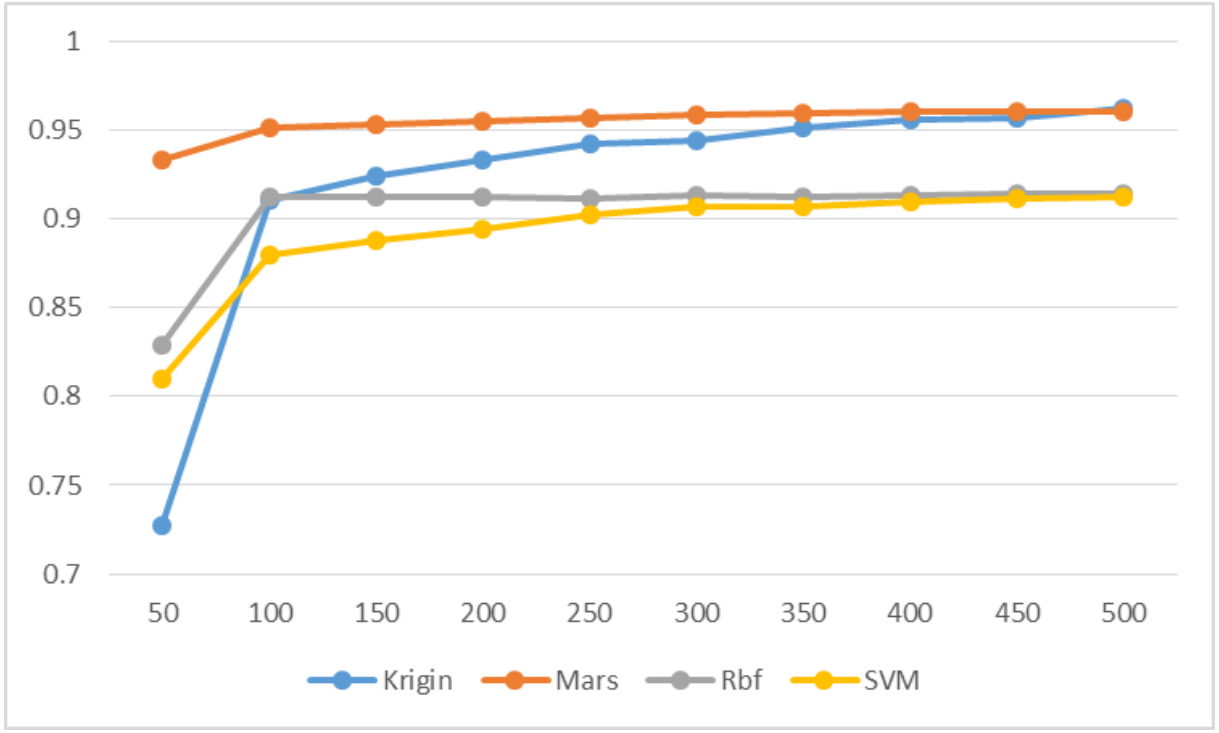
Overall, Kriging performs best

Comparison of surrogate models with 400 initial samples



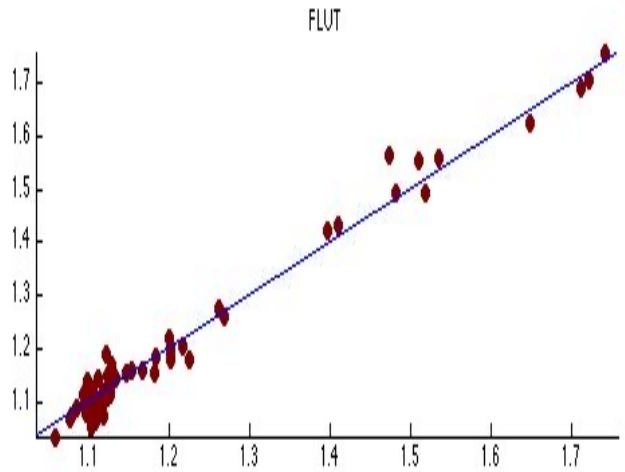
After parameter Scaling, SVM perform better

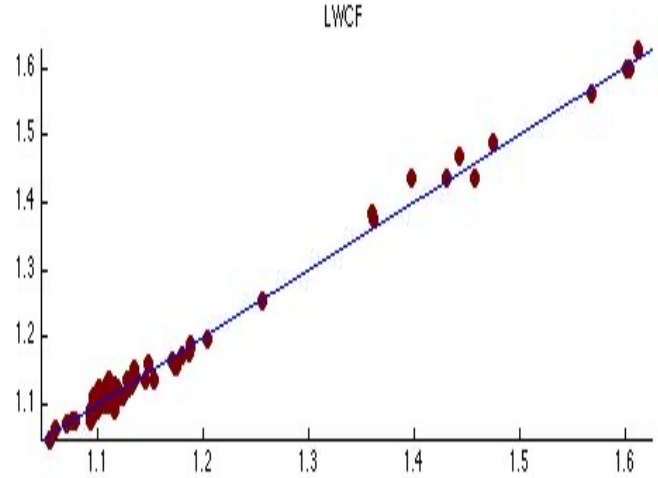
Selection of initial sample size for training

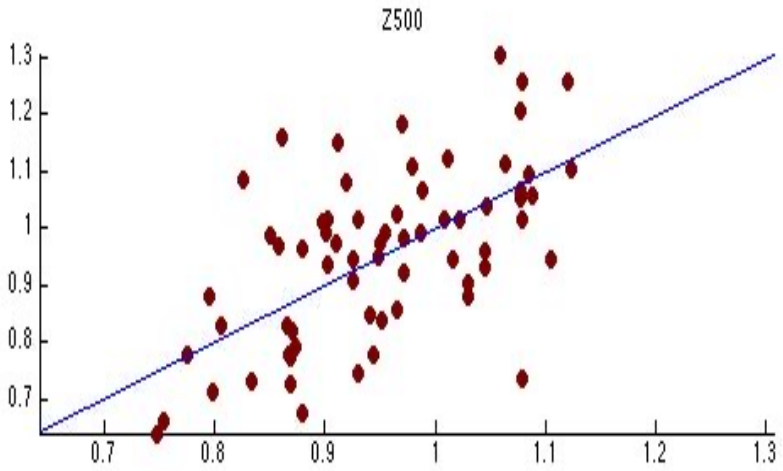


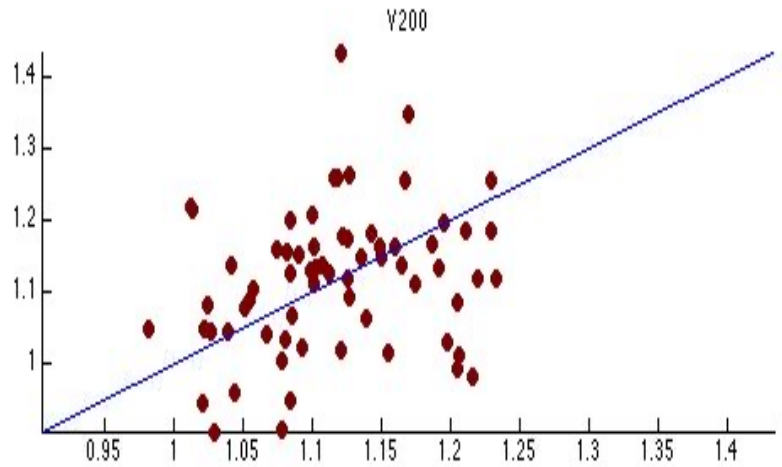
X: coefficient R
Y: initial sample size for training

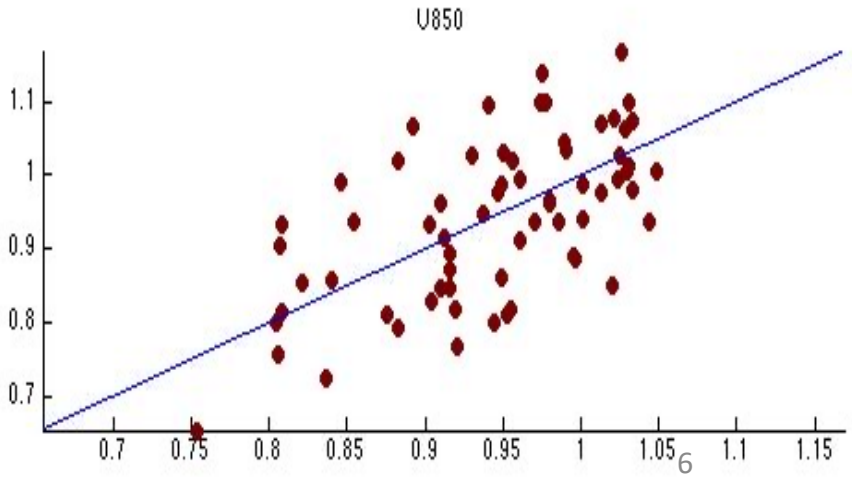
Surrogate modeling with Kriging for GAMIL model











Conclusions

- Mars and Kriging are better than SVM and RBF.
  - For specific variables (Q400 and FLUTC), SVM and RBF perform poorly
  - Mars is better with small sample size for training. As the train size becomes larger, Kriging outperforms than Mars
- Surrogate Models needs the surface be smooth (even locally). Considering that, Kriging and Mars outperforms than SVM and RBF
- In general, 200 train samples is enough
- Parameter Scaling is very important to SVM