**Submission Model Documentation**

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Competition: Predict Future Sales

1. **Summary**

I have spent my time in 70% feature engineering / 30% machine learning. The most important insight was to understand the data leakage. It was related to the items in the test set. I had to generate the feature matrix and the cross validation set accordingly. The most important features were related to the number of sales in recent months and different mean encodings for categorical variables. I have used Python, the ensemble method Random Forest from scikit-learn and the library light gradient boosting.

1. Feature Selection / Extraction

The technique used was the usual in these cases, “error trial”. The most important features were related to the number of sales in recent months and different mean encodings for categorical variables. The most important aspect was to understand the difference between test and training distribution in order to create good features.

1. Training Methods.

The models we have trained was Gradient Boosting. We have used the predictions of these models as meta-features for stacking. The meta-model was a simple linear regression.

1. Background

I am a student in Mathematics at University of Texas at Dallas. My background is in mathematical optimization.

**Appendix**

**A1. Dependencies**

numpy 1.19.5

pandas 1.0.5

sklearn 0.23.1

scipy 1.5.0

lightgbm 3.1.1

seaborn 0.10.1

**A2. References**

How to win Kaggle Competitions - Coursera