Flip 00 project final report

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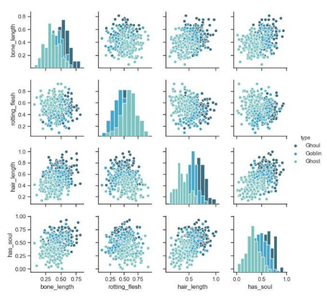
Introduction

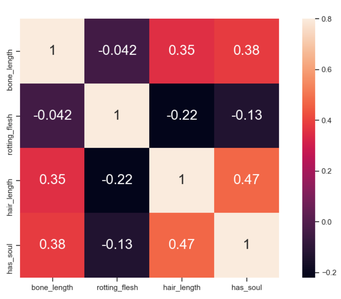
The data contains the location and circumstances of every field goal attempted by Kobe Bryant took during his 20-year career. The task is to predict whether the basket went in (shot_made_flag). The following is the attributes list of data:

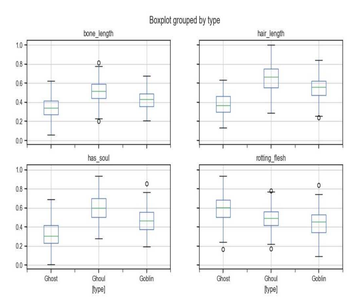
shot_made_flag Yes=1No=0
action_type *Jumpshot,Layup,Dunk, Tipshot,Hookshot,Bankshot*
loc_x ,loc_y shots position
shot_type 2PT Field Goal,2PT Field Goal
shot_zone_area shots area by area
shot_zone_range shots area by radius
shot_zone_basic shots area by NBA rules
shot_made_flag *Yes=1, No=0*

Data Visualization

The following figures show the distribution of the data. The pairplot shows that data is distributed normally. and most pairs are widely scattered but some of them show clusters. Through correlogram can gain that it is no obvious linear relationship between variables. And boxplot shows the outliers are very small, which can be ignored.





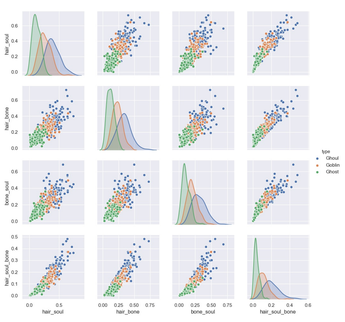


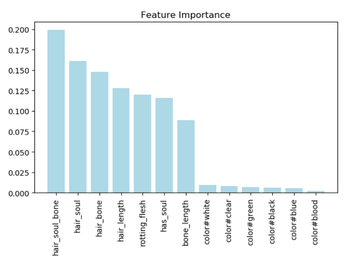
Feature Engineering

Some of attributes show clusters: hair_length and has_soul, hair_length and bone_length. So create new variables with multiplication of these columns:

hair_soul 'hair_length' * 'has_soul'
hair_bone 'hair_length' * 'bone_length]'
bone_soul 'row[bone_length' * 'has_soul'
hair_soul_bone 'hair_length' * 'has_soul' * 'bone_length'

Using the Feature Importance this function of Random Forest to select the most important features to form a new train data. The two picture, one is pairplot which is ploted by using new features data. another is the bar plot which shows the importance of features





Algorithm

Choose the following algorithms, use original train data and new train data to train the models, and determine a set of optimal parameters through Grid Search. Because the train data is relatively small, a ten-fold cross-validation is used.

- RandomForest
- LogisticRegression
- SVC
- KNeighbors
- XGBoost
- Netual Network

Take the trained models as the base models of ensemble model, and average the prediction results by using voting

Algorithm

Experiment Result

The tables below are the metrics classification report of ensemble model in original and new train data.

- Metrics Classification Report of Ensemble Model in original train data

	precision	recall	f1-score	support
Ghost	0.80	0.83	0.82	24
Ghoul	0.88	0.79	0.84	29
Goblin	0.67	0.73	0.70	22
micro avg	0.79	0.79	0.79	75
macro avg	0.78	0.78	0.78	75
weighted avg	0.79	0.79	0.79	75

- Metrics Classification Report of Ensemble Model in new train data

	precision	recall	f1-score	support
Ghost	0.84	0.88	0.86	24
Ghoul	0.93	0.97	0.95	29
Goblin	0.80	0.73	0.76	22
micro avg	0.87	0.87	0.87	75
macro avg	0.86	0.86	0.86	75
weighted avg	0.86	0.87	0.86	75

It can be observed that ensemble model performaces better in new features.

Conclusion

Exploratory Data Analysis It is an exploratory analysis of the data can provide the necessary conclusions for data processing and modeling.

Data Preprocessing This step contains dealing with missing data and outliers, changing categorical variable into one-hot code and so on.

Feature Engineering It's the most important thing. Create features, then select the most useful features.

Model Training The models have man… …rid Search to find the optimal paratemers.

Acknowledgement
- Thanks!