Flip 00 project final report

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Introduction

After a month of making scientific observations and taking careful measurements, can determined that 900 ghouls, ghosts, and goblins. The raw dataset contains train set with *371* samples and *529* unlabeled samples as test set. Through the train data, find the relationship between the attributes and species, and then identify the ghastly creatures. The following is the attributes list of data:

id id of the creature

bone_length average length of bone in the creature, normalized between *0* and *1*

rotting_flesh percentage of rotting flesh in the creature

hair_length average hair length, normalized between *0* and *1*

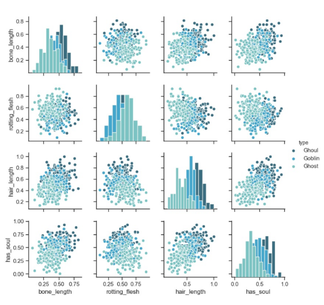
has_soul percentage of soul in the creature

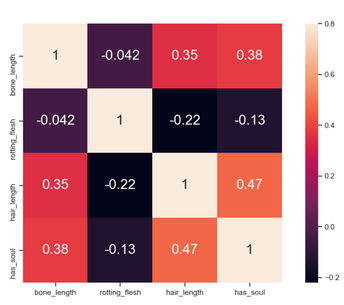
Color dominant color of the creature: *white*,*black*,*clear*, *blue*,*green*,*blood*

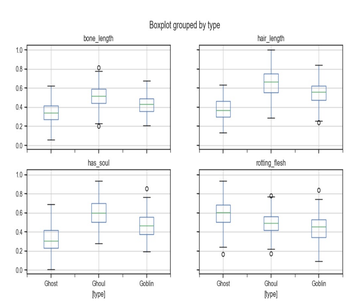
type target variable: *Ghost*, *Goblin*, and *Ghoul*

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:

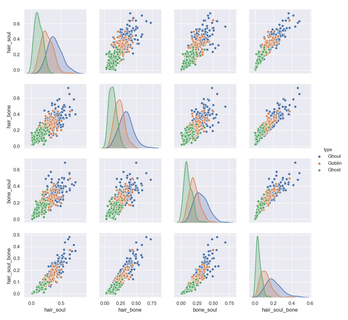
hair_soul hair_length * has_soul

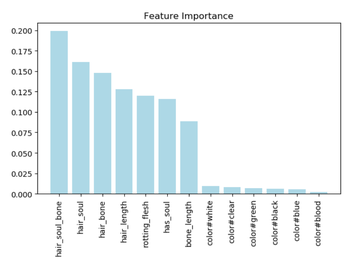
hair_bone 'hair_length' * 'bone_length]'

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 ırid Search to find the optimal paratemers.

Acknowledgement

- Thanks!