

Ranking Nursery School Applications

Capstone Project - 2023

Problem Definition

- Given a set of categorical features, rank the nursery school applications to the appropriate class
- Building a Machine Learning model for a hierarchical decision model
- Link: <https://archive.ics.uci.edu/dataset/76/nursery>

Data

- All are categorical data
- Target is multiclass

Variable Name	Role	Type	Demographic	Description	Units	Missing Values
parents	Feature	Categorical				no
has_nurs	Feature	Categorical				no
form	Feature	Categorical				no
children	Feature	Categorical				no
housing	Feature	Categorical				no
finance	Feature	Categorical				no
social	Feature	Categorical				no
health	Feature	Categorical				no
class	Target	Categorical				no

Machine Learning approach

- A classification problem
- Multiclass problem
- Supervised learning approach

Methodology

- Exploratory data analysis
 - Data frequency, duplicates, missing values
- Feature engineering
 - Chi-squared test
 - One Hot encoding
- Model building
 - Begin with Logistic Regression
 - With minimum features

Methodology cntd...

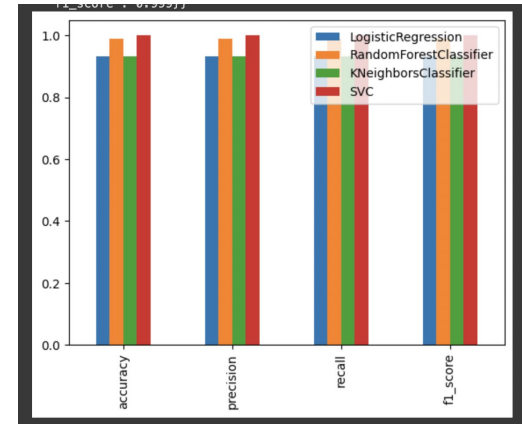
- Model evaluation
 - Accuracy, Precision, Recall, F1 Score
 - Multi ROC curve
- Feature expansion
 - Iteratively increase the features based on Chi-Squared results
 - Evaluate the model
- Feature engineering revisited
 - Remove low frequency target classes and re-evaluate

Methodology cntd...

- Model comparisons
 - Comparisons against other models, KNeighbour, SVC, Tree Classifier
- Hyperparameter Tuning
 - Out of the best model, tune parameters for best score

Results/Conclusions

- All the features has to be used to generate the best model
- SVC was the best model for the problem
- SVC gave ~1 precision, accuracy, recall and F1 score



End to end solution

- A web application with a form, will rank the application with the corresponding parameters

Rank Nursery Applications

Please select following to rank given application

Parents:	<input type="text" value="Usual"/>
Nursery room:	<input type="text" value="Proper"/>
Family Form:	<input type="text" value="Complete"/>
Childrens's In Family:	<input type="text" value="1"/>
Housing condition :	<input type="text" value="Convenient"/>
Family Finance:	<input type="text" value="Convenient"/>
Family Social:	<input type="text" value="Non Problematic"/>
Family Health:	<input type="text" value="Recommended"/>
<input type="button" value="Submit"/>	

Rank: Very Recommended

Q&A