universidade de aveiro

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Garbage Classification

Fundamentos de Aprendizagem Automática
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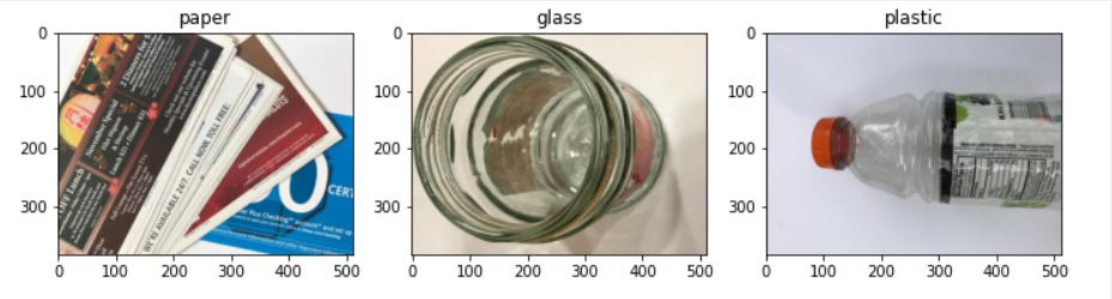
Table of contents

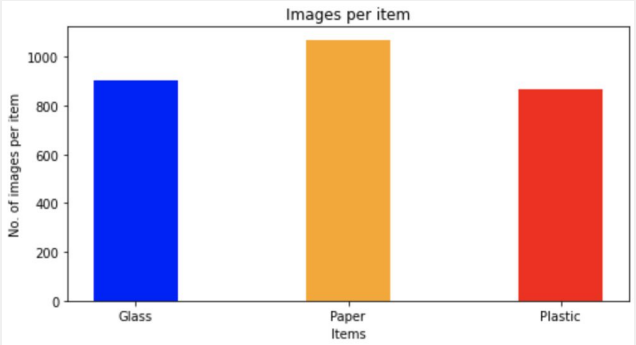
Context

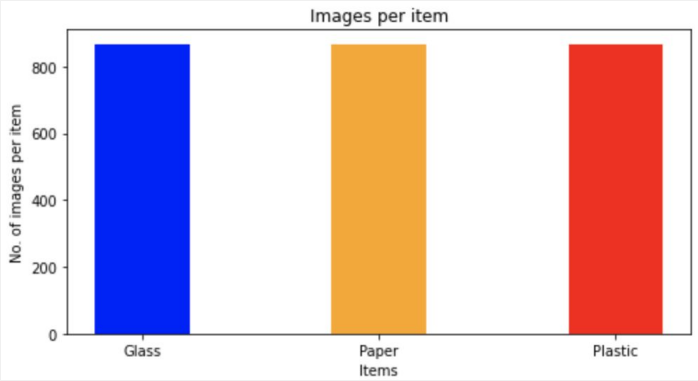
- Why?
- Dataset available on Kaggle
- Different machine learning models implemented:
  - Logistic Regression
  - SVM
  - Decision Tree
  - Random Forest
  - Neural Networks



Dataset Preparation

- Unbalanced Dataset
  - Glass - 900 images
  - Paper - 1070 images
  - Plastic - 868 images



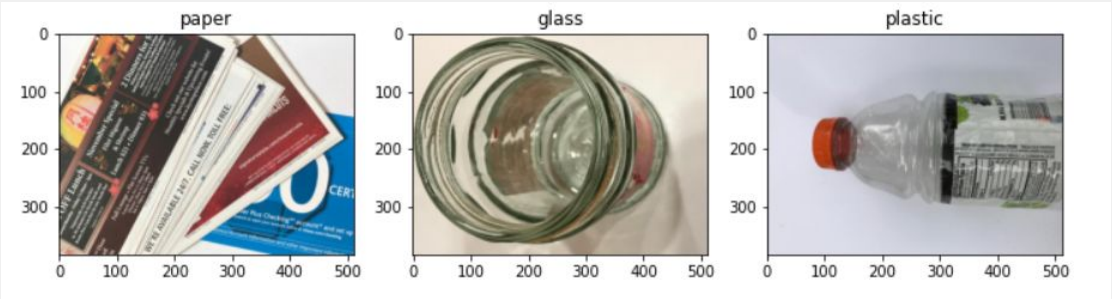


- Balanced Dataset
  - Glass - 868 images
  - Paper - 868 images
  - Plastic - 868 images

Dataset Preparation

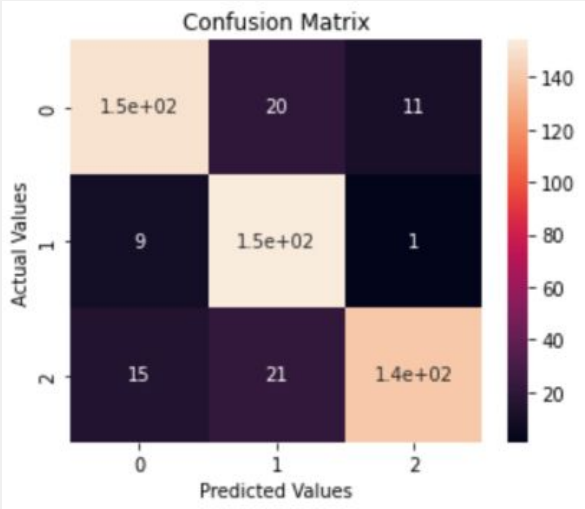
- Image size 512*384
- Large number of features
- Final: 128*128

- Pixel normalization



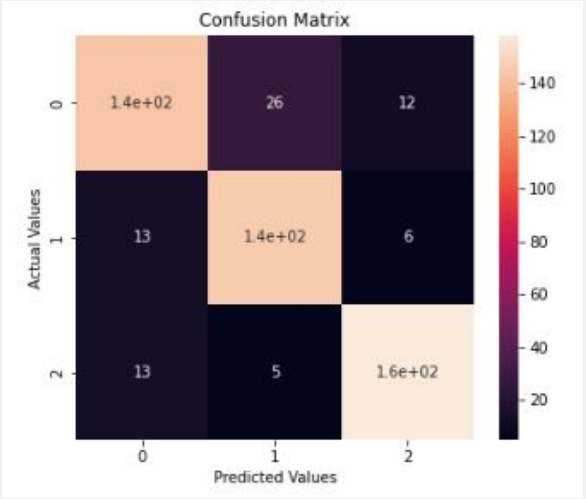
Logistic Regression

	Base	HyperTuned	K-fold CV
Accuracy	85.22%	85.22%	85.22%
F1 Score	85.22%	85.22%	85.22%



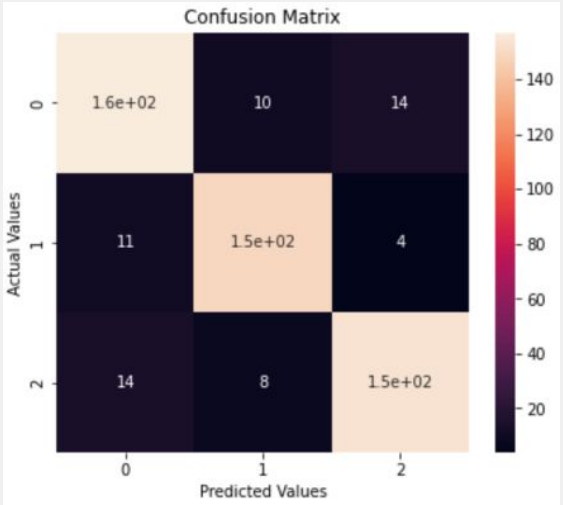
SVM

	Base	HyperTuned	K-fold CV
Accuracy	85.60%	88.30%	85.22%
F1 Score	85.59%	88.27%	85.22%



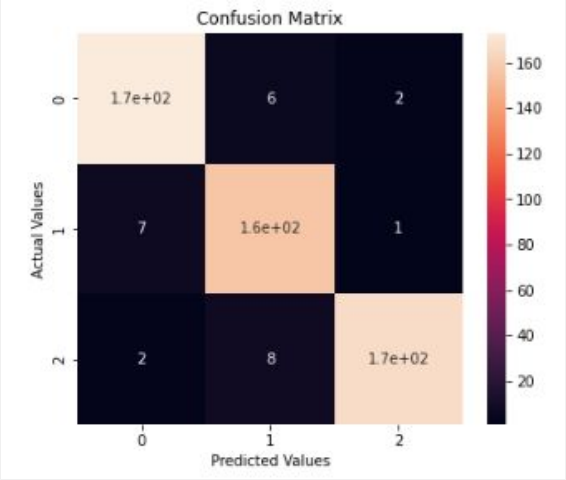
Decision Tree

	Base	HyperTuned	K-fold CV
Accuracy	89.05%	87.72%	86.75%
F1 Score	89.09%	87.70%	86.77%



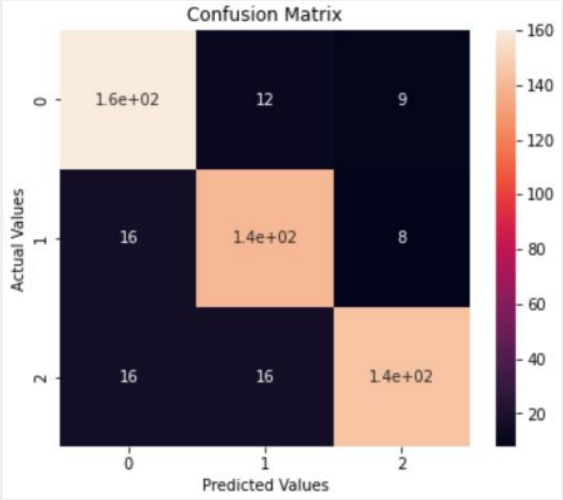
Random Forest

	Base	HyperTuned	K-fold CV
Accuracy	95.01%	94.24%	96.16%
F1 Score	94.99%	94.25%	96.16%

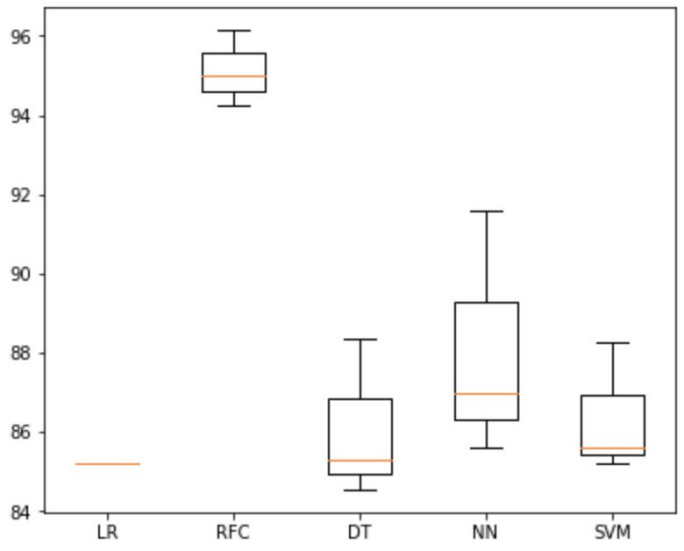


Neural Networks

	Base	HyperTuned	K-fold CV
Accuracy	91.55%	86.94%	85.60%
F1 Score	91.57%	86.97%	85.62%



Models Comparison



Other Works

- Random Forests : An algorithm for image classification, Ned Horning
- Image Classification using Random Forests and Ferns, Anna Bosch, Andrew Zisserman and Xavier Munoz
- Image Classification and Recognition Based on Deep Learning and Random Forest Algorithm, Erhui Xi
- Image recognition using Machine learning, Abhinav N Patil
- Fine-Tuning Models Comparisons on Garbage Classification for Recyclability, Umut Özkaya and Levent Seyfi

Thanks!