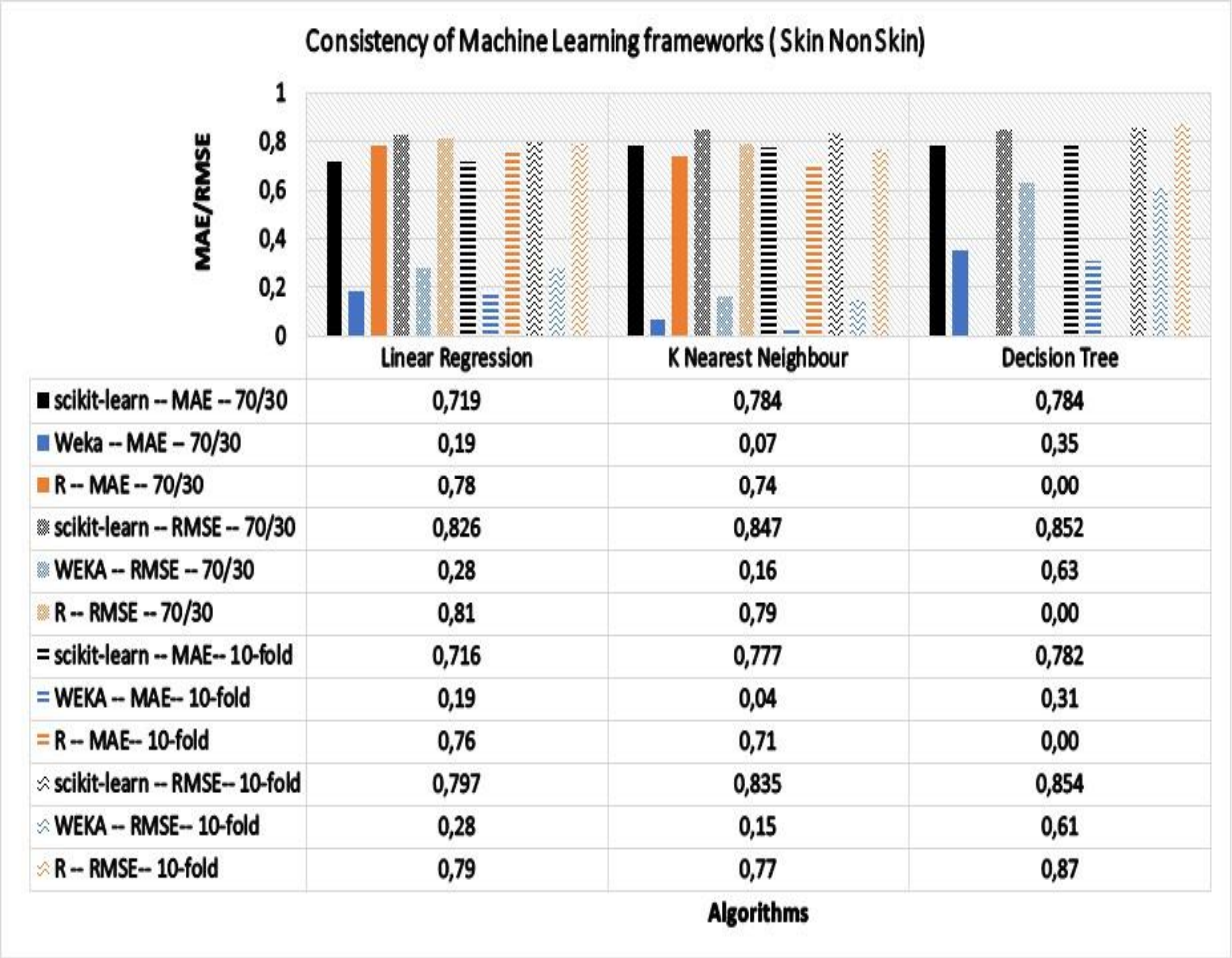
Consistency of Machine-Learning Frameworks' Implementations: Report



Findings/Answer (200-300 words)

The goal of our work is to see how consistent the implementations of Machine Learning frameworks are.

For that we will be using three Machine Learning frameworks as mentioned in the table below.

We will use these frameworks to implement the same algorithms and we will see if we will get the same results.

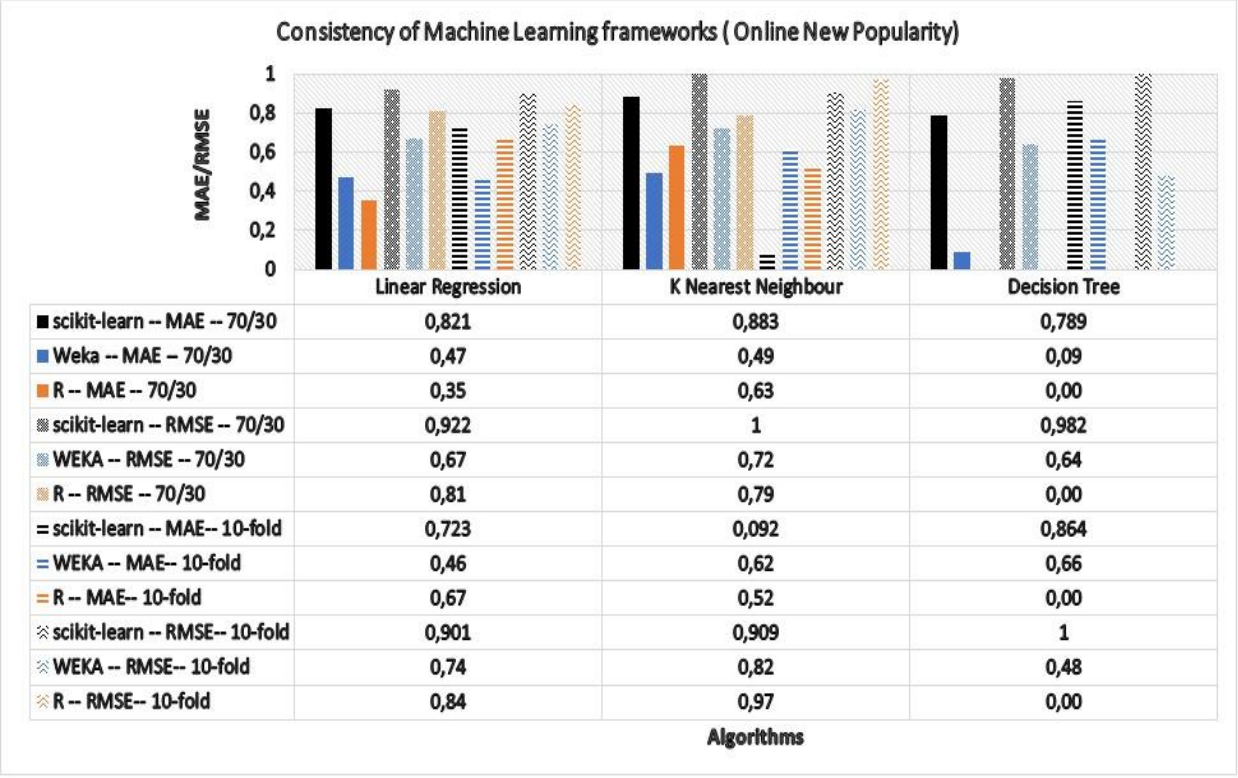
- For the first dataset which is Skin Non Skin :

As we can see from the graph, most of the cases Scikit learn performed better than Weka and R regardless the algorithm used or the metric chosen, except for some cases when R performed better, for instance:

In linear regression using the hold out 70/30 split and the MAE metric with a precision (0.78) vs. (0.72), then again using the 10 fold cross validation but now in the Decision Tree algorithm, using RMSE metric with a difference of precision 0,02 (0,87 vs. 0,85).

This are the two times when R performed slightly better than Scikit learn.

As well, we can easily notice that Weka is the framework that gives less precision regardless the algorithm or the metrics used. Its best precision was (0.63) in decision tree with 70/30 test split using RMSE metric, against (0.852) for Sckit learn.



- For the second dataset (Online News Popularity):

From the graph it goes without saying that Scikit learn performed better than R and Weka no matter which algorithm or metrics being used, except for the K Nearest Neighbor with 10 fold cross validation using MAE where the precision scored wasn't good (0.09) against (0.62) for Weka and (0.52) for R.

Scikit learn performed perfectly when using 70/30 split with RMSE for all the three algorithms: (0.92) for linear regression, (1) for K Nearest Neighbor and (0.98) for decision tree.

Gathering all the results, it seems that Scikit learn performed very well, and better than R and Weka, regardless the datasets size, the algorithms and the metrics being used. Although however it can't give the best results in few cases, and as we can see, the more the dataset is big and complex in terms of features, Scikit learn performs better and more precisely.

To sum up, it seems that theory doesn't match with practice, that's to say that same machine learning algorithms implemented in different frameworks will give different results and show difference in performances.

Additional Information

N/A

Data, Algorithms, etc.

Framework 1	Scikit-learn
Framework 2	Weka
Framework 3	R
Algorithm 1	Linear regression
Algorithm 2	K-Nearest Neighbour
Algorithm 3	Decision Tree Classifier
Dataset 1	Skin Non Skin
Dataset 2	Online News Popularity
Metric 1	MAE
Metric 2	RMSE
Split Method 1	70/30
Split Method 2	10-fold