Improving Clincial Resource Allocation with Machine Learning

Problem

Clinics are often **overworked, overstressed** and have **limited resources** especially in developing regions. We approach three specific clincial resource allocation problems to alleviate these burdens

1 Clinics are not prepared enough for a patient's future medical needs eg. low drug stocks, insufficient medical staff, etc

2 resources (such as reminders, transport,etc) to attend their next medical consultation

3 resources to prevent them from defaulting from their HIV ARV treatments

Proposed Solutions

Build **Machine Learning models** that can

1 Predict a patient's next symptom

Based on (Features)	
	Historical Symptom Totals
	When Last Symptoms Reported
	Age
	Current Treatment

Can know what to prepare for

2 Predict a patient's next attendance

Based on (Features)	
	Total Attended, Total Missed
	Age, Sex, Occupation, Location
	Appointment day of the week
	Did patient attend last time

Can know who to remind

3 Predict if a patient will default

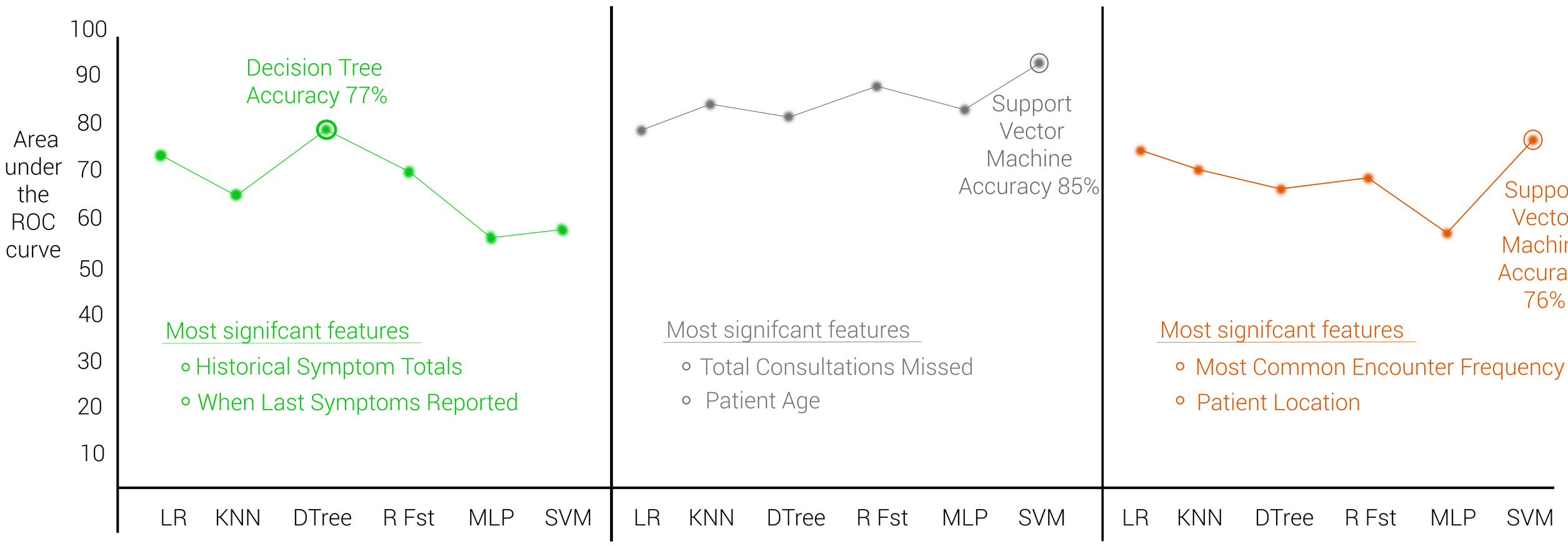
Based on (Features)	
	Most frequent clinic visit type
	Age, Sex, Occupation, Location
	Most common Encounter Freq
	Does patient have a guardian

Can know who to intervene

Results

Experiment implemented through scikit-learn library on a large Malawian clinic dataset

Comparison of Machine Learning Technique Performance for Each Problem



Conclusions

The accuracy of 77% is a fair result but not significant enough to be used in a real clinical context yet. The model produced does provide a strong basis for further symptom prediction research

The 85% accuracy is a substantial result hence this model could be used in a real clinical context to assist in preventing missed appointments

The accuracy of 76% shows a satisfactory result, thus the model could be useful to medical experts in finding defaulters before they build up a treatment resillience

Technique Key

LR = Logistic Regression
KNN = K Nearest Neighbours
DTree = Decision Tree
R Fst = Random Forrest
MLP = Multilayer Perceptron
SVM = Support Vector Machine

ROC = Measure of how well a model can distinguish between classes

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