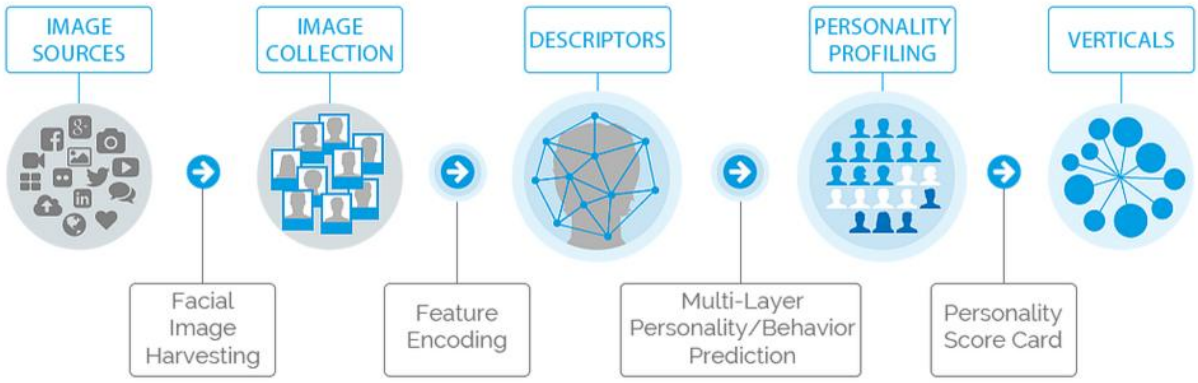
Image Recognition in Swachh Bharat Urban Mission Mobile Photo Uploads by Citizens - Proof of Concept

Attempt was made on Object Detection (Toilet Seat) & Image Detection (Beneficiary in Geo Tagged Toilet Photos) for 65574 Training Data Set of One month data of Swachh Bharat mission (Urban) Online.

Concept of Image Recognition Process -



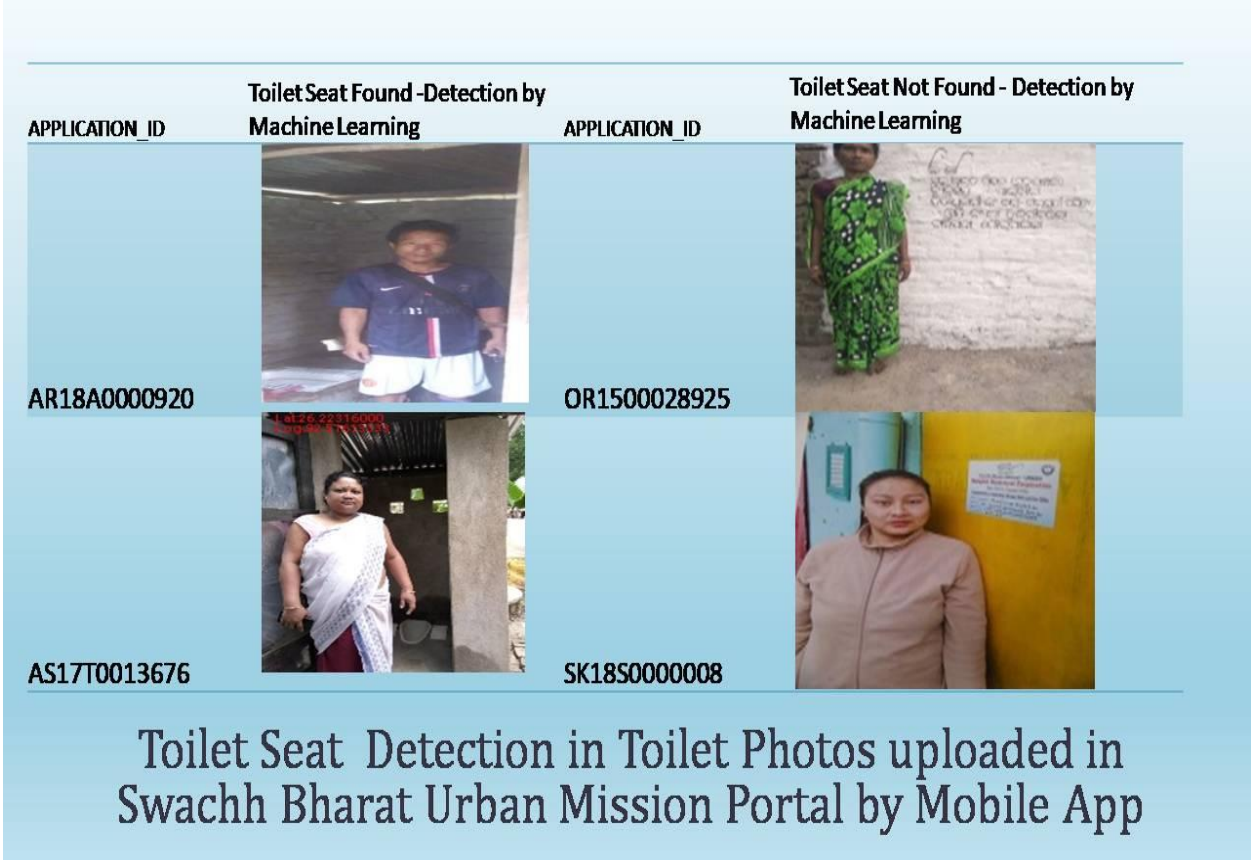
The Images Collected is preprocessed for color, brightness etc..also images are cropped, resized etc..to have same size and aspects ratio. Next is Feature description like edge detection, corner detection etc.. then feature extraction using different computer vision algorithms resulting in a feature descriptor or feature vector and then using classifier algorithm to detect the image provided into a category like cat, dog etc.. This is the process used by Machine Learning.

For Deep Learning Convolutional Neural Network does the job of both Feature Encoding and Classification.

The Constructed Toilet Seat Image Data was each 65 KB only each. Machine learning was done and data Classified with Following Results :

1. KNN & SIFT Algorithm used with features =30 For Toilet Detection.

Training DataSet	Number of Parameters Threshold for Machine Learning	Predic-ted : Toilet Found = Y	Predicted : Toilet Found=Y Checked Sample Size=100	Predicted : Toilet Found=N Checked Sample Size=100	Remarks
With Toilet Web Images as Training Set	30	24639	48% correct	55% correct	As Pre-trained Classifier Model was not available for toilets, result was poor.
With Toilet Web Images as Training Set	20	35597	85% improvement in correct prediction of another sample where ML Predicted = N with parameter 30		
With Toilet Images classified Wrongly, Added to Training Set	30	40842	88% improvement in correct prediction of another Sample where ML Predicted = N with parameter 30	39% improvement in correct prediction of another Sample where ML Predicted = N with parameter 30	Algorithm Learnt & results improved.
Deep Learning with Neural Network	Completed		96% accuracy obtained		Training Done with 5 lac records



2. HAAR Cascade Frontal Face Default classifier used with features encoded =30 for Human face Detection.

Training DataSet	Number of Parameters Threshold for Machine Learning	Predicted : Human Face Found = Y	Predicted : Human Face Found =Y Checked Sample Size=100	Predicted : Human Face Found =N Checked Sample Size=100	Remarks
With Human Web Images as Training Set	30	32081	100% Correct	28% Correct	

With Human Web Images as Training Set	20	27797	60% improvement in correct prediction of Another sample where ML Predicted = N with parameter 30	1% improvement in correct prediction of Another sample where ML Predicted = N with parameter 30	As Trained Human Images from Web are in millions, parameter 30 is optimal
Deep Learning with Neural Network	Completed		96% Model accuracy obtained		POC done with 5 lac records