Team SuperNova Documentation
-TagMe! ML programming contest

Please **summarize your method:**

1) Software Used: - MATLAB R2012b

2) Feature Extraction Process (*) :- SIFT

3) Similarity/Distance Measures (*) :-- Radial Basis Function (RBF)

3) Classifier (if you have used any standard classifier):- SVM (one v/s one SMO)

4) References (if any) :-
[1] libSVM-3.17 has been used.
http://www.csie.ntu.edu.tw/~cjlin/libsvm/
[2] Fast training of Support Vector Machines using Sequential Minimum Optimization, John C. Platt, Microsoft Research.
(research.microsoft.com/en-us/um/people/jplatt/smo-book.pdf)

Please describe **the algorithms in details:**

1) Feature Extraction step (*):- (please write in detail) We have not used any other algorithm. It is the same as provided.

2) Training Algorithm: SMO (Sequential Minimal Optimization)

Input Format:- .mat (extracted from the input files)
Tunable Parameters:- gamma = .006 , C = 0 , epsilon = .001 , Kernel = rbf
Output Format:- .mat (which was further exported into the uploaded .txt file)

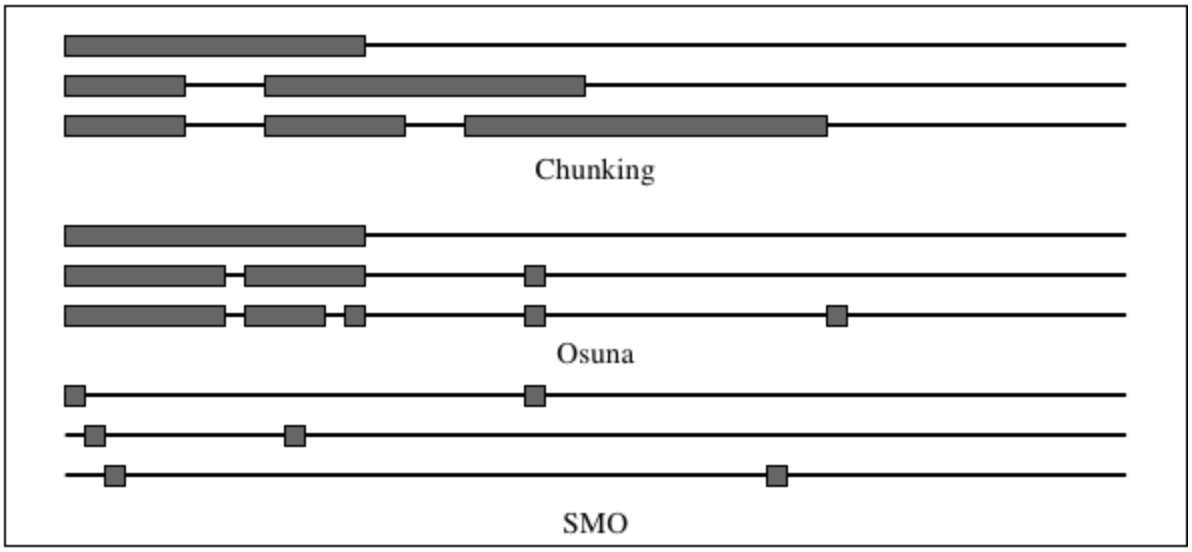
(Now please write the algorithm)

Sequential minimal optimization (**SMO**) is an algorithm for solving the quadratic programming (QP) problem that arises during the training of support vector machines without invoking any extra matrix storage and without invoking an iterative numerical routine for each sub-problem. SMO decomposes the overall QP problem into QP subproblems similar to Osuna's method [2].

SMO chooses the smallest possible optimization problem at every step. At every step, SMO chooses two Lagrange multipliers to jointly optimize, finds optimal values for these multipliers, and updates the SVM to reflect the new optimal values as shown in the

figure below.

SMO is widely used for training support vector machines and is implemented by the popular libsvm tool.



The reason we have chosen libSVM is that many of the open source libraries are simply wrapping over libSVM with other languages such as scikit-learn.

3) Validation and Parameter Tuning (*) :

4) Prediction Algorithm:

We trained the model using svmtrain which returned a struct named model which contained all the data about the k(k-1)/2 classifiers . Then these one-vs-one classifiers were used by the svmpredict to predict the class of a particular instance by first calculating the probabilities and based on which probability is higher the final decision is made .

Interpretation of results on validation data:

Why do you think your algorithm got the accuracy that it did on the validation data? Are there scope for improvements?

Yes there are further scope of improvements using the multi-class svm technique we are using. One could also use classifiers based on Convolutional Neural Networks.
Instead of using SIFT if we use other (unsupervised) feature extraction algorithms like Deep Belief Networks , that would have resulted in better results.
But then, recent research also indicates that a simlpe K-means clustering beats

algorithms auto-encoders and RBMs on image classification.

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1> (*) : Sections marked (*) are optional . Explain ony if you have explicitly used these steps. For e.g, there is no need for the Feature Extraction Process section, if you have used the features provided by us.

2> For the Validation and Parameter tuning section, please mention the final values of the parameters used for training (if any).