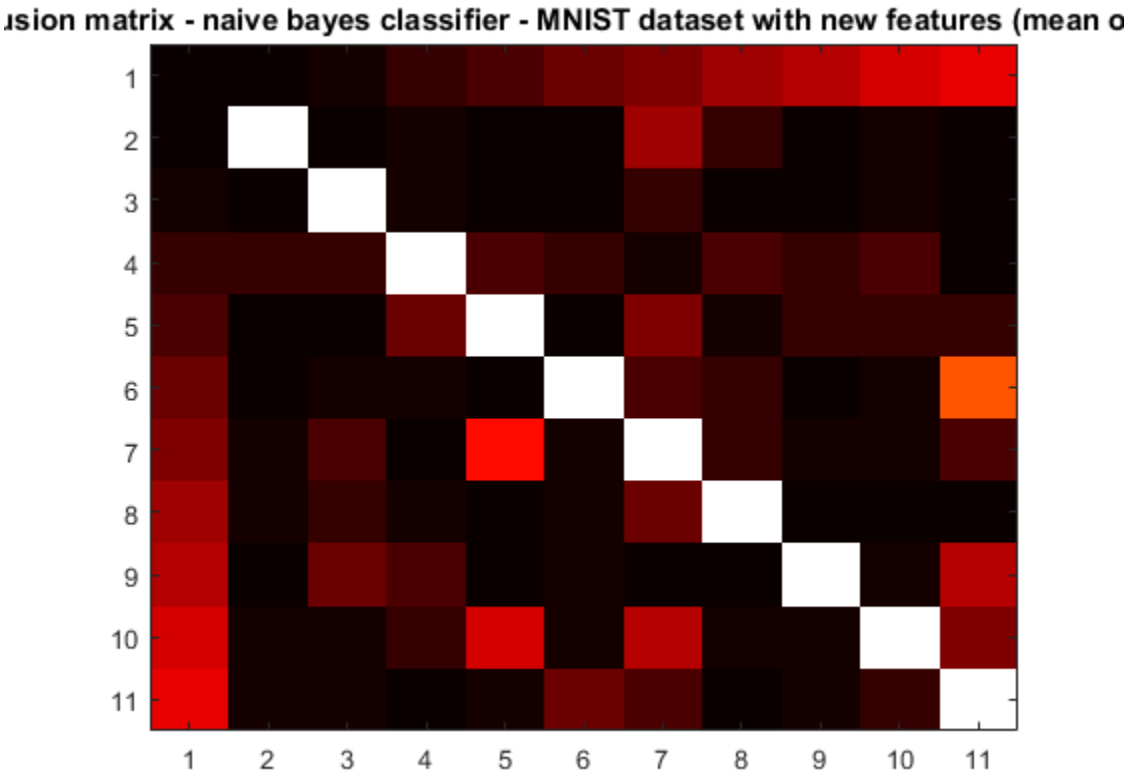
```
% Add new features by taking the mean of certain areas of each picture

N=60000;M=10000;
M_new_data_train = reshape(M_data_train,[N,24,24]);
M_new_data_train  = permute(imresize(permute(M_new_data_train,
[2,3,1]),0.4),[3,1,2]);
M_new_data_train = [repmat(M_new_data_train(:,:), [1 4])
 M_data_train];

M_new_data_test = reshape(M_data_test,[M,24,24]);
M_new_data_test  = permute(imresize(permute(M_new_data_test,
[2,3,1]),0.4),[3,1,2]);
M_new_data_test = [repmat(M_new_data_test(:,:),[1 4]),M_data_test];

% Train the classifier
[M_new_means, M_new_variances] =
 f1_train_naive_bayes_classifier( M_new_data_train, M_labels_train );

% Test the predictions on the test data for the MNIST dataset
[M_labels_prediction, M_confusion_matrix, M_accuracy] =
 f2_predict_naive_bayes_classifier( M_new_means, M_new_variances,
 M_new_data_test, M_labels_test, 0.084);

% Display the confusion matrix and the accuracy
M_confusion_matrix
M_accuracy

% Display the confusion matrix through an image
figure();
colormap hot;
image(M_confusion_matrix*2.5);
title('confusion matrix - naive bayes classifier - MNIST dataset with
 new features (mean of areas)')
```

M_confusion_matrix =

NaN	0	1	2	3	4	5	6	7	8	9
0	90	0	1	0	0	6	2	0	1	0
1	0	96	1	0	0	2	0	0	1	0
2	2	2	83	3	2	1	3	2	3	0
3	0	0	4	83	0	5	1	2	2	2
4	0	1	1	0	80	3	2	0	1	13
5	1	3	0	10	1	78	2	1	1	3
6	1	2	1	0	1	4	91	0	0	0
7	0	4	3	0	1	0	0	84	1	7
8	1	1	2	8	1	7	1	1	73	5
9	1	1	0	1	4	3	0	1	2	87

M_accuracy =

```
0.8468
```



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