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# Feature Dimensionality Reduction

## 0. Introduction

In this lab, we investigated several common techniques to do feature reduction. We used the Animals with Attributes (AwA2) dataset from <https://cvml.ist.ac.at/AwA2/>, which consists of 37322 images of 50 animal classes with pre-extracted features for each image. The goal of this lab is to apply different feature dimensionality reduction technique to these features and measure the 'quality' via training a linear SVM to do multi-class classification on the dataset.

## 1. Baseline -- Use Pre-extracted Features

In this section, we simply train a linear SVM with the (provided) pre-extracted features.

We first split the dataset into a training set (60%) and a test set (40%). Then we performed 5-fold cross-validation within the training set to determine the best choice for the hyperparameter C in `sklearn.svm.SVC` -- an existing SVM package that can be used directly. We conducted a grid-search for the optimal hyperparameter C in the range of

[1e-5, 1e-4, 1e-3, 1e-2, 1e-1, 1, 1e1., 1e2., 1e3.]

The result is shown as follows:

C	1e-5	1e-4	1e-3	1e-2	1e-1	1	1e1	1e2	1e3
Accuracy	0.6854 (+/- 0.0030)	0.9055 (+/- 0.0063)	0.9304 (+/- 0.0062)	0.9280 (+/- 0.0058)	0.9262 (+/- 0.0077)	0.9262 (+/- 0.0076)	0.9240 (+/- 0.0078)	0.9233 (+/- 0.0085)	0.9233 (+/- 0.0085)

We can see from the plot that C=1e-3 (0.001) gives the highest accuracy. We can now go ahead and test its performance on the test set:

Accuracy = 0.9338

## 2. Feature Reduction

With the baseline performance, we are now ready to explore the feasibility of applying feature reduction techniques learned in class. We report the results of three feature reduction methods here.

### 2.1. Feature Selection -- Evolutionary Algorithm

The first method is feature selection, meaning for each image, we select only a subset of the components in its original feature. It is helpful, conceptually, to think of the selection process as selecting a binary mask. The binary masks have the same dimensionality as the features but applying different masks to the original features gives different size-reduced features. Our goal is then to try to find one (or a set of) good mask so that applying those masks to original features gives features that are both smaller in size but also maintains a good classification accuracy when trained with an SVM.

We chose a evolutionary algorithm to search for better masks in the mask space. A population of 100 masks is generated randomly and used to generate 100 sets of features. For each set of features, we train a linear SVM and keep track of its performance. \footnote{We split the training set further into a training set (80%) and validation set (20%) to train and evaluate each set of features.} Next, we picked the masks with top 10% performance (i.e. masks with top 10 evaluation performance) and make small, random changes to them to enrich the mask population to 80. Namely, for each of the 10 masks, we randomly picked 3 (out of 2048) positions and generate 8 new masks by considering all permutation on these 3 positions. We also brought in 20 completely random masks to enlarge the whole mask population back to 100 again, and we iterate for 5 rounds.

The result is shown as follows:

Round	1st	2nd	3rd	4th	5th
Mean Accuracy of top 10 percent masks	0.93 (+/- 0.00)	0.92 (+/- 0.00)	0.92 (+/- 0.00)	0.92 (+/- 0.00)	0.92 (+/- 0.00)

The accuracies of all masks in all rounds are put in the Appendix.

The result might seem weird at first glance -- all masks in all iterations have almost exactly the same performance. We are supposed to see an increasing curve with an evolutionary algorithm! Yes, that is right but here is a coarse explanation why we see such a result.

1). within a search space whose cardinality is  $2^{2048}$ , a population of 100 is obviously too few. The evolutionary algorithm works better with large population pool.

2). 5 iterations are too few as well. It typically requires more than thousands of iterations, if not more, for an evolutionary algorithm to find its way toward a good solution in the search space. 5 iterations are just ridiculously small.

3). Most importantly, almost all the masks have a length of around 1000. Well, this is reasonable since we generated each component (True or False) randomly and the length of the mask obeys a binomial distribution, so a mask's expected length is 1000. However, all masks of length ~1000 have roughly the same performance. We can still conclude something useful -- the individual components in the original feature does not play a big role but rather the size of the reduced feature. That is, as long as you keep 1000 components in the feature, you get approximately the same performance no matter which 1000 out of 2048 components you choose to keep. Probably a better way to generate the mask population is to generate masks of various length (length refers to the total number of True's) randomly so as to ensure length-wise exploration, rather than being limited to masks with similar length.

In hindsight, we should not use an evolutionary algorithm because of computation resource limitation but rather a forward selection/backward deletion method.

## 2.2. Feature Projection -- Principal Component Analysis (PCA)

Traditional feature selection keeps the features intact and chooses  $n$  best features among them, removing the redundant and co-linear features. However, PCA is a dimensionality reduction algorithm where new features are created which represents the original feature dimensions in a lower dimension with a little loss of the total information. It performs linear dimensionality reduction using Singular Value Decomposition of the data to project it to a lower dimensional space.

Scikit-learn library provides a *decomposition.PCA()* API that performs PCA conveniently. We let the argument `n_components=0.95`, which means scikit-learn will choose the minimum number of principal components such that 95% of the variance is retained. Finally, we get 830 principal components, which is a good amount of reduction from the original 2048 features.

We train and test these new data using SVM with  $c=0.001$ , get an accuracy of 93.25% on the test set. It's similar to the accuracy without PCA, but as we can see, the dimension of feature space is greatly reduced, which in turn reduces the complexity of the SVM model. As a result, we observed a decent decrease in the training time of SVM as well as the prediction time.

In this section, we also experiment with two common data preprocessing techniques: min-max normalization and z-score normalization. With min-max normalization, we add an additional step to normalize the original data to  $[0, 1]$  scale, then repeat PCA and SVM steps, get 1027 principal components and accuracy of only 75.17% on the testing set. Similarly, with z-score normalization, we normalize the original data to a distribution of mean=0 and standard deviation=1. The result is 1124 principal components and an accuracy of 93.05%. It turns out normalization doesn't further improve accuracy or help PCA get a smaller feature space. It can be explained that the original data are from the output of a

neural network, which is already normalized by Batch Normalization in the neural network. So performing normalization again is unnecessary.

## 2.3. Feature Learning -- Auto-Encoder

The last method is Auto-Encoder, one among many possible ways to do feature learning.

We designed a artificial neural network (ANN) with fully connected layers for this auto-encoder using Keras, summarized as follows:

Layer (type)	Output Shape	Param #
=====		
input_1 (InputLayer)	(None, 2048)	0
dense_1 (Dense)	(None, 2000)	4098000
dense_2 (Dense)	(None, 1750)	3501750
dense_3 (Dense)	(None, 1500)	2626500
dense_4 (Dense)	(None, 1250)	1876250
dense_5 (Dense)	(None, 1000)	1251000
dense_6 (Dense)	(None, 750)	750750
dense_7 (Dense)	(None, 500)	375500
dense_8 (Dense)	(None, 250)	125250
dense_9 (Dense)	(None, 500)	125500
dense_10 (Dense)	(None, 750)	375750
dense_11 (Dense)	(None, 1000)	751000
dense_12 (Dense)	(None, 1250)	1251250
dense_13 (Dense)	(None, 1500)	1876500
dense_14 (Dense)	(None, 1750)	2626750
dense_15 (Dense)	(None, 2000)	3502000
dense_16 (Dense)	(None, 2048)	4098048
=====		
Total params: 29,211,798		
Trainable params: 29,211,798		
Non-trainable params: 0		

Dense layers 1 through 8 constitutes the encoder part and dense layers 9 through 16 forms the decoder part.

We first trained this ANN with the original training set for 200 epochs in an ordinary supervised learning manner. <sup>\footnote{the labels of the training set are the training set itself!}</sup> Then we take the first half of the network (the 'encoder' part) and feed into our training set and test set. The output predictions are therefore the new size-reduced feature (250-dimensional in our example). What we did next is, again, train a linear SVM with those size-reduced features and test it on the test set. The final accuracy is

Accuracy: 0.803470

### 3. Conclusion

We explored three dimensionality reduction techniques for classification problem with the AwA2 dataset in this lab ---- evolutionary algorithm, PCA, and auto-encoder. We compared it with the baseline algorithm which directly uses the pre-extracted features. Our experiment validated the feasibility of feature reduction. Finally, we want to reserve our judgement on the question of which method is the best dimensional reduction method because we only did a few experiments which are still far away from being able to draw any assertive conclusions. More iterative experiments (e.g. tuning the structure of the auto-encoder network to find the best encoding dimension) are required to answer this question.

### Appendix:

#### Detailed performance of each mask in the evolutionary algorithm

1st round:

mask population shape = (100, 2048)

Mask 1, # of active component = 1017

Mean Accuracy = 0.9281089528912704

Mask 2, # of active component = 1022

Mean Accuracy = 0.9307881223487385

Mask 3, # of active component = 1031

Mean Accuracy = 0.9278856887698147

Mask 4, # of active component = 1028

Mean Accuracy = 0.9236436704621568

Mask 5, # of active component = 1045

Mean Accuracy = 0.9296718017414601

Mask 6, # of active component = 1028

Mean Accuracy = 0.9301183299843715

Mask 7, # of active component = 1048

Mean Accuracy = 0.9249832551908909

Mask 8, # of active component = 1053

Mean Accuracy = 0.927662424648359  
Mask 9, # of active component = 1030  
Mean Accuracy = 0.9254297834338022  
Mask 10, # of active component = 1063  
Mean Accuracy = 0.9283322170127261  
Mask 11, # of active component = 1082  
Mean Accuracy = 0.9301183299843715  
Mask 12, # of active component = 1031  
Mean Accuracy = 0.9278856887698147  
Mask 13, # of active component = 1023  
Mean Accuracy = 0.9267693681625363  
Mask 14, # of active component = 1001  
Mean Accuracy = 0.926992632283992  
Mask 15, # of active component = 997  
Mean Accuracy = 0.9260995757981693  
Mask 16, # of active component = 1051  
Mean Accuracy = 0.9263228399196249  
Mask 17, # of active component = 1019  
Mean Accuracy = 0.9278856887698147  
Mask 18, # of active component = 1018  
Mean Accuracy = 0.9283322170127261  
Mask 19, # of active component = 1032  
Mean Accuracy = 0.9298950658629158  
Mask 20, # of active component = 1013  
Mean Accuracy = 0.9267693681625363  
Mask 21, # of active component = 1002  
Mean Accuracy = 0.926992632283992  
Mask 22, # of active component = 1021  
Mean Accuracy = 0.9310113864701942  
Mask 23, # of active component = 1026  
Mean Accuracy = 0.9260995757981693  
Mask 24, # of active component = 1037  
Mean Accuracy = 0.9321277070774726  
Mask 25, # of active component = 1015  
Mean Accuracy = 0.927662424648359  
Mask 26, # of active component = 1044  
Mean Accuracy = 0.9298950658629158  
Mask 27, # of active component = 1017  
Mean Accuracy = 0.9310113864701942  
Mask 28, # of active component = 1026  
Mean Accuracy = 0.9272158964054477  
Mask 29, # of active component = 1017  
Mean Accuracy = 0.9247599910694352  
Mask 30, # of active component = 957  
Mean Accuracy = 0.9245367269479795  
Mask 31, # of active component = 1026

Mean Accuracy = 0.9258763116767136  
Mask 32, # of active component = 1062  
Mean Accuracy = 0.9296718017414601  
Mask 33, # of active component = 1010  
Mean Accuracy = 0.926992632283992  
Mask 34, # of active component = 1035  
Mean Accuracy = 0.9278856887698147  
Mask 35, # of active component = 1080  
Mean Accuracy = 0.9290020093770931  
Mask 36, # of active component = 1086  
Mean Accuracy = 0.9278856887698147  
Mask 37, # of active component = 1021  
Mean Accuracy = 0.9283322170127261  
Mask 38, # of active component = 1008  
Mean Accuracy = 0.9290020093770931  
Mask 39, # of active component = 1010  
Mean Accuracy = 0.9294485376200045  
Mask 40, # of active component = 1008  
Mean Accuracy = 0.9316811788345613  
Mask 41, # of active component = 1016  
Mean Accuracy = 0.9292252734985488  
Mask 42, # of active component = 1038  
Mean Accuracy = 0.9263228399196249  
Mask 43, # of active component = 1029  
Mean Accuracy = 0.9263228399196249  
Mask 44, # of active component = 1046  
Mean Accuracy = 0.9294485376200045  
Mask 45, # of active component = 1029  
Mean Accuracy = 0.9298950658629158  
Mask 46, # of active component = 1014  
Mean Accuracy = 0.9290020093770931  
Mask 47, # of active component = 1026  
Mean Accuracy = 0.9287787452556374  
Mask 48, # of active component = 1027  
Mean Accuracy = 0.9278856887698147  
Mask 49, # of active component = 1045  
Mean Accuracy = 0.9321277070774726  
Mask 50, # of active component = 1063  
Mean Accuracy = 0.9310113864701942  
Mask 51, # of active component = 963  
Mean Accuracy = 0.9298950658629158  
Mask 52, # of active component = 991  
Mean Accuracy = 0.9258763116767136  
Mask 53, # of active component = 1010  
Mean Accuracy = 0.9301183299843715  
Mask 54, # of active component = 1033

Mean Accuracy = 0.9260995757981693  
Mask 55, # of active component = 1037  
Mean Accuracy = 0.9314579147131056  
Mask 56, # of active component = 1017  
Mean Accuracy = 0.9290020093770931  
Mask 57, # of active component = 1012  
Mean Accuracy = 0.9265461040410806  
Mask 58, # of active component = 1027  
Mean Accuracy = 0.9285554811341817  
Mask 59, # of active component = 987  
Mean Accuracy = 0.9256530475552579  
Mask 60, # of active component = 1026  
Mean Accuracy = 0.9281089528912704  
Mask 61, # of active component = 1006  
Mean Accuracy = 0.9296718017414601  
Mask 62, # of active component = 1027  
Mean Accuracy = 0.9278856887698147  
Mask 63, # of active component = 1010  
Mean Accuracy = 0.9296718017414601  
Mask 64, # of active component = 1053  
Mean Accuracy = 0.9274391605269033  
Mask 65, # of active component = 985  
Mean Accuracy = 0.9292252734985488  
Mask 66, # of active component = 991  
Mean Accuracy = 0.9258763116767136  
Mask 67, # of active component = 1069  
Mean Accuracy = 0.9298950658629158  
Mask 68, # of active component = 1046  
Mean Accuracy = 0.9260995757981693  
Mask 69, # of active component = 1026  
Mean Accuracy = 0.9281089528912704  
Mask 70, # of active component = 994  
Mean Accuracy = 0.9292252734985488  
Mask 71, # of active component = 1040  
Mean Accuracy = 0.9287787452556374  
Mask 72, # of active component = 1019  
Mean Accuracy = 0.9274391605269033  
Mask 73, # of active component = 1008  
Mean Accuracy = 0.9316811788345613  
Mask 74, # of active component = 1024  
Mean Accuracy = 0.9285554811341817  
Mask 75, # of active component = 1014  
Mean Accuracy = 0.9298950658629158  
Mask 76, # of active component = 1010  
Mean Accuracy = 0.9285554811341817  
Mask 77, # of active component = 1006



Mean Accuracy = 0.927662424648359  
Mask 78, # of active component = 1024  
Mean Accuracy = 0.9283322170127261  
Mask 79, # of active component = 1027  
Mean Accuracy = 0.9267693681625363  
Mask 80, # of active component = 1010  
Mean Accuracy = 0.9285554811341817  
Mask 81, # of active component = 1055  
Mean Accuracy = 0.9298950658629158  
Mask 82, # of active component = 1009  
Mean Accuracy = 0.9296718017414601  
Mask 83, # of active component = 1021  
Mean Accuracy = 0.9294485376200045  
Mask 84, # of active component = 1018  
Mean Accuracy = 0.9312346505916499  
Mask 85, # of active component = 1010  
Mean Accuracy = 0.9292252734985488  
Mask 86, # of active component = 1002  
Mean Accuracy = 0.9274391605269033  
Mask 87, # of active component = 1018  
Mean Accuracy = 0.9254297834338022  
Mask 88, # of active component = 1020  
Mean Accuracy = 0.9272158964054477  
Mask 89, # of active component = 1008  
Mean Accuracy = 0.9267693681625363  
Mask 90, # of active component = 1044  
Mean Accuracy = 0.927662424648359  
Mask 91, # of active component = 1010  
Mean Accuracy = 0.9312346505916499  
Mask 92, # of active component = 1025  
Mean Accuracy = 0.9294485376200045  
Mask 93, # of active component = 1020  
Mean Accuracy = 0.9278856887698147  
Mask 94, # of active component = 1040  
Mean Accuracy = 0.926992632283992  
Mask 95, # of active component = 1069  
Mean Accuracy = 0.9298950658629158  
Mask 96, # of active component = 1002  
Mean Accuracy = 0.9245367269479795  
Mask 97, # of active component = 1007  
Mean Accuracy = 0.9301183299843715  
Mask 98, # of active component = 1016  
Mean Accuracy = 0.9287787452556374  
Mask 99, # of active component = 1028  
Mean Accuracy = 0.9287787452556374  
Mask 100, # of active component = 1019

Mean Accuracy = 0.9303415941058272

Mean performance of top 10 percent masks in this round: 0.93 (+/- 0.00)

2nd round:

mask population shape = (100, 2048)

Mask 1, # of active component = 1030  
Mean Accuracy = 0.9240901987050681  
Mask 2, # of active component = 1029  
Mean Accuracy = 0.9240901987050681  
Mask 3, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 4, # of active component = 1028  
Mean Accuracy = 0.9236436704621568  
Mask 5, # of active component = 1029  
Mean Accuracy = 0.9236436704621568  
Mask 6, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 7, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 8, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 9, # of active component = 958  
Mean Accuracy = 0.9245367269479795  
Mask 10, # of active component = 957  
Mean Accuracy = 0.9245367269479795  
Mask 11, # of active component = 957  
Mean Accuracy = 0.9240901987050681  
Mask 12, # of active component = 956  
Mean Accuracy = 0.9240901987050681  
Mask 13, # of active component = 957  
Mean Accuracy = 0.9256530475552579  
Mask 14, # of active component = 956  
Mean Accuracy = 0.9252065193123465  
Mask 15, # of active component = 956  
Mean Accuracy = 0.9247599910694352  
Mask 16, # of active component = 955  
Mean Accuracy = 0.9247599910694352  
Mask 17, # of active component = 1002  
Mean Accuracy = 0.9245367269479795  
Mask 18, # of active component = 1001  
Mean Accuracy = 0.9243134628265238  
Mask 19, # of active component = 1001  
Mean Accuracy = 0.9243134628265238  
Mask 20, # of active component = 1000

Mean Accuracy = 0.9243134628265238  
Mask 21, # of active component = 1001  
Mean Accuracy = 0.9245367269479795  
Mask 22, # of active component = 1000  
Mean Accuracy = 0.9240901987050681  
Mask 23, # of active component = 1000  
Mean Accuracy = 0.9243134628265238  
Mask 24, # of active component = 999  
Mean Accuracy = 0.9243134628265238  
Mask 25, # of active component = 1018  
Mean Accuracy = 0.9245367269479795  
Mask 26, # of active component = 1017  
Mean Accuracy = 0.9245367269479795  
Mask 27, # of active component = 1017  
Mean Accuracy = 0.9247599910694352  
Mask 28, # of active component = 1016  
Mean Accuracy = 0.9247599910694352  
Mask 29, # of active component = 1017  
Mean Accuracy = 0.9247599910694352  
Mask 30, # of active component = 1016  
Mean Accuracy = 0.9247599910694352  
Mask 31, # of active component = 1016  
Mean Accuracy = 0.9249832551908909  
Mask 32, # of active component = 1015  
Mean Accuracy = 0.9247599910694352  
Mask 33, # of active component = 1049  
Mean Accuracy = 0.9247599910694352  
Mask 34, # of active component = 1048  
Mean Accuracy = 0.9247599910694352  
Mask 35, # of active component = 1048  
Mean Accuracy = 0.9249832551908909  
Mask 36, # of active component = 1047  
Mean Accuracy = 0.9249832551908909  
Mask 37, # of active component = 1048  
Mean Accuracy = 0.9247599910694352  
Mask 38, # of active component = 1047  
Mean Accuracy = 0.9247599910694352  
Mask 39, # of active component = 1047  
Mean Accuracy = 0.9249832551908909  
Mask 40, # of active component = 1046  
Mean Accuracy = 0.9249832551908909  
Mask 41, # of active component = 1031  
Mean Accuracy = 0.9258763116767136  
Mask 42, # of active component = 1030  
Mean Accuracy = 0.9258763116767136  
Mask 43, # of active component = 1030

Mean Accuracy = 0.9258763116767136  
Mask 44, # of active component = 1029  
Mean Accuracy = 0.9260995757981693  
Mask 45, # of active component = 1030  
Mean Accuracy = 0.9254297834338022  
Mask 46, # of active component = 1029  
Mean Accuracy = 0.9252065193123465  
Mask 47, # of active component = 1029  
Mean Accuracy = 0.9256530475552579  
Mask 48, # of active component = 1028  
Mean Accuracy = 0.9254297834338022  
Mask 49, # of active component = 1020  
Mean Accuracy = 0.9254297834338022  
Mask 50, # of active component = 1019  
Mean Accuracy = 0.9254297834338022  
Mask 51, # of active component = 1019  
Mean Accuracy = 0.9256530475552579  
Mask 52, # of active component = 1018  
Mean Accuracy = 0.9254297834338022  
Mask 53, # of active component = 1019  
Mean Accuracy = 0.9260995757981693  
Mask 54, # of active component = 1018  
Mean Accuracy = 0.9260995757981693  
Mask 55, # of active component = 1018  
Mean Accuracy = 0.9260995757981693  
Mask 56, # of active component = 1017  
Mean Accuracy = 0.9260995757981693  
Mask 57, # of active component = 988  
Mean Accuracy = 0.9256530475552579  
Mask 58, # of active component = 987  
Mean Accuracy = 0.9258763116767136  
Mask 59, # of active component = 987  
Mean Accuracy = 0.9256530475552579  
Mask 60, # of active component = 986  
Mean Accuracy = 0.9258763116767136  
Mask 61, # of active component = 987  
Mean Accuracy = 0.9260995757981693  
Mask 62, # of active component = 986  
Mean Accuracy = 0.9265461040410806  
Mask 63, # of active component = 986  
Mean Accuracy = 0.9260995757981693  
Mask 64, # of active component = 985  
Mean Accuracy = 0.9265461040410806  
Mask 65, # of active component = 1027  
Mean Accuracy = 0.9260995757981693  
Mask 66, # of active component = 1026

Mean Accuracy = 0.9260995757981693  
Mask 67, # of active component = 1026  
Mean Accuracy = 0.9258763116767136  
Mask 68, # of active component = 1025  
Mean Accuracy = 0.9258763116767136  
Mask 69, # of active component = 1026  
Mean Accuracy = 0.9258763116767136  
Mask 70, # of active component = 1025  
Mean Accuracy = 0.9258763116767136  
Mask 71, # of active component = 1025  
Mean Accuracy = 0.9258763116767136  
Mask 72, # of active component = 1024  
Mean Accuracy = 0.9258763116767136  
Mask 73, # of active component = 991  
Mean Accuracy = 0.9258763116767136  
Mask 74, # of active component = 990  
Mean Accuracy = 0.9258763116767136  
Mask 75, # of active component = 990  
Mean Accuracy = 0.9254297834338022  
Mask 76, # of active component = 989  
Mean Accuracy = 0.9254297834338022  
Mask 77, # of active component = 990  
Mean Accuracy = 0.9254297834338022  
Mask 78, # of active component = 989  
Mean Accuracy = 0.9254297834338022  
Mask 79, # of active component = 989  
Mean Accuracy = 0.9252065193123465  
Mask 80, # of active component = 988  
Mean Accuracy = 0.9252065193123465  
Mask 81, # of active component = 1028  
Mean Accuracy = 0.9281089528912704  
Mask 82, # of active component = 1021  
Mean Accuracy = 0.9290020093770931  
Mask 83, # of active component = 1029  
Mean Accuracy = 0.927662424648359  
Mask 84, # of active component = 1003  
Mean Accuracy = 0.9298950658629158  
Mask 85, # of active component = 1012  
Mean Accuracy = 0.9272158964054477  
Mask 86, # of active component = 1053  
Mean Accuracy = 0.9278856887698147  
Mask 87, # of active component = 1020  
Mean Accuracy = 0.9278856887698147  
Mask 88, # of active component = 1058  
Mean Accuracy = 0.926992632283992  
Mask 89, # of active component = 1000

Mean Accuracy = 0.926992632283992  
Mask 90, # of active component = 1029  
Mean Accuracy = 0.9298950658629158  
Mask 91, # of active component = 1010  
Mean Accuracy = 0.9283322170127261  
Mask 92, # of active component = 1004  
Mean Accuracy = 0.9265461040410806  
Mask 93, # of active component = 969  
Mean Accuracy = 0.9249832551908909  
Mask 94, # of active component = 993  
Mean Accuracy = 0.9310113864701942  
Mask 95, # of active component = 1050  
Mean Accuracy = 0.9283322170127261  
Mask 96, # of active component = 1020  
Mean Accuracy = 0.9281089528912704  
Mask 97, # of active component = 1012  
Mean Accuracy = 0.9263228399196249  
Mask 98, # of active component = 1024  
Mean Accuracy = 0.9281089528912704  
Mask 99, # of active component = 1040  
Mean Accuracy = 0.9292252734985488  
Mask 100, # of active component = 1036  
Mean Accuracy = 0.9298950658629158

Mean performance of top 10 percent masks in this round: 0.92 (+/- 0.00)

3rd round:

mask population shape = (100, 2048)

Mask 1, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 2, # of active component = 1026  
Mean Accuracy = 0.9231971422192453  
Mask 3, # of active component = 1026  
Mean Accuracy = 0.9236436704621568  
Mask 4, # of active component = 1025  
Mean Accuracy = 0.923420406340701  
Mask 5, # of active component = 1026  
Mean Accuracy = 0.9247599910694352  
Mask 6, # of active component = 1025  
Mean Accuracy = 0.9247599910694352  
Mask 7, # of active component = 1025  
Mean Accuracy = 0.9249832551908909  
Mask 8, # of active component = 1024  
Mean Accuracy = 0.9249832551908909  
Mask 9, # of active component = 1031

Mean Accuracy = 0.9240901987050681  
Mask 10, # of active component = 1030  
Mean Accuracy = 0.9240901987050681  
Mask 11, # of active component = 1030  
Mean Accuracy = 0.9240901987050681  
Mask 12, # of active component = 1029  
Mean Accuracy = 0.9236436704621568  
Mask 13, # of active component = 1030  
Mean Accuracy = 0.9240901987050681  
Mask 14, # of active component = 1029  
Mean Accuracy = 0.9240901987050681  
Mask 15, # of active component = 1029  
Mean Accuracy = 0.9236436704621568  
Mask 16, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 17, # of active component = 1031  
Mean Accuracy = 0.9236436704621568  
Mask 18, # of active component = 1030  
Mean Accuracy = 0.923420406340701  
Mask 19, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 20, # of active component = 1029  
Mean Accuracy = 0.923420406340701  
Mask 21, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 22, # of active component = 1029  
Mean Accuracy = 0.9236436704621568  
Mask 23, # of active component = 1029  
Mean Accuracy = 0.923420406340701  
Mask 24, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 25, # of active component = 1029  
Mean Accuracy = 0.9240901987050681  
Mask 26, # of active component = 1028  
Mean Accuracy = 0.9243134628265238  
Mask 27, # of active component = 1028  
Mean Accuracy = 0.9236436704621568  
Mask 28, # of active component = 1027  
Mean Accuracy = 0.9240901987050681  
Mask 29, # of active component = 1028  
Mean Accuracy = 0.9238669345836125  
Mask 30, # of active component = 1027  
Mean Accuracy = 0.9240901987050681  
Mask 31, # of active component = 1027  
Mean Accuracy = 0.923420406340701  
Mask 32, # of active component = 1026

Mean Accuracy = 0.9238669345836125  
Mask 33, # of active component = 1031  
Mean Accuracy = 0.923420406340701  
Mask 34, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 35, # of active component = 1030  
Mean Accuracy = 0.923420406340701  
Mask 36, # of active component = 1029  
Mean Accuracy = 0.9236436704621568  
Mask 37, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 38, # of active component = 1029  
Mean Accuracy = 0.923420406340701  
Mask 39, # of active component = 1029  
Mean Accuracy = 0.923420406340701  
Mask 40, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 41, # of active component = 1030  
Mean Accuracy = 0.923420406340701  
Mask 42, # of active component = 1029  
Mean Accuracy = 0.9231971422192453  
Mask 43, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 44, # of active component = 1028  
Mean Accuracy = 0.9225273498548783  
Mask 45, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 46, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 47, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 48, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 49, # of active component = 1033  
Mean Accuracy = 0.9231971422192453  
Mask 50, # of active component = 1032  
Mean Accuracy = 0.9238669345836125  
Mask 51, # of active component = 1032  
Mean Accuracy = 0.9231971422192453  
Mask 52, # of active component = 1031  
Mean Accuracy = 0.9238669345836125  
Mask 53, # of active component = 1032  
Mean Accuracy = 0.9236436704621568  
Mask 54, # of active component = 1031  
Mean Accuracy = 0.9238669345836125  
Mask 55, # of active component = 1031



Mean Accuracy = 0.9236436704621568  
Mask 56, # of active component = 1030  
Mean Accuracy = 0.9240901987050681  
Mask 57, # of active component = 1030  
Mean Accuracy = 0.9240901987050681  
Mask 58, # of active component = 1029  
Mean Accuracy = 0.9245367269479795  
Mask 59, # of active component = 1029  
Mean Accuracy = 0.9243134628265238  
Mask 60, # of active component = 1028  
Mean Accuracy = 0.9240901987050681  
Mask 61, # of active component = 1029  
Mean Accuracy = 0.9240901987050681  
Mask 62, # of active component = 1028  
Mean Accuracy = 0.9240901987050681  
Mask 63, # of active component = 1028  
Mean Accuracy = 0.9238669345836125  
Mask 64, # of active component = 1027  
Mean Accuracy = 0.9240901987050681  
Mask 65, # of active component = 958  
Mean Accuracy = 0.9240901987050681  
Mask 66, # of active component = 957  
Mean Accuracy = 0.9240901987050681  
Mask 67, # of active component = 957  
Mean Accuracy = 0.9240901987050681  
Mask 68, # of active component = 956  
Mean Accuracy = 0.9240901987050681  
Mask 69, # of active component = 957  
Mean Accuracy = 0.9254297834338022  
Mask 70, # of active component = 956  
Mean Accuracy = 0.9249832551908909  
Mask 71, # of active component = 956  
Mean Accuracy = 0.9254297834338022  
Mask 72, # of active component = 955  
Mean Accuracy = 0.9249832551908909  
Mask 73, # of active component = 958  
Mean Accuracy = 0.9240901987050681  
Mask 74, # of active component = 957  
Mean Accuracy = 0.9240901987050681  
Mask 75, # of active component = 957  
Mean Accuracy = 0.9240901987050681  
Mask 76, # of active component = 956  
Mean Accuracy = 0.9238669345836125  
Mask 77, # of active component = 957  
Mean Accuracy = 0.9243134628265238  
Mask 78, # of active component = 956

Mean Accuracy = 0.9243134628265238  
Mask 79, # of active component = 956  
Mean Accuracy = 0.9240901987050681  
Mask 80, # of active component = 955  
Mean Accuracy = 0.9240901987050681  
Mask 81, # of active component = 1031  
Mean Accuracy = 0.9292252734985488  
Mask 82, # of active component = 1038  
Mean Accuracy = 0.9290020093770931  
Mask 83, # of active component = 1007  
Mean Accuracy = 0.927662424648359  
Mask 84, # of active component = 1046  
Mean Accuracy = 0.9296718017414601  
Mask 85, # of active component = 1044  
Mean Accuracy = 0.9323509711989283  
Mask 86, # of active component = 1020  
Mean Accuracy = 0.9287787452556374  
Mask 87, # of active component = 1000  
Mean Accuracy = 0.9274391605269033  
Mask 88, # of active component = 1020  
Mean Accuracy = 0.9307881223487385  
Mask 89, # of active component = 1044  
Mean Accuracy = 0.9292252734985488  
Mask 90, # of active component = 1029  
Mean Accuracy = 0.9281089528912704  
Mask 91, # of active component = 1002  
Mean Accuracy = 0.9258763116767136  
Mask 92, # of active component = 1050  
Mean Accuracy = 0.9290020093770931  
Mask 93, # of active component = 1027  
Mean Accuracy = 0.9287787452556374  
Mask 94, # of active component = 1023  
Mean Accuracy = 0.9283322170127261  
Mask 95, # of active component = 1079  
Mean Accuracy = 0.926992632283992  
Mask 96, # of active component = 974  
Mean Accuracy = 0.9281089528912704  
Mask 97, # of active component = 1042  
Mean Accuracy = 0.927662424648359  
Mask 98, # of active component = 991  
Mean Accuracy = 0.9281089528912704  
Mask 99, # of active component = 1057  
Mean Accuracy = 0.9281089528912704  
Mask 100, # of active component = 1015  
Mean Accuracy = 0.9310113864701942

Mean performance of top 10 percent masks in this round: 0.92 (+/- 0.00)

4th round:

mask population shape = (100, 2048)

Mask 1, # of active component = 1030  
Mean Accuracy = 0.9243134628265238  
Mask 2, # of active component = 1029  
Mean Accuracy = 0.9240901987050681  
Mask 3, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 4, # of active component = 1028  
Mean Accuracy = 0.9225273498548783  
Mask 5, # of active component = 1029  
Mean Accuracy = 0.9249832551908909  
Mask 6, # of active component = 1028  
Mean Accuracy = 0.9247599910694352  
Mask 7, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 8, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 9, # of active component = 1031  
Mean Accuracy = 0.9229738780977896  
Mask 10, # of active component = 1030  
Mean Accuracy = 0.9231971422192453  
Mask 11, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 12, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 13, # of active component = 1030  
Mean Accuracy = 0.9229738780977896  
Mask 14, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 15, # of active component = 1029  
Mean Accuracy = 0.923420406340701  
Mask 16, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 17, # of active component = 1029  
Mean Accuracy = 0.9229738780977896  
Mask 18, # of active component = 1028  
Mean Accuracy = 0.9238669345836125  
Mask 19, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 20, # of active component = 1027  
Mean Accuracy = 0.9238669345836125  
Mask 21, # of active component = 1028

Mean Accuracy = 0.9231971422192453  
Mask 22, # of active component = 1027  
Mean Accuracy = 0.9247599910694352  
Mask 23, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 24, # of active component = 1026  
Mean Accuracy = 0.9247599910694352  
Mask 25, # of active component = 1028  
Mean Accuracy = 0.922750613976334  
Mask 26, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 27, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 28, # of active component = 1026  
Mean Accuracy = 0.9229738780977896  
Mask 29, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 30, # of active component = 1026  
Mean Accuracy = 0.9231971422192453  
Mask 31, # of active component = 1026  
Mean Accuracy = 0.923420406340701  
Mask 32, # of active component = 1025  
Mean Accuracy = 0.9231971422192453  
Mask 33, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 34, # of active component = 1026  
Mean Accuracy = 0.9238669345836125  
Mask 35, # of active component = 1026  
Mean Accuracy = 0.923420406340701  
Mask 36, # of active component = 1025  
Mean Accuracy = 0.9238669345836125  
Mask 37, # of active component = 1026  
Mean Accuracy = 0.9231971422192453  
Mask 38, # of active component = 1025  
Mean Accuracy = 0.9238669345836125  
Mask 39, # of active component = 1025  
Mean Accuracy = 0.9231971422192453  
Mask 40, # of active component = 1024  
Mean Accuracy = 0.9238669345836125  
Mask 41, # of active component = 1027  
Mean Accuracy = 0.923420406340701  
Mask 42, # of active component = 1026  
Mean Accuracy = 0.9236436704621568  
Mask 43, # of active component = 1026  
Mean Accuracy = 0.9231971422192453  
Mask 44, # of active component = 1025

Mean Accuracy = 0.9231971422192453  
Mask 45, # of active component = 1026  
Mean Accuracy = 0.9231971422192453  
Mask 46, # of active component = 1025  
Mean Accuracy = 0.9238669345836125  
Mask 47, # of active component = 1025  
Mean Accuracy = 0.923420406340701  
Mask 48, # of active component = 1024  
Mean Accuracy = 0.9240901987050681  
Mask 49, # of active component = 1032  
Mean Accuracy = 0.9238669345836125  
Mask 50, # of active component = 1031  
Mean Accuracy = 0.9240901987050681  
Mask 51, # of active component = 1031  
Mean Accuracy = 0.923420406340701  
Mask 52, # of active component = 1030  
Mean Accuracy = 0.9229738780977896  
Mask 53, # of active component = 1031  
Mean Accuracy = 0.9236436704621568  
Mask 54, # of active component = 1030  
Mean Accuracy = 0.9238669345836125  
Mask 55, # of active component = 1030  
Mean Accuracy = 0.9231971422192453  
Mask 56, # of active component = 1029  
Mean Accuracy = 0.9231971422192453  
Mask 57, # of active component = 1034  
Mean Accuracy = 0.9231971422192453  
Mask 58, # of active component = 1033  
Mean Accuracy = 0.923420406340701  
Mask 59, # of active component = 1033  
Mean Accuracy = 0.9231971422192453  
Mask 60, # of active component = 1032  
Mean Accuracy = 0.923420406340701  
Mask 61, # of active component = 1033  
Mean Accuracy = 0.9236436704621568  
Mask 62, # of active component = 1032  
Mean Accuracy = 0.9236436704621568  
Mask 63, # of active component = 1032  
Mean Accuracy = 0.9236436704621568  
Mask 64, # of active component = 1031  
Mean Accuracy = 0.9236436704621568  
Mask 65, # of active component = 1033  
Mean Accuracy = 0.9231971422192453  
Mask 66, # of active component = 1032  
Mean Accuracy = 0.9238669345836125  
Mask 67, # of active component = 1032

Mean Accuracy = 0.9231971422192453  
Mask 68, # of active component = 1031  
Mean Accuracy = 0.9238669345836125  
Mask 69, # of active component = 1032  
Mean Accuracy = 0.9231971422192453  
Mask 70, # of active component = 1031  
Mean Accuracy = 0.9238669345836125  
Mask 71, # of active component = 1031  
Mean Accuracy = 0.9231971422192453  
Mask 72, # of active component = 1030  
Mean Accuracy = 0.9238669345836125  
Mask 73, # of active component = 1028  
Mean Accuracy = 0.9236436704621568  
Mask 74, # of active component = 1027  
Mean Accuracy = 0.9238669345836125  
Mask 75, # of active component = 1027  
Mean Accuracy = 0.9243134628265238  
Mask 76, # of active component = 1026  
Mean Accuracy = 0.9240901987050681  
Mask 77, # of active component = 1027  
Mean Accuracy = 0.9236436704621568  
Mask 78, # of active component = 1026  
Mean Accuracy = 0.9236436704621568  
Mask 79, # of active component = 1026  
Mean Accuracy = 0.9240901987050681  
Mask 80, # of active component = 1025  
Mean Accuracy = 0.923420406340701  
Mask 81, # of active component = 1058  
Mean Accuracy = 0.927662424648359  
Mask 82, # of active component = 1045  
Mean Accuracy = 0.9263228399196249  
Mask 83, # of active component = 1056  
Mean Accuracy = 0.926992632283992  
Mask 84, # of active component = 1005  
Mean Accuracy = 0.9256530475552579  
Mask 85, # of active component = 1028  
Mean Accuracy = 0.9310113864701942  
Mask 86, # of active component = 1058  
Mean Accuracy = 0.9267693681625363  
Mask 87, # of active component = 1043  
Mean Accuracy = 0.9267693681625363  
Mask 88, # of active component = 1043  
Mean Accuracy = 0.9290020093770931  
Mask 89, # of active component = 1030  
Mean Accuracy = 0.9260995757981693  
Mask 90, # of active component = 1002

Mean Accuracy = 0.9254297834338022  
Mask 91, # of active component = 1021  
Mean Accuracy = 0.926992632283992  
Mask 92, # of active component = 1003  
Mean Accuracy = 0.9298950658629158  
Mask 93, # of active component = 1051  
Mean Accuracy = 0.9263228399196249  
Mask 94, # of active component = 1010  
Mean Accuracy = 0.9290020093770931  
Mask 95, # of active component = 1044  
Mean Accuracy = 0.9287787452556374  
Mask 96, # of active component = 994  
Mean Accuracy = 0.9281089528912704  
Mask 97, # of active component = 1050  
Mean Accuracy = 0.9281089528912704  
Mask 98, # of active component = 1045  
Mean Accuracy = 0.9263228399196249  
Mask 99, # of active component = 1018  
Mean Accuracy = 0.9283322170127261  
Mask 100, # of active component = 1014  
Mean Accuracy = 0.927662424648359

Mean performance of top 10 percent masks in this round: 0.92 (+/- 0.00)

5th round:

mask population shape = (100, 2048)

Mask 1, # of active component = 1028  
Mean Accuracy = 0.9225273498548783  
Mask 2, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 3, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 4, # of active component = 1026  
Mean Accuracy = 0.923420406340701  
Mask 5, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 6, # of active component = 1026  
Mean Accuracy = 0.923420406340701  
Mask 7, # of active component = 1026  
Mean Accuracy = 0.923420406340701  
Mask 8, # of active component = 1025  
Mean Accuracy = 0.923420406340701  
Mask 9, # of active component = 1030  
Mean Accuracy = 0.9225273498548783  
Mask 10, # of active component = 1029

Mean Accuracy = 0.9240901987050681  
Mask 11, # of active component = 1029  
Mean Accuracy = 0.9231971422192453  
Mask 12, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 13, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 14, # of active component = 1028  
Mean Accuracy = 0.9236436704621568  
Mask 15, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 16, # of active component = 1027  
Mean Accuracy = 0.9231971422192453  
Mask 17, # of active component = 1032  
Mean Accuracy = 0.9225273498548783  
Mask 18, # of active component = 1031  
Mean Accuracy = 0.922750613976334  
Mask 19, # of active component = 1031  
Mean Accuracy = 0.9225273498548783  
Mask 20, # of active component = 1030  
Mean Accuracy = 0.9225273498548783  
Mask 21, # of active component = 1031  
Mean Accuracy = 0.9225273498548783  
Mask 22, # of active component = 1030  
Mean Accuracy = 0.922750613976334  
Mask 23, # of active component = 1030  
Mean Accuracy = 0.9225273498548783  
Mask 24, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 25, # of active component = 1030  
Mean Accuracy = 0.9238669345836125  
Mask 26, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 27, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 28, # of active component = 1028  
Mean Accuracy = 0.9238669345836125  
Mask 29, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 30, # of active component = 1028  
Mean Accuracy = 0.922750613976334  
Mask 31, # of active component = 1028  
Mean Accuracy = 0.922750613976334  
Mask 32, # of active component = 1027  
Mean Accuracy = 0.922750613976334  
Mask 33, # of active component = 1033



Mean Accuracy = 0.923420406340701  
Mask 34, # of active component = 1032  
Mean Accuracy = 0.9231971422192453  
Mask 35, # of active component = 1032  
Mean Accuracy = 0.9231971422192453  
Mask 36, # of active component = 1031  
Mean Accuracy = 0.9229738780977896  
Mask 37, # of active component = 1032  
Mean Accuracy = 0.9236436704621568  
Mask 38, # of active component = 1031  
Mean Accuracy = 0.923420406340701  
Mask 39, # of active component = 1031  
Mean Accuracy = 0.923420406340701  
Mask 40, # of active component = 1030  
Mean Accuracy = 0.9231971422192453  
Mask 41, # of active component = 1032  
Mean Accuracy = 0.9229738780977896  
Mask 42, # of active component = 1031  
Mean Accuracy = 0.9231971422192453  
Mask 43, # of active component = 1031  
Mean Accuracy = 0.922750613976334  
Mask 44, # of active component = 1030  
Mean Accuracy = 0.9229738780977896  
Mask 45, # of active component = 1031  
Mean Accuracy = 0.9236436704621568  
Mask 46, # of active component = 1030  
Mean Accuracy = 0.9238669345836125  
Mask 47, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 48, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 49, # of active component = 1031  
Mean Accuracy = 0.9236436704621568  
Mask 50, # of active component = 1030  
Mean Accuracy = 0.922750613976334  
Mask 51, # of active component = 1030  
Mean Accuracy = 0.9238669345836125  
Mask 52, # of active component = 1029  
Mean Accuracy = 0.9229738780977896  
Mask 53, # of active component = 1030  
Mean Accuracy = 0.9236436704621568  
Mask 54, # of active component = 1029  
Mean Accuracy = 0.922750613976334  
Mask 55, # of active component = 1029  
Mean Accuracy = 0.9238669345836125  
Mask 56, # of active component = 1028

Mean Accuracy = 0.9229738780977896  
Mask 57, # of active component = 1030  
Mean Accuracy = 0.9223040857334226  
Mask 58, # of active component = 1029  
Mean Accuracy = 0.9223040857334226  
Mask 59, # of active component = 1029  
Mean Accuracy = 0.9223040857334226  
Mask 60, # of active component = 1028  
Mean Accuracy = 0.9223040857334226  
Mask 61, # of active component = 1029  
Mean Accuracy = 0.9231971422192453  
Mask 62, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 63, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 64, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 65, # of active component = 1029  
Mean Accuracy = 0.9229738780977896  
Mask 66, # of active component = 1028  
Mean Accuracy = 0.923420406340701  
Mask 67, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 68, # of active component = 1027  
Mean Accuracy = 0.923420406340701  
Mask 69, # of active component = 1028  
Mean Accuracy = 0.9229738780977896  
Mask 70, # of active component = 1027  
Mean Accuracy = 0.922750613976334  
Mask 71, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 72, # of active component = 1026  
Mean Accuracy = 0.922750613976334  
Mask 73, # of active component = 1027  
Mean Accuracy = 0.9229738780977896  
Mask 74, # of active component = 1026  
Mean Accuracy = 0.922750613976334  
Mask 75, # of active component = 1026  
Mean Accuracy = 0.9231971422192453  
Mask 76, # of active component = 1025  
Mean Accuracy = 0.922750613976334  
Mask 77, # of active component = 1026  
Mean Accuracy = 0.9229738780977896  
Mask 78, # of active component = 1025  
Mean Accuracy = 0.9231971422192453  
Mask 79, # of active component = 1025

Mean Accuracy = 0.9231971422192453  
Mask 80, # of active component = 1024  
Mean Accuracy = 0.923420406340701  
Mask 81, # of active component = 1005  
Mean Accuracy = 0.9287787452556374  
Mask 82, # of active component = 1011  
Mean Accuracy = 0.9274391605269033  
Mask 83, # of active component = 1036  
Mean Accuracy = 0.9247599910694352  
Mask 84, # of active component = 1012  
Mean Accuracy = 0.9245367269479795  
Mask 85, # of active component = 1022  
Mean Accuracy = 0.9307881223487385  
Mask 86, # of active component = 1003  
Mean Accuracy = 0.9305648582272829  
Mask 87, # of active component = 1003  
Mean Accuracy = 0.9301183299843715  
Mask 88, # of active component = 988  
Mean Accuracy = 0.9301183299843715  
Mask 89, # of active component = 1026  
Mean Accuracy = 0.9281089528912704  
Mask 90, # of active component = 992  
Mean Accuracy = 0.9263228399196249  
Mask 91, # of active component = 1019  
Mean Accuracy = 0.9296718017414601  
Mask 92, # of active component = 1003  
Mean Accuracy = 0.9278856887698147  
Mask 93, # of active component = 1051  
Mean Accuracy = 0.927662424648359  
Mask 94, # of active component = 1022  
Mean Accuracy = 0.9281089528912704  
Mask 95, # of active component = 1034  
Mean Accuracy = 0.9283322170127261  
Mask 96, # of active component = 1050  
Mean Accuracy = 0.9287787452556374  
Mask 97, # of active component = 1051  
Mean Accuracy = 0.9307881223487385  
Mask 98, # of active component = 1042  
Mean Accuracy = 0.9285554811341817  
Mask 99, # of active component = 1031  
Mean Accuracy = 0.9292252734985488  
Mask 100, # of active component = 1015  
Mean Accuracy = 0.9303415941058272

Mean performance of top 10 percent masks in this round: 0.92 (+/- 0.00)