Class 1, PCA

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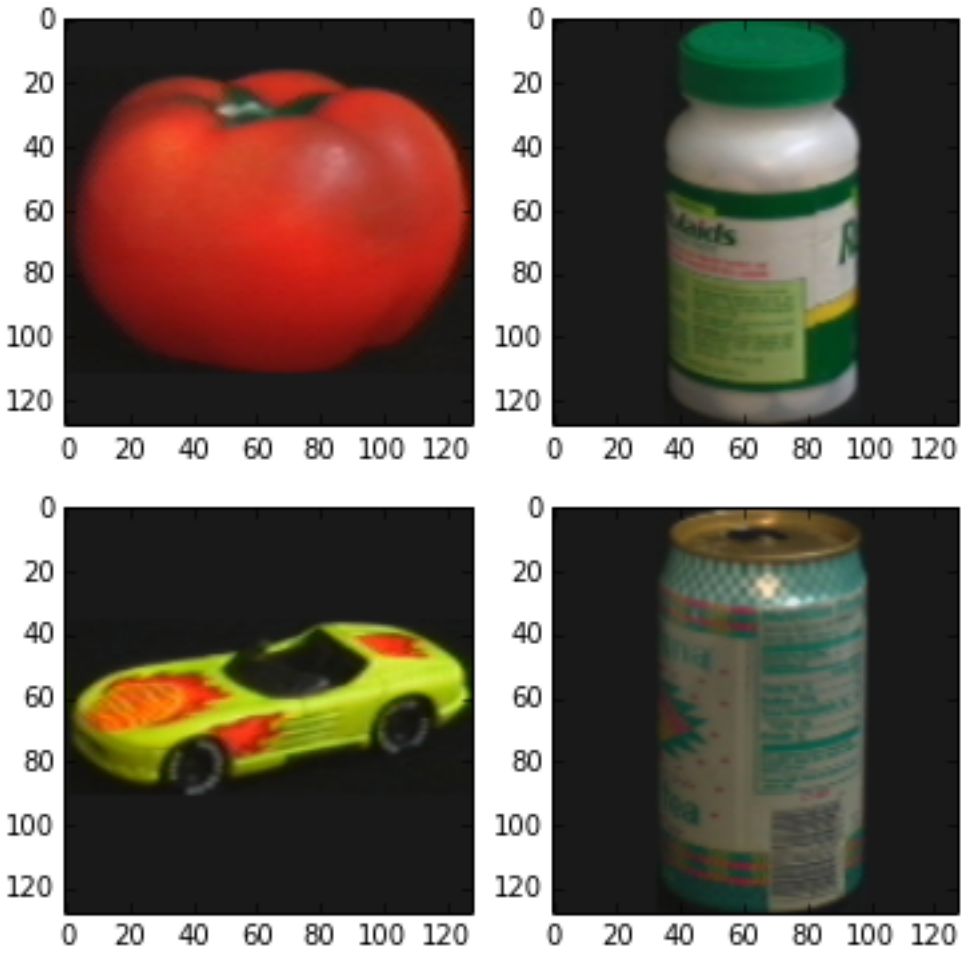
In [1]:
```
%matplotlib inline
from tasks import tasks
```

Part I

Take four random classes from COIL-100.

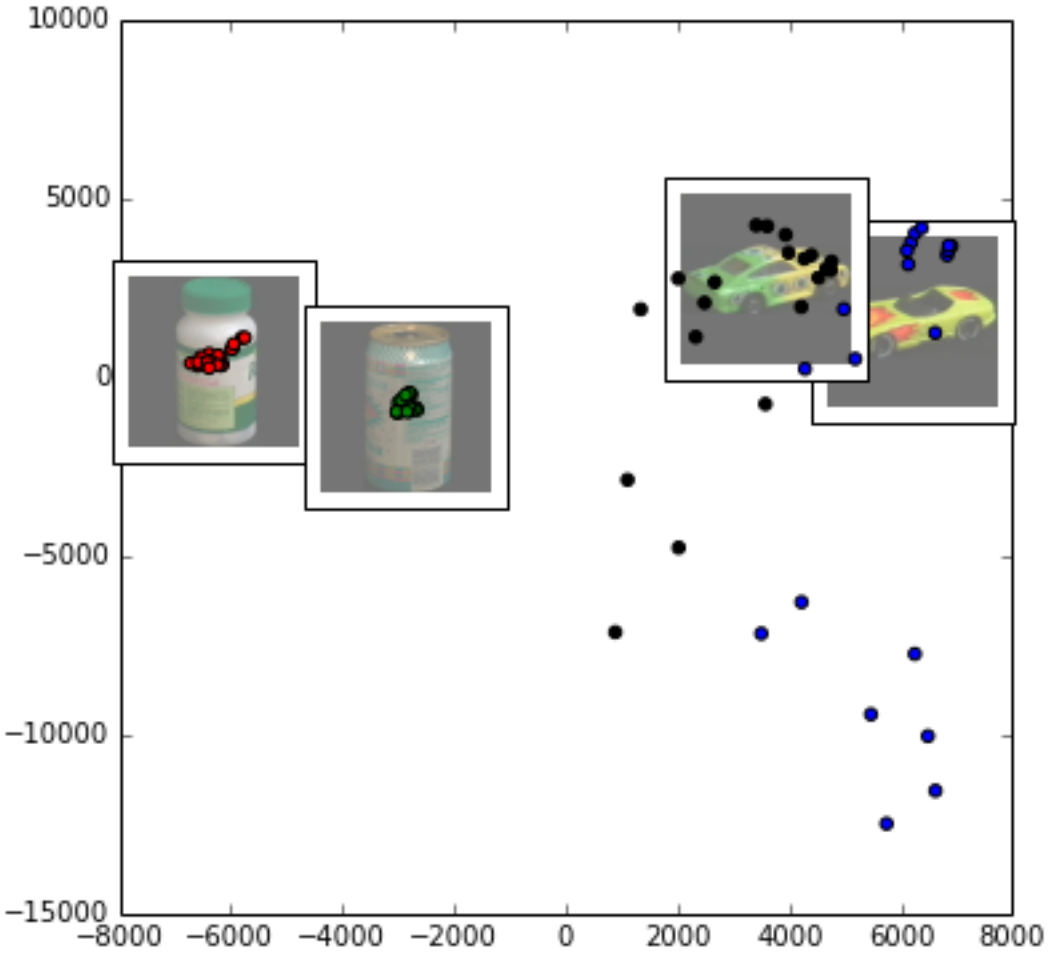
In [2]:
```
tasks('classes=4-5-6-7,n=20,show')
```



Part II

Plot first two principal components.

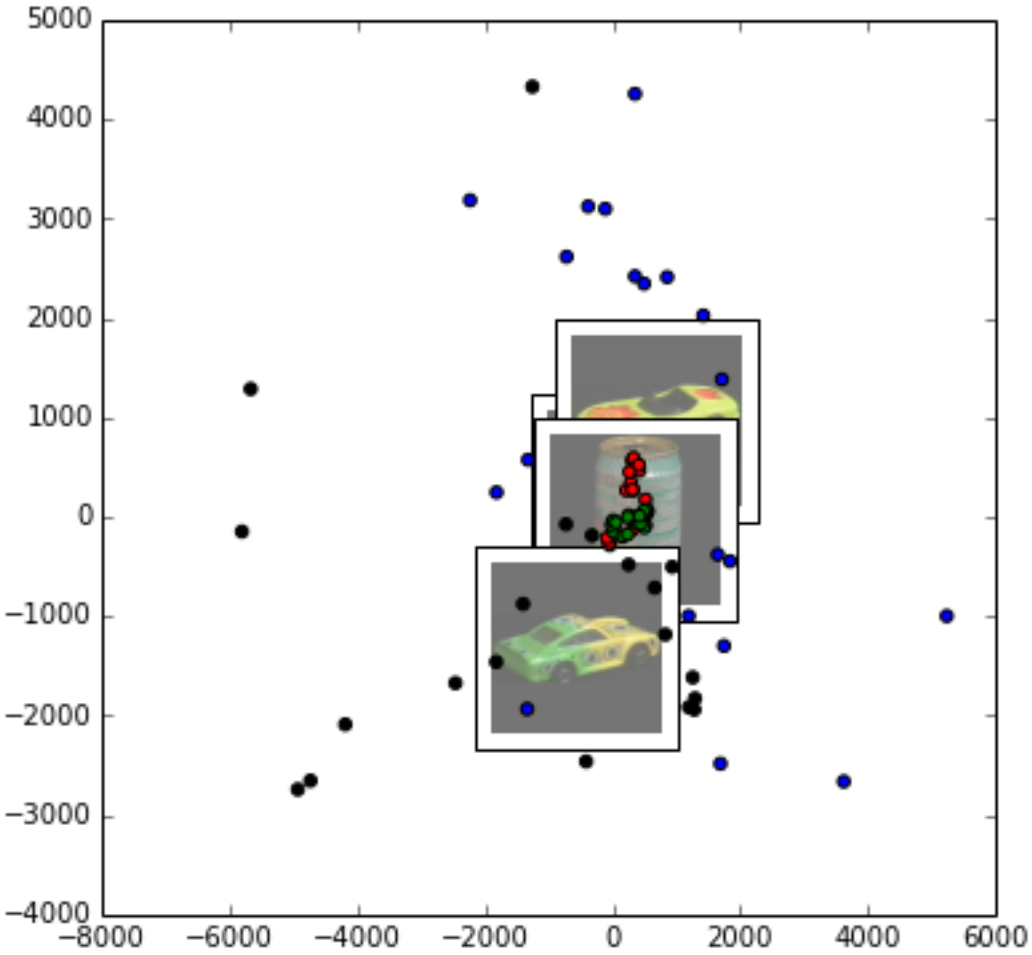
In [3]:
```
tasks('classes=5-6-7-8,n=20,pca=2,vis=0-1')
```



Part III

Plot next two principal components.

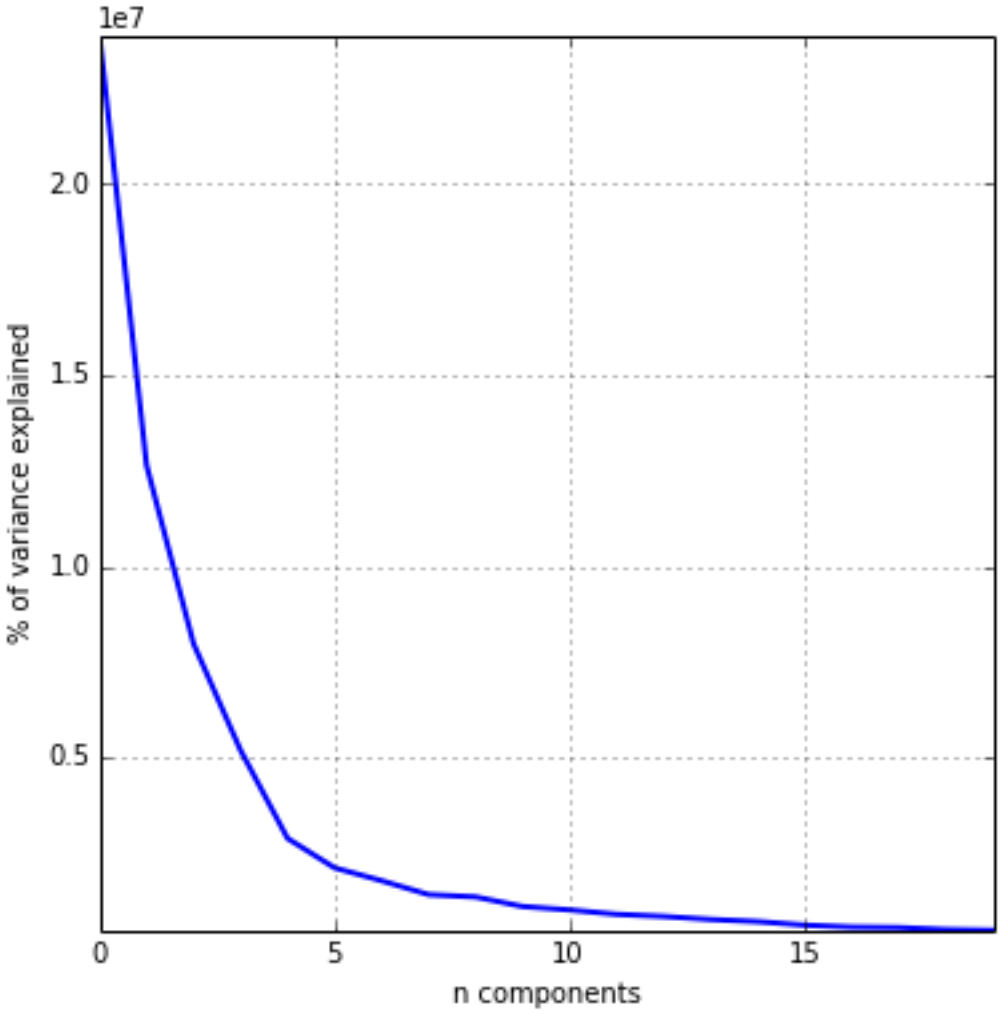
In [4]:
```
tasks('classes=5-6-7-8,n=20,pca=2,vis=4-5')
```



Part IV

Show how much variance is explained by each principal component.

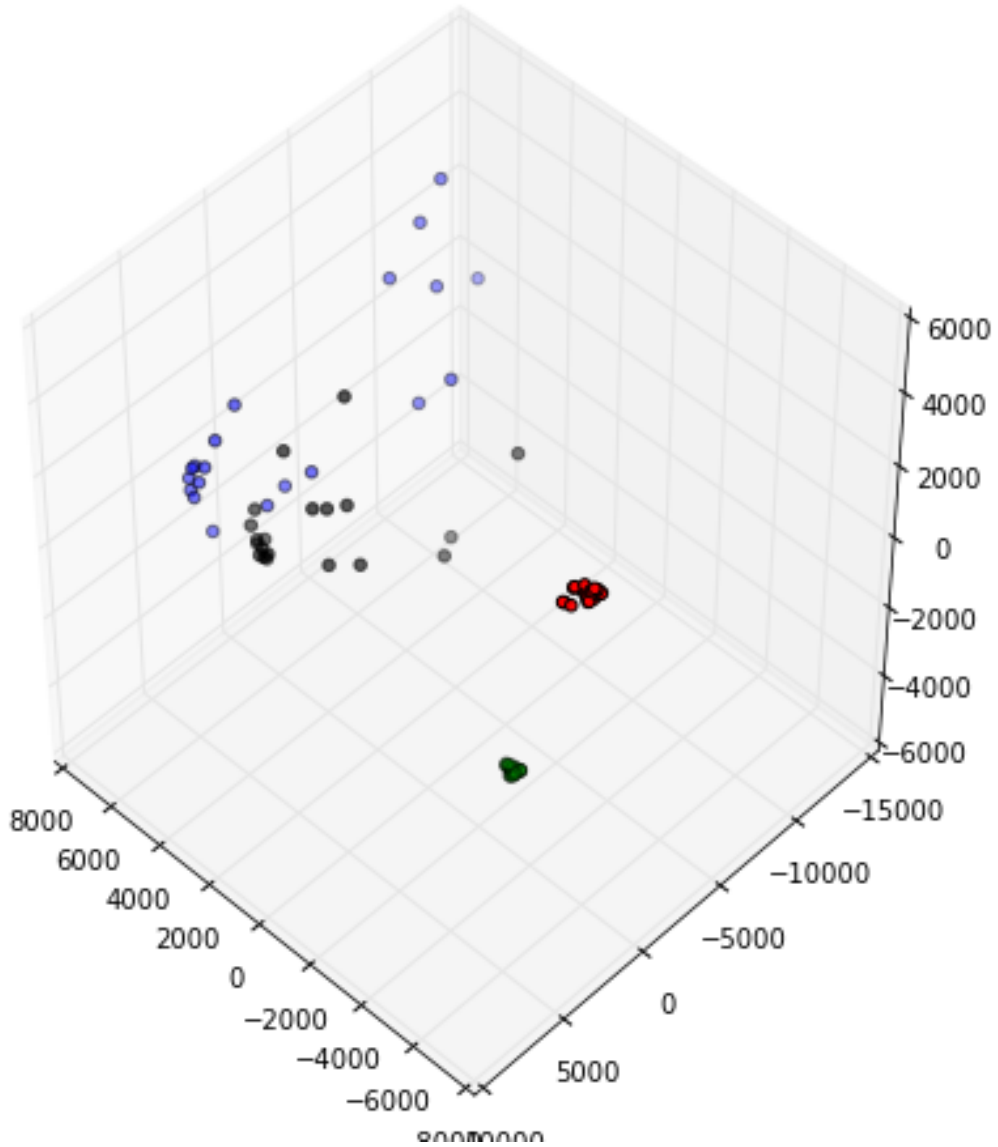
In [5]:
```
tasks('classes=5-6-7-8,n=20,pca=20,eig')
```



Part V

How about three principal components?

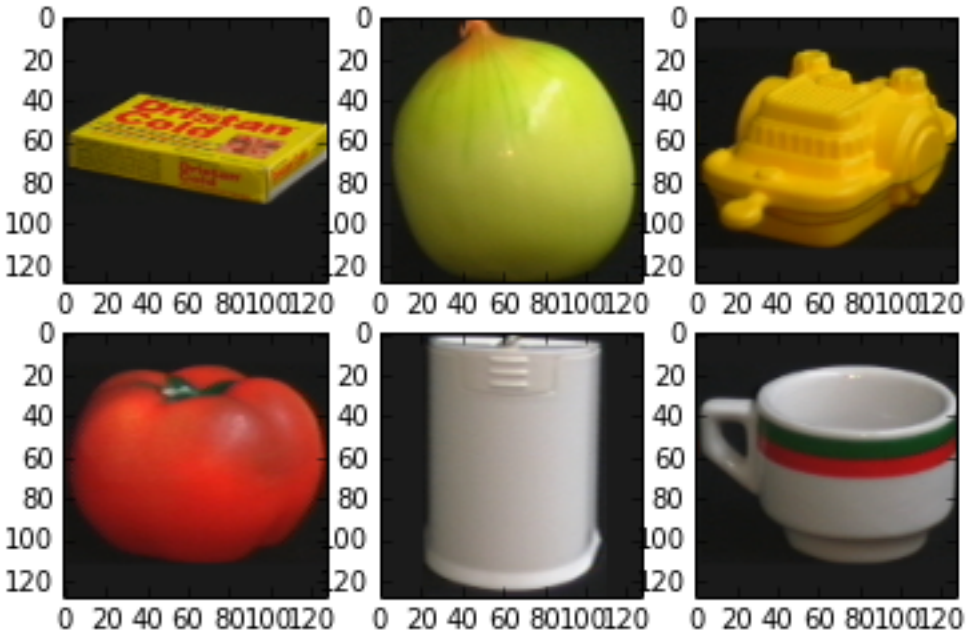
In [6]:
```
tasks('classes=5-6-7-8,n=20,pca=3,vis3d=0-1-2')
```



Part VI

Now let's try more objects.

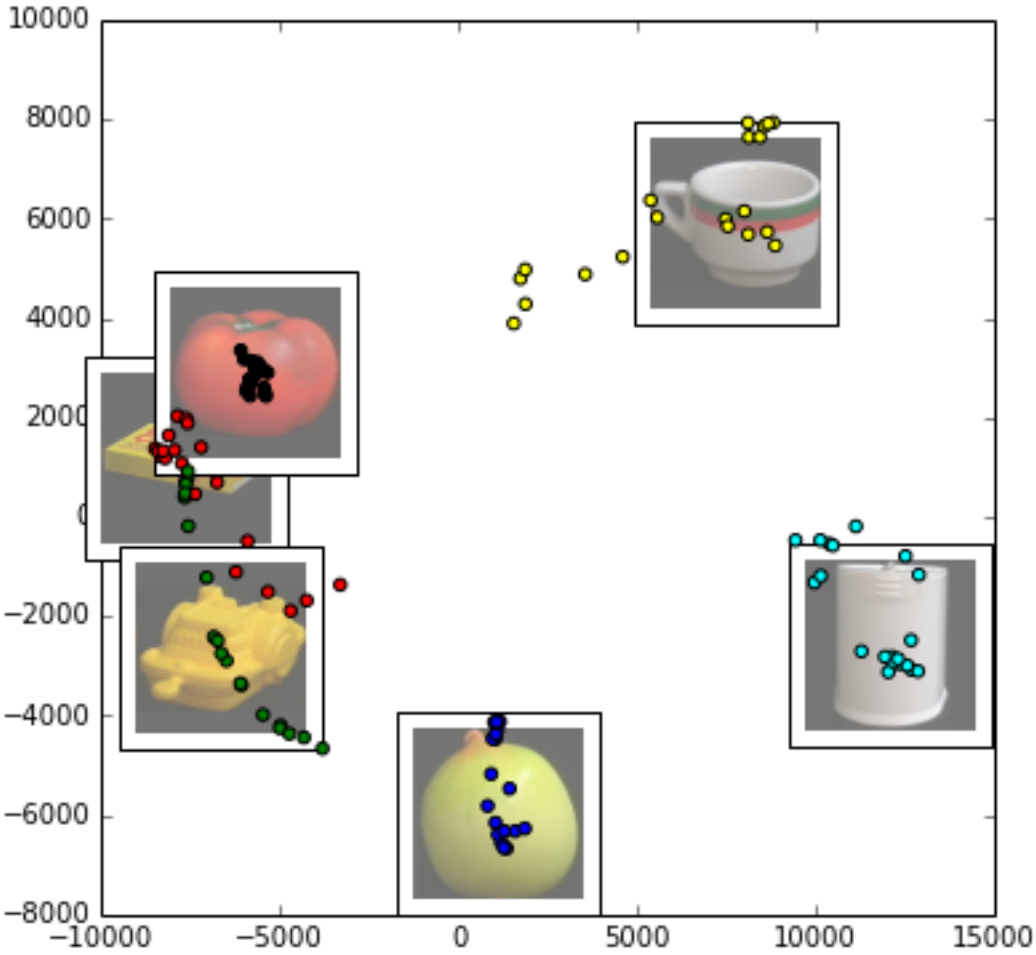
In [7]:
```
tasks('classes=1-2-3-4-9-10,n=20,show')
```



Part VII

Again, first two components.

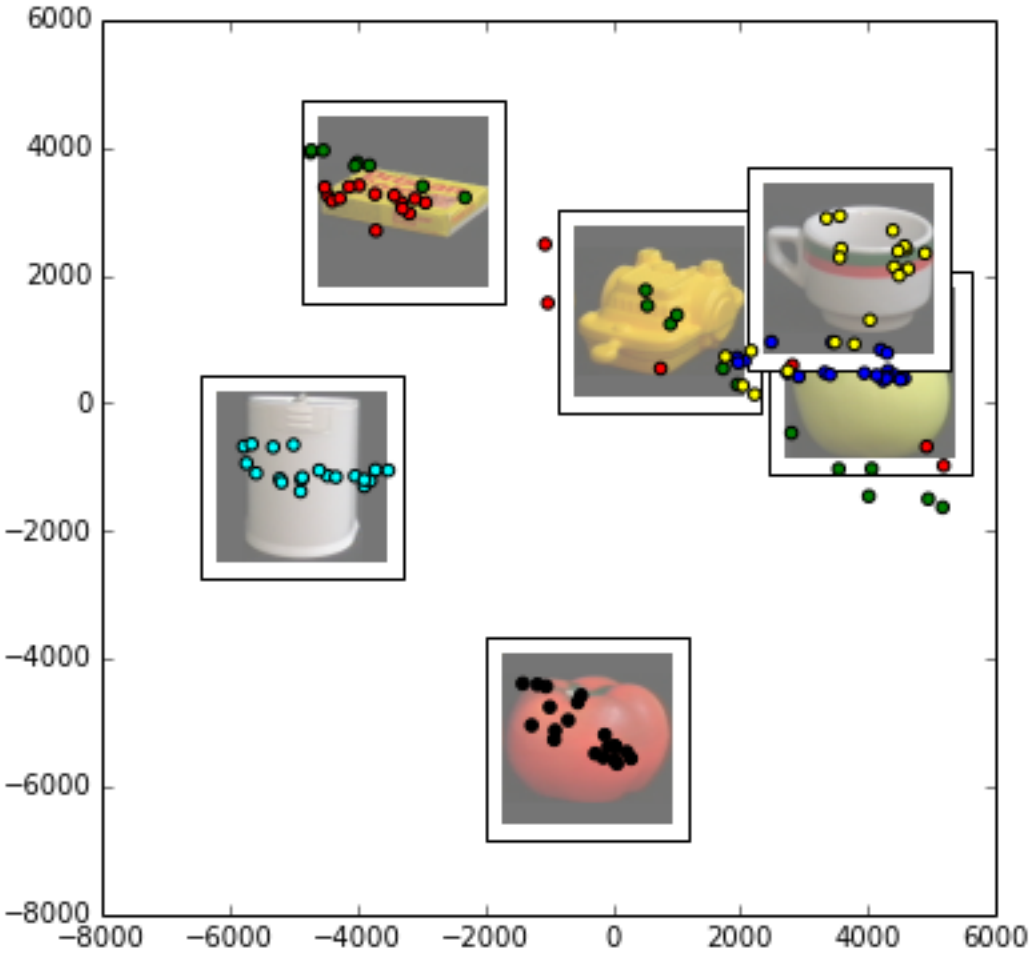
In [8]:
```
tasks('classes=1-2-3-4-9-10,n=20,pca=2,vis=0-1')
```



Part VIII

Next two components.

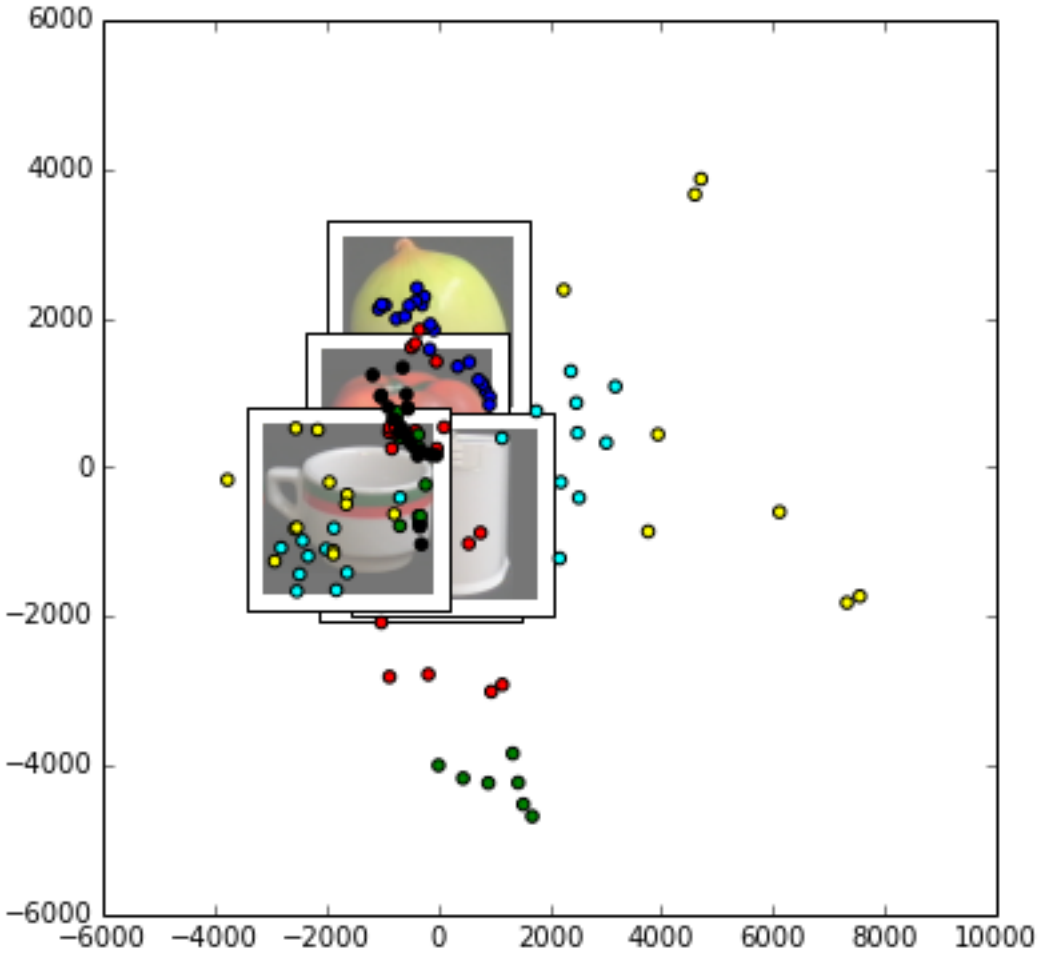
In [9]:
```
tasks('classes=1-2-3-4-9-10,n=20,pca=2,vis=2-3')
```



Part IX

And next two…

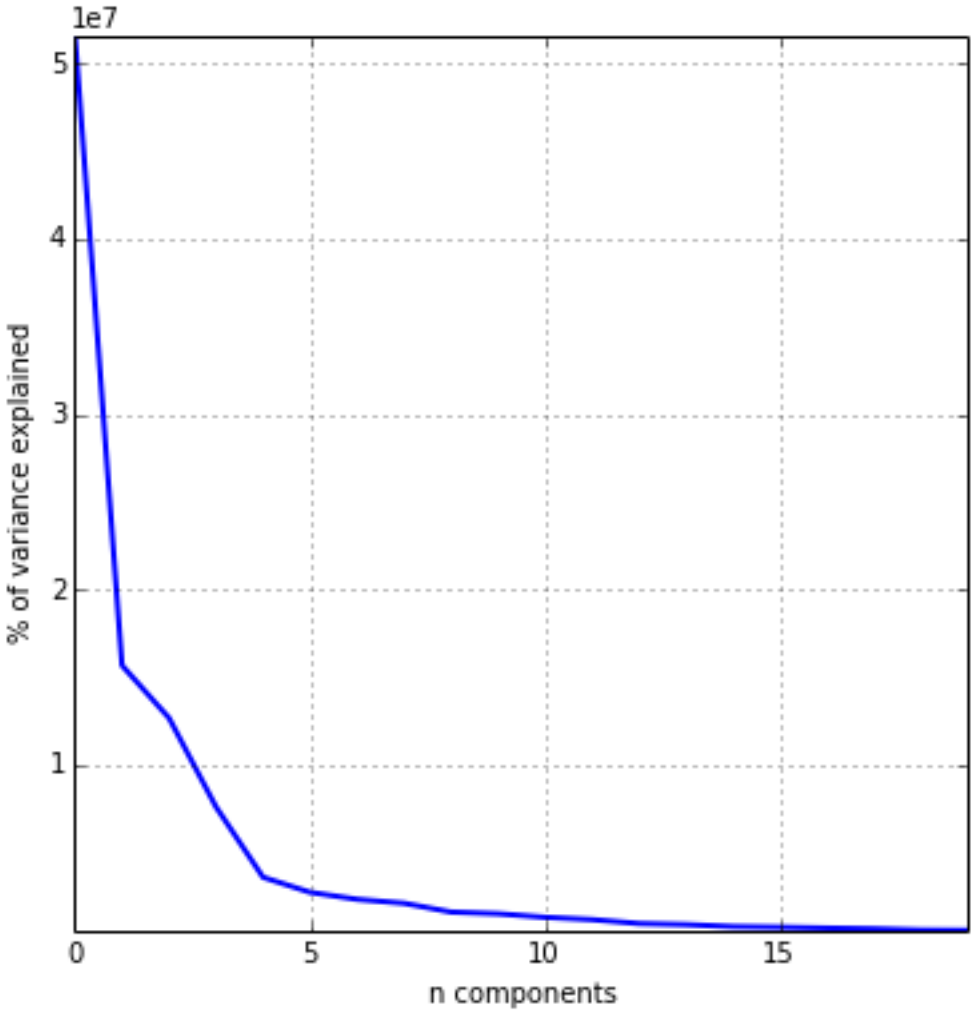
In [10]:
```
tasks('classes=1-2-3-4-9-10,n=20,pca=2,vis=4-5')
```



Part X

What about component distribution?

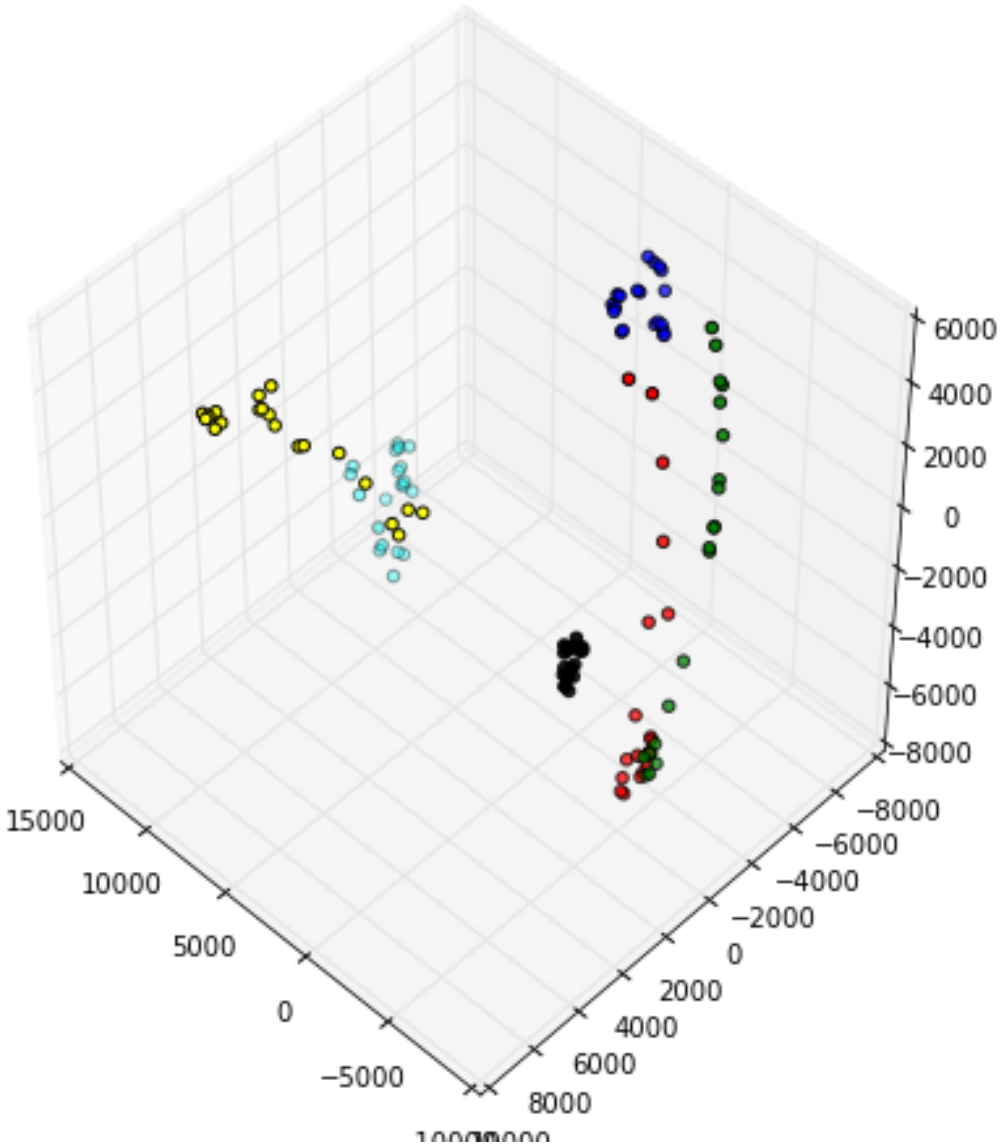
In [11]:
```
tasks('classes=1-2-3-4-9-10,n=20,pca=20,eig')
```



Part XI

First three

In [12]:
```
tasks('classes=1-2-3-4-9-10,n=20,pca=3,vis3d=0-1-2')
```



Part XII

Let's try to learn to distinguish between them. We'll use Naive Bayes classifier.

1 First, without PCA.

In [13]:
```
tasks('classes=1-2-3-4-9-10,n=20,nb')
```

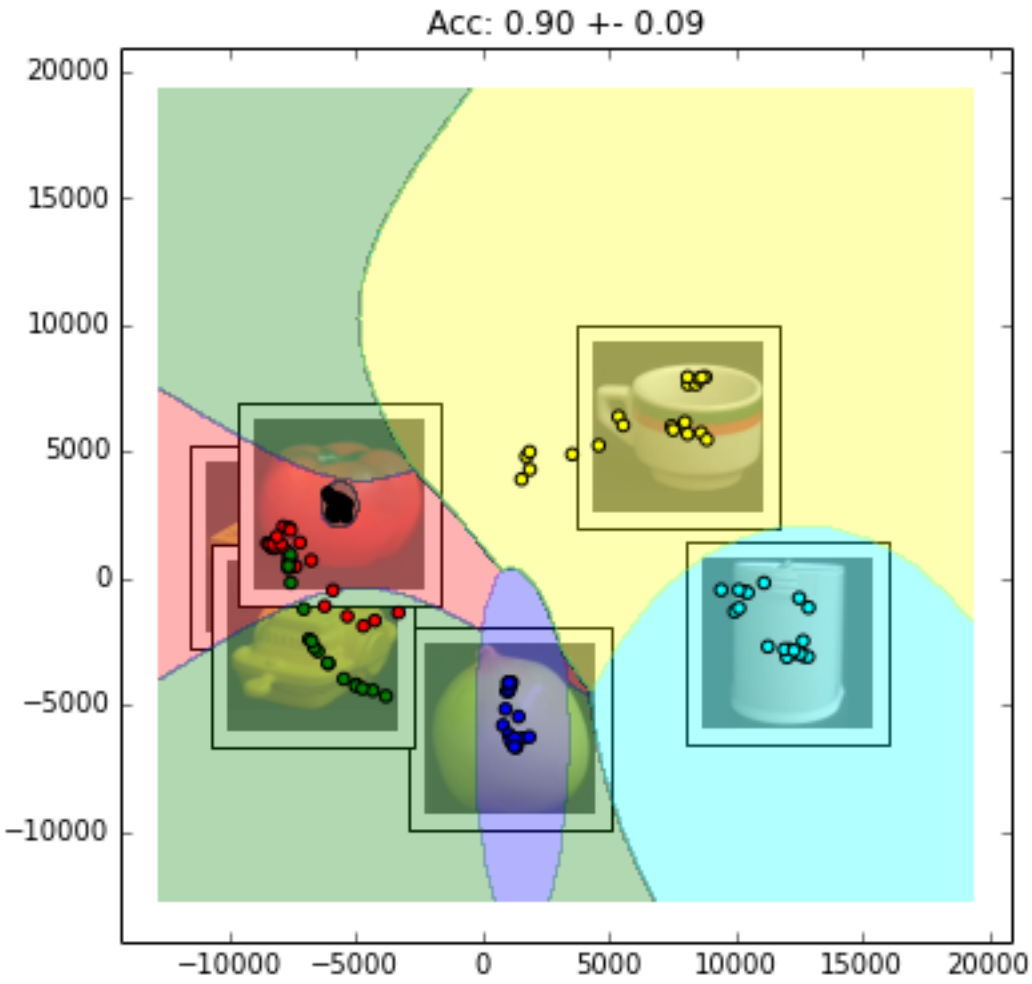
```
Acc: 0.87 +- 0.08
```

2 Now with PCA with two first components.

```
In [14]: tasks('classes=1-2-3-4-9-10,n=20,pca=2,nb')
Acc: 0.90 +- 0.09
```

3 Let's visualize decision boundaries.

```
In [15]: tasks('classes=1-2-3-4-9-10,n=20,vis=0-1,pca=2,nb,heat')
Acc: 0.90 +- 0.09
```




```
In [15]:
```