In [52]:
```
import tensorflow as tf
import numpy as np
import pickle as pkl
from sklearn.manifold import TSNE
from flip_gradient import flip_gradient
from utils import *
from timeit import default_timer as timer
import numpy as np
from keras import backend as K
from keras.datasets import mnist
from keras.layers import Conv2D,Dense,MaxPool2D,Flatten, Dropout
from keras.models import Sequential
from sklearn.ensemble import ExtraTreesClassifier
from sklearn.tree import DecisionTreeClassifier
from sklearn.metrics import accuracy_score
from keras_helper import NNWeightHelper
from snes import SNES
from sklearn.ensemble import RandomForestClassifier
from sklearn.metrics import accuracy_score
import scipy.misc
```

In [53]:
```
from tensorflow.examples.tutorials.mnist import input_data
mnist = input_data.read_data_sets('MNIST_data', one_hot=True)

# Process MNIST
mnist_train = (mnist.train.images > 0).reshape(55000, 28, 28, 1).astype(np.uint8) * 25
mnist_train = np.concatenate([mnist_train, mnist_train, mnist_train], 3)
mnist_test = (mnist.test.images > 0).reshape(10000, 28, 28, 1).astype(np.uint8) * 255
mnist_test = np.concatenate([mnist_test, mnist_test, mnist_test], 3)
mnist_valid = (mnist.validation.images > 0).reshape(mnist.validation.images.shape[0],2
mnist_valid= np.concatenate([mnist_valid,mnist_valid,mnist_valid],axis=3)


print(type(mnist_train[0]))

# Load MNIST-M
mnistm = pkl.load(open('mnistm_data.pkl', 'rb'))
mnistm_train = mnistm['train']
mnistm_test = mnistm['test']
mnistm_valid = mnistm['valid']

# Compute pixel mean for normalizing data
pixel_mean = np.vstack([mnist_train, mnistm_train]).mean((0, 1, 2))

# Create a mixed dataset for TSNE visualization
num_test = 500
combined_test_imgs = np.vstack([mnist_test[:num_test], mnistm_test[:num_test]])
combined_test_labels = np.vstack([mnist.test.labels[:num_test], mnist.test.labels[:num
combined_test_domain = np.vstack([np.tile([1., 0.], [num_test, 1]),
        np.tile([0., 1.], [num_test, 1])])
```

```
Extracting MNIST_data/train-images-idx3-ubyte.gz
Extracting MNIST_data/train-labels-idx1-ubyte.gz
Extracting MNIST_data/t10k-images-idx3-ubyte.gz
Extracting MNIST_data/t10k-labels-idx1-ubyte.gz
<type 'numpy.ndarray'>
```

In [55]:
```
imshow_grid(mnist_train)
imshow_grid(mnistm_train)
```

In [56]:
```
mnist_train_labels = mnist.train.labels
mnist_test_labels = mnist.test.labels
mnist_valid_labels = mnist.validation.labels
print (len(mnist_train_labels), len(mnist_test_labels))
# print (mnist_train_labels[0:4])
```

```
(55000, 10000)
```

In [57]:
```
# input image dimensions
img_rows, img_cols = 28, 28
num_classes = 10
input_shape = (img_rows, img_cols, 3)
```

In [75]:
```
x_train, y_train = mnist_train , mnist_train_labels
x_valid, y_valid = mnist_valid, mnist_valid_labels
Mx_train, My_train = mnistm_train , mnist_train_labels
Mx_valid, My_valid = mnistm_valid, mnist_valid_labels
```

In [76]:
```
model = Sequential()
model.add(Conv2D(32,kernel_size=(5,5),activation='relu',input_shape=input_shape))
model.add(MaxPool2D())
model.add((Conv2D(48,kernel_size=(3, 3), activation='relu')))
model.add(MaxPool2D())
model.add(Flatten())
model.add(Dropout(0.1))
model.add(Dense(10,activation='relu'))
model.compile(loss='mse',optimizer='adam')
model = model
model.summary()
```

```
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_5 (Conv2D)            (None, 24, 24, 32)        2432
_________________________________________________________________
max_pooling2d_5 (MaxPooling2 (None, 12, 12, 32)        0
_________________________________________________________________
conv2d_6 (Conv2D)            (None, 10, 10, 48)        13872
_________________________________________________________________
max_pooling2d_6 (MaxPooling2 (None, 5, 5, 48)          0
_________________________________________________________________
flatten_3 (Flatten)          (None, 1200)              0
_________________________________________________________________
dropout_3 (Dropout)          (None, 1200)              0
_________________________________________________________________
dense_3 (Dense)              (None, 10)                12010
=================================================================
Total params: 28,314
Trainable params: 28,314
Non-trainable params: 0
_________________________________________________________________
```

In [77]:
```
nnw = NNWeightHelper(model)
weights = nnw.get_weights()
```

In [78]:
```
SX=np.asarray(x_train)
SY=np.asarray(y_train)
SVX=np.asarray(x_valid)
SVY=np.asarray(y_valid)
input_shape=SX.shape[1:]

TX = np.asarray(Mx_train)
TY = np.asarray(My_train)
TVX = np.asarray(Mx_valid)
TVY = np.asarray(My_valid)

MX=np.concatenate((SX, TX), axis=0)
MY=np.concatenate((np.zeros(SX.shape[0]), np.ones(TX.shape[0])),axis=0)

MVX = np.concatenate((SVX, TVX),axis=0)
MVY = np.concatenate((np.zeros(SVX.shape[0]), np.ones(TVX.shape[0])),axis=0)

input_shape=SX.shape[1:]
```

In [79]:
```
def Train_classifier(x,y):
    x_features=model.predict(x)
    clf=RandomForestClassifier(n_estimators=18)
    clf=clf.fit(x_features, y)
    return clf

def Predict_from_clf(clf,x):
    x_features=model.predict(x)
    y=clf.predict(x_features)
    return y

def saveModel(filename):
    file=open(filename+'.json','w')
    file.write(model.to_json())
    model.save_weights(filename+'.h5')
    file.close()

def load_model(filename):
    file=open(filename+'.json')
    model=file.read()
    model=model_from_json(model)
    model.load_weight(filename+'.json')

def new_score_fun(label_accuracy,domain_accuray):
    return label_accuracy - (4*(np.square(domain_accuray-0.5)))
```

In [80]:
```
label_clf = RandomForestClassifier()
domain_clf = RandomForestClassifier()
```

In [81]:
```
RD_Indices = np.random.choice(a=list(range(MX.shape[0])),size=1024)
M_D_TX = MX[RD_Indices]
M_D_TY = MY[RD_Indices]

RS_Indices = np.random.choice(a=list(range(SX.shape[0])),size=1024)
S_TX = SX[RS_Indices]
S_TY = SY[RS_Indices]

RDV_indices = np.random.choice(a=list(range(MVX.shape[0])), size=1024)
M_D_VX = MVX[RDV_indices]
M_D_VY = MVY[RDV_indices]

SV_indices = np.random.choice(a=list((range(SVX.shape[0]))),size=1024)
validX = SVX[SV_indices]
validY = SVY[SV_indices]
```

In [82]:
```
label_clf = Train_classifier(SX,SY)
label_pred = Predict_from_clf(label_clf, validX)
label_accuracy = accuracy_score(validY,label_pred)
print ('label_accuracy',label_accuracy )

domain_clf = Train_classifier(M_D_TX, M_D_TY)
domain_pred = Predict_from_clf(domain_clf, M_D_VX)
domain_accuracy = accuracy_score(M_D_VY, domain_pred)
print ('domain_accuracy',domain_accuracy )

weight_modifier=NNWeightHelper(model)
weights=weight_modifier.get_weights()

print 'weights to evolve:',len(weights)
```

```
('label_accuracy', 0.380859375)
('domain_accuracy', 0.9033203125)
weights to evolve: 28314
```

In [83]:
```
snes=SNES(weights,1,20)
```

In [84]:
```
logscore = []
for i in range(60):
    start = timer()
    new_weights=snes.ask()

    complied_score = []
    domain_accuracys = []
    label_accuracys = []

    for w in new_weights:
        RD_Indices = np.random.choice(a=list(range(MX.shape[0])),size=1024)
        M_D_TX = MX[RD_Indices]
        M_D_TY = MY[RD_Indices]

        RS_Indices = np.random.choice(a=list(range(SX.shape[0])),size=1024)
        S_TX = SX[RS_Indices]
        S_TY = SY[RS_Indices]

        RDV_indices = np.random.choice(a=list(range(MVX.shape[0])), size=1024)
        M_D_VX = MVX[RDV_indices]
        M_D_VY = MVY[RDV_indices]

        SV_indices = np.random.choice(a=list((range(SVX.shape[0]))),size=1024)
        validX = SVX[SV_indices]
        validY = SVY[SV_indices]
        weight_modifier.set_weights(w)

        label_clf=Train_classifier(S_TX,S_TY)
        label_predictions = Predict_from_clf(label_clf, validX)
        label_accuracy=accuracy_score(validY,label_predictions)
#         print ('label_accuracy',label_accuracy )

        domain_clf = Train_classifier(M_D_TX,M_D_TY)
        domain_predictions=Predict_from_clf(domain_clf,M_D_VX)
        domain_accuracy=accuracy_score(M_D_VY,domain_predictions)
#         print ('domain_accuracy',domain_accuracy )


        new_score = new_score_fun(label_accuracy, domain_accuracy)
        complied_score.append(new_score)
        domain_accuracys.append(domain_accuracy)
        label_accuracys.append(label_accuracy)

    snes.tell(new_weights,complied_score)
    max_index=np.argmax(complied_score)
    end = timer()
    print("It took", end - start, "seconds to complete generation")
    print("the fit model has label_accuracy: %0.3f and domain_accuracy:%0.3f and compl
          %(label_accuracys[max_index], domain_accuracys[max_index], complied_score[ma

    logscore.append(complied_score[max_index])
```

```
('Step', 1, ':', -0.07291030883789062, 'best:', -0.07291030883789062, 20)
('It took', 20.770617961883545, 'seconds to complete generation')
the fit model has label_accuracy: 0.203 and domain_accuracy:0.763 and fitness_scor
e:-0.073
('Step', 2, ':', 0.0, 'best:', 0.0, 20)
('It took', 20.403969049453735, 'seconds to complete generation')
the fit model has label_accuracy: 0.165 and domain_accuracy:0.703 and fitness_scor
e:0.000
('Step', 3, ':', -0.027744293212890625, 'best:', 0.0, 20)
('It took', 20.43546199798584, 'seconds to complete generation')
the fit model has label_accuracy: 0.187 and domain_accuracy:0.731 and fitness_scor
e:-0.028
('Step', 4, ':', -0.052677154541015625, 'best:', 0.0, 20)
('It took', 20.26436710357666, 'seconds to complete generation')
the fit model has label_accuracy: 0.279 and domain_accuracy:0.788 and fitness_scor
e:-0.053
('Step', 5, ':', 0.00726318359375, 'best:', 0.00726318359375, 20)
```

```
('It took', 20.314198970794678, 'seconds to complete generation')
the fit model has label_accuracy: 0.179 and domain_accuracy:0.707 and fitness_scor
e:0.007
('Step', 6, ':', -0.014163970947265625, 'best:', 0.00726318359375, 20)
('It took', 20.225824117660522, 'seconds to complete generation')
the fit model has label_accuracy: 0.128 and domain_accuracy:0.688 and fitness_scor
e:-0.014
('Step', 7, ':', 0.014492034912109375, 'best:', 0.014492034912109375, 20)
('It took', 20.37145495414734, 'seconds to complete generation')
the fit model has label_accuracy: 0.137 and domain_accuracy:0.675 and fitness_scor
e:0.014
('Step', 8, ':', 0.07525253295898438, 'best:', 0.07525253295898438, 20)
('It took', 20.386691093444824, 'seconds to complete generation')
the fit model has label_accuracy: 0.182 and domain_accuracy:0.663 and fitness_scor
e:0.075
('Step', 9, ':', 0.072021484375, 'best:', 0.07525253295898438, 20)
('It took', 20.438518047332764, 'seconds to complete generation')
the fit model has label_accuracy: 0.113 and domain_accuracy:0.602 and fitness_scor
e:0.072
('Step', 10, ':', 0.09954833984375, 'best:', 0.09954833984375, 20)
('It took', 20.06223702430725, 'seconds to complete generation')
the fit model has label_accuracy: 0.132 and domain_accuracy:0.590 and fitness_scor
e:0.100
('Step', 11, ':', 0.0976409912109375, 'best:', 0.09954833984375, 20)
('It took', 20.25060200691223, 'seconds to complete generation')
the fit model has label_accuracy: 0.158 and domain_accuracy:0.623 and fitness_scor
e:0.098
('Step', 12, ':', 0.13271713256835938, 'best:', 0.13271713256835938, 20)
('It took', 19.945361137390137, 'seconds to complete generation')
the fit model has label_accuracy: 0.200 and domain_accuracy:0.630 and fitness_scor
e:0.133
('Step', 13, ':', 0.08203125, 'best:', 0.13271713256835938, 20)
('It took', 19.81911301612854, 'seconds to complete generation')
the fit model has label_accuracy: 0.130 and domain_accuracy:0.609 and fitness_scor
e:0.082
('Step', 14, ':', 0.12142562866210938, 'best:', 0.13271713256835938, 20)
('It took', 19.930845022201538, 'seconds to complete generation')
the fit model has label_accuracy: 0.172 and domain_accuracy:0.612 and fitness_scor
e:0.121
('Step', 15, ':', 0.0779876708984375, 'best:', 0.13271713256835938, 20)
('It took', 19.98439598083496, 'seconds to complete generation')
the fit model has label_accuracy: 0.097 and domain_accuracy:0.568 and fitness_scor
e:0.078
('Step', 16, ':', 0.13570785522460938, 'best:', 0.13570785522460938, 20)
('It took', 19.976675033569336, 'seconds to complete generation')
the fit model has label_accuracy: 0.195 and domain_accuracy:0.622 and fitness_scor
e:0.136
('Step', 17, ':', 0.12084579467773438, 'best:', 0.13570785522460938, 20)
('It took', 19.97342300415039, 'seconds to complete generation')
the fit model has label_accuracy: 0.155 and domain_accuracy:0.593 and fitness_scor
e:0.121
('Step', 18, ':', 0.17620849609375, 'best:', 0.17620849609375, 20)
('It took', 20.021899938583374, 'seconds to complete generation')
the fit model has label_accuracy: 0.251 and domain_accuracy:0.637 and fitness_scor
e:0.176
('Step', 19, ':', 0.07369613647460938, 'best:', 0.17620849609375, 20)
('It took', 20.21200203895569, 'seconds to complete generation')
the fit model has label_accuracy: 0.091 and domain_accuracy:0.565 and fitness_scor
e:0.074
('Step', 20, ':', 0.08294677734375, 'best:', 0.17620849609375, 20)
('It took', 20.157356023788452, 'seconds to complete generation')
the fit model has label_accuracy: 0.186 and domain_accuracy:0.660 and fitness_scor
e:0.083
('Step', 21, ':', 0.0830078125, 'best:', 0.17620849609375, 20)
('It took', 19.800989866256714, 'seconds to complete generation')
the fit model has label_accuracy: 0.118 and domain_accuracy:0.594 and fitness_scor
e:0.083
('Step', 22, ':', 0.10851669311523438, 'best:', 0.17620849609375, 20)
('It took', 20.140537977218628, 'seconds to complete generation')
the fit model has label_accuracy: 0.157 and domain_accuracy:0.610 and fitness_scor
```

```
e:0.109
('Step', 23, ':', 0.09014511108398438, 'best:', 0.17620849609375, 20)
('It took', 19.927549123764038, 'seconds to complete generation')
the fit model has label_accuracy: 0.221 and domain_accuracy:0.681 and fitness_scor
e:0.090
('Step', 24, ':', 0.16308212280273438, 'best:', 0.17620849609375, 20)
('It took', 19.84715485572815, 'seconds to complete generation')
the fit model has label_accuracy: 0.225 and domain_accuracy:0.624 and fitness_scor
e:0.163
('Step', 25, ':', 0.10424423217773438, 'best:', 0.17620849609375, 20)
('It took', 19.836089849472046, 'seconds to complete generation')
the fit model has label_accuracy: 0.139 and domain_accuracy:0.593 and fitness_scor
e:0.104
('Step', 26, ':', 0.1044921875, 'best:', 0.17620849609375, 20)
('It took', 19.879451036453247, 'seconds to complete generation')
the fit model has label_accuracy: 0.113 and domain_accuracy:0.547 and fitness_scor
e:0.104
('Step', 27, ':', 0.13076400756835938, 'best:', 0.17620849609375, 20)
('It took', 19.908148050308228, 'seconds to complete generation')
the fit model has label_accuracy: 0.198 and domain_accuracy:0.630 and fitness_scor
e:0.131
('Step', 28, ':', 0.078857421875, 'best:', 0.17620849609375, 20)
('It took', 19.970968008041382, 'seconds to complete generation')
the fit model has label_accuracy: 0.120 and domain_accuracy:0.602 and fitness_scor
e:0.079
('Step', 29, ':', 0.0827484130859375, 'best:', 0.17620849609375, 20)
('It took', 19.952478170394897, 'seconds to complete generation')
the fit model has label_accuracy: 0.164 and domain_accuracy:0.643 and fitness_scor
e:0.083
('Step', 30, ':', 0.0939788818359375, 'best:', 0.17620849609375, 20)
('It took', 19.851691961288452, 'seconds to complete generation')
the fit model has label_accuracy: 0.117 and domain_accuracy:0.576 and fitness_scor
e:0.094
('Step', 31, ':', 0.079833984375, 'best:', 0.17620849609375, 20)
('It took', 19.661595106124878, 'seconds to complete generation')
the fit model has label_accuracy: 0.135 and domain_accuracy:0.617 and fitness_scor
e:0.080
('Step', 32, ':', 0.08599472045898438, 'best:', 0.17620849609375, 20)
('It took', 19.905591011047363, 'seconds to complete generation')
the fit model has label_accuracy: 0.116 and domain_accuracy:0.587 and fitness_scor
e:0.086
('Step', 33, ':', 0.13665771484375, 'best:', 0.17620849609375, 20)
('It took', 19.790705919265747, 'seconds to complete generation')
the fit model has label_accuracy: 0.169 and domain_accuracy:0.590 and fitness_scor
e:0.137
('Step', 34, ':', 0.108154296875, 'best:', 0.17620849609375, 20)
('It took', 19.80703592300415, 'seconds to complete generation')
the fit model has label_accuracy: 0.149 and domain_accuracy:0.602 and fitness_scor
e:0.108
('Step', 35, ':', 0.1240081787109375, 'best:', 0.17620849609375, 20)
('It took', 20.92529797554016, 'seconds to complete generation')
the fit model has label_accuracy: 0.185 and domain_accuracy:0.623 and fitness_scor
e:0.124
('Step', 36, ':', 0.13180160522460938, 'best:', 0.17620849609375, 20)
('It took', 20.28514289855957, 'seconds to complete generation')
the fit model has label_accuracy: 0.132 and domain_accuracy:0.503 and fitness_scor
e:0.132
('Step', 37, ':', 0.17809677124023438, 'best:', 0.17809677124023438, 20)
('It took', 20.27926802635193, 'seconds to complete generation')
the fit model has label_accuracy: 0.187 and domain_accuracy:0.546 and fitness_scor
e:0.178

('Step', 38, ':', 0.16845321655273438, 'best:', 0.17809677124023438, 20)
('It took', 20.213808059692383, 'seconds to complete generation')
the fit model has label_accuracy: 0.185 and domain_accuracy:0.563 and fitness_scor
e:0.168
('Step', 39, ':', 0.16650009155273438, 'best:', 0.17809677124023438, 20)
('It took', 20.45617389678955, 'seconds to complete generation')
the fit model has label_accuracy: 0.182 and domain_accuracy:0.562 and fitness_scor
e:0.167
```

```
('Step', 40, ':', 0.21883773803710938, 'best:', 0.21883773803710938, 20)
('It took', 20.444185972213745, 'seconds to complete generation')
the fit model has label_accuracy: 0.245 and domain_accuracy:0.581 and fitness_scor
e:0.219
('Step', 41, ':', 0.22048568725585938, 'best:', 0.22048568725585938, 20)
('It took', 20.34163188934326, 'seconds to complete generation')
the fit model has label_accuracy: 0.228 and domain_accuracy:0.542 and fitness_scor
e:0.220
('Step', 42, ':', 0.2383880615234375, 'best:', 0.2383880615234375, 20)
('It took', 20.498934984207153, 'seconds to complete generation')
the fit model has label_accuracy: 0.240 and domain_accuracy:0.521 and fitness_scor
e:0.238
('Step', 43, ':', 0.23760604858398438, 'best:', 0.2383880615234375, 20)
('It took', 20.397908926010132, 'seconds to complete generation')
the fit model has label_accuracy: 0.257 and domain_accuracy:0.569 and fitness_scor
e:0.238
('Step', 44, ':', 0.22603988647460938, 'best:', 0.2383880615234375, 20)
('It took', 20.314714193344116, 'seconds to complete generation')
the fit model has label_accuracy: 0.243 and domain_accuracy:0.565 and fitness_scor
e:0.226
('Step', 45, ':', 0.24505615234375, 'best:', 0.24505615234375, 20)
('It took', 20.86320209503174, 'seconds to complete generation')
the fit model has label_accuracy: 0.277 and domain_accuracy:0.590 and fitness_scor
e:0.245
('Step', 46, ':', 0.22497177124023438, 'best:', 0.24505615234375, 20)
('It took', 20.409596920013428, 'seconds to complete generation')
the fit model has label_accuracy: 0.250 and domain_accuracy:0.579 and fitness_scor
e:0.225
('Step', 47, ':', 0.23580551147460938, 'best:', 0.24505615234375, 20)
('It took', 20.272320985794067, 'seconds to complete generation')
the fit model has label_accuracy: 0.250 and domain_accuracy:0.560 and fitness_scor
e:0.236
('Step', 48, ':', 0.2774925231933594, 'best:', 0.2774925231933594, 20)
('It took', 20.3313729763031, 'seconds to complete generation')
the fit model has label_accuracy: 0.280 and domain_accuracy:0.526 and fitness_scor
e:0.277
('Step', 49, ':', 0.251953125, 'best:', 0.2774925231933594, 20)
('It took', 20.464900970458984, 'seconds to complete generation')
the fit model has label_accuracy: 0.268 and domain_accuracy:0.562 and fitness_scor
e:0.252
('Step', 50, ':', 0.26068115234375, 'best:', 0.2774925231933594, 20)
('It took', 21.024746894836426, 'seconds to complete generation')
the fit model has label_accuracy: 0.274 and domain_accuracy:0.559 and fitness_scor
e:0.261
('Step', 51, ':', 0.2464447021484375, 'best:', 0.2774925231933594, 20)
('It took', 21.380491018295288, 'seconds to complete generation')
the fit model has label_accuracy: 0.286 and domain_accuracy:0.600 and fitness_scor
e:0.246
('Step', 52, ':', 0.2522544860839844, 'best:', 0.2774925231933594, 20)
('It took', 20.474724054336548, 'seconds to complete generation')
the fit model has label_accuracy: 0.265 and domain_accuracy:0.556 and fitness_scor
e:0.252
('Step', 53, ':', 0.2572288513183594, 'best:', 0.2774925231933594, 20)
('It took', 20.24232316017151, 'seconds to complete generation')
the fit model has label_accuracy: 0.271 and domain_accuracy:0.558 and fitness_scor
e:0.257
('Step', 54, ':', 0.2676658630371094, 'best:', 0.2774925231933594, 20)
('It took', 20.459728002548218, 'seconds to complete generation')
the fit model has label_accuracy: 0.275 and domain_accuracy:0.544 and fitness_scor
e:0.268
('Step', 55, ':', 0.254638671875, 'best:', 0.2774925231933594, 20)
('It took', 23.335206985473633, 'seconds to complete generation')
the fit model has label_accuracy: 0.284 and domain_accuracy:0.586 and fitness_scor
e:0.255
('Step', 56, ':', 0.2778282165527344, 'best:', 0.2778282165527344, 20)
('It took', 21.465917825698853, 'seconds to complete generation')
the fit model has label_accuracy: 0.293 and domain_accuracy:0.562 and fitness_scor
e:0.278
('Step', 57, ':', 0.2650718688964844, 'best:', 0.2778282165527344, 20)
('It took', 20.7005398273468, 'seconds to complete generation')
```

```
the fit model has label_accuracy: 0.271 and domain_accuracy:0.540 and fitness_scor
e:0.265
('Step', 58, ':', 0.2784996032714844, 'best:', 0.2784996032714844, 20)
('It took', 20.581918954849243, 'seconds to complete generation')
the fit model has label_accuracy: 0.290 and domain_accuracy:0.554 and fitness_scor
e:0.278
('Step', 59, ':', 0.2527732849121094, 'best:', 0.2784996032714844, 20)
('It took', 20.369581937789917, 'seconds to complete generation')
the fit model has label_accuracy: 0.275 and domain_accuracy:0.575 and fitness_scor
e:0.253
('Step', 60, ':', 0.2737884521484375, 'best:', 0.2784996032714844, 20)
('It took', 20.464088916778564, 'seconds to complete generation')
the fit model has label_accuracy: 0.305 and domain_accuracy:0.588 and fitness_scor
e:0.274
```

In [85]:
```
saveModel('mnistmodeltest_dense128_new')
import pandas as pd
scorelog = pd.DataFrame(logscore)
scorelog.to_csv('logscore1.csv', header=None)
```

In [86]:
```
weight_modifier.set_weights(snes.center)
```

In [87]:
```
label_clf = Train_classifier(mnist_train,mnist_train_labels)
sourcePredictions = Predict_from_clf(label_clf, mnist_test)
sourceAccuray = accuracy_score(mnist_test_labels,sourcePredictions)
print  "label predicitions on MNIST %0.3f" % (sourceAccuray)

targetPredictions = Predict_from_clf(label_clf, mnistm_test)
targetAccuracy = accuracy_score(targetPredictions, mnist_test_labels)
print "label predicitons on MNISTM %0.3f" %(targetAccuracy)
```

```
label predicitions on MNIST 0.268
label predicitons on MNISTM 0.103
```

In [88]:
```
R_MT_INDEX = np.random.choice(a=list(range(MX.shape[0])), size=MY.shape[0])
TM_X = MX[R_MT_INDEX]
TM_Y = MY[R_MT_INDEX]

TEST_MX = np.concatenate([mnist_test, mnistm_test], axis=0)
TEST_MY = np.concatenate([np.zeros(mnist_test.shape[0]), np.ones(mnistm_test.shape[0])
```

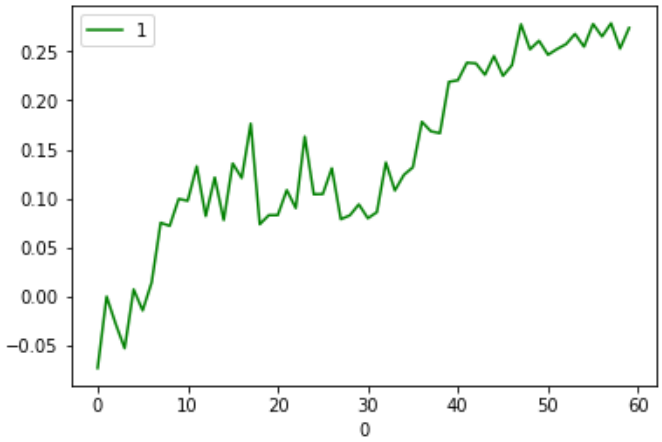
In [89]:
```
domain_clf = Train_classifier(TM_X, TM_Y)
domain_pred = Predict_from_clf(domain_clf, TEST_MX)
domain_accuracy= accuracy_score(TEST_MY, domain_pred)
print("domain predicitions accuracy: %0.3f" %(domain_accuracy))
```

```
domain predicitions accuracy: 0.555
```

In [92]:
```
log = pd.read_csv('logscore1.csv', header=None)
# print log
```

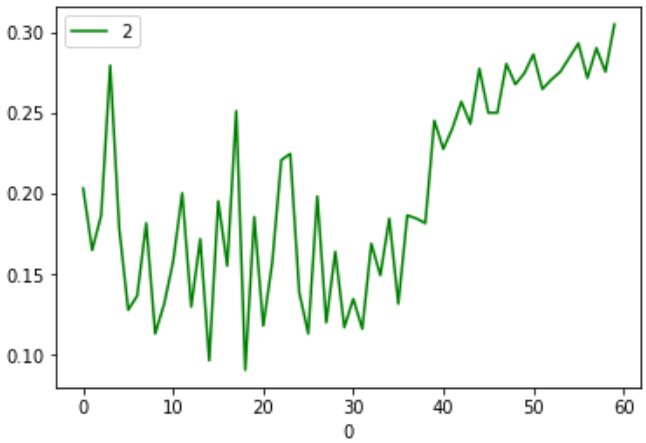
In [97]:
```
# log.plot()
log.plot(x=0, y=1, style='g')
```

Out[97]: <matplotlib.axes._subplots.AxesSubplot at 0x1c247f94d0>



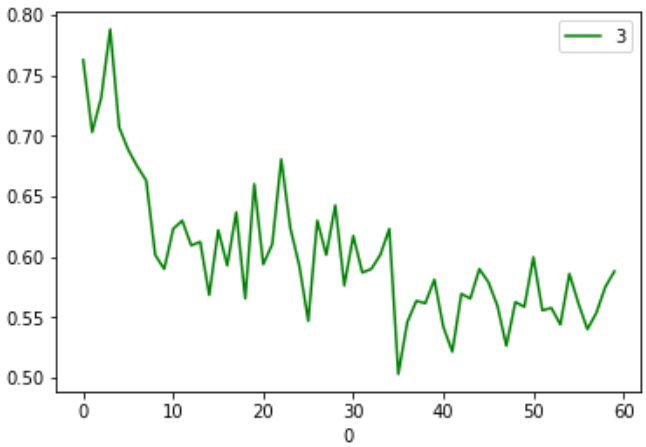
In [98]:
```
log.plot(x=0, y=2, style='g')
```

Out[98]: <matplotlib.axes._subplots.AxesSubplot at 0x1c23260490>



In [99]:
```
log.plot(x=0, y=3, style='g')
```

Out[99]: <matplotlib.axes._subplots.AxesSubplot at 0x1c23940550>



In [ ]: