

```
1 /Users/snehamishra/PycharmProjects/Test/venv/bin/python /
  Users/snehamishra/Desktop/UMKC/Fall2018/Python/Python-
  DeepLearning_Fall2018/Mod2_ICP7/Source/
  DeepLearning_SourceCode7/autoencoder.py
2 Using TensorFlow backend.
3 2018-12-10 18:31:24.523996: I tensorflow/core/platform/
  cpu_feature_guard.cc:141] Your CPU supports instructions
  that this TensorFlow binary was not compiled to use: AVX2
  FMA
4 Train on 60000 samples, validate on 10000 samples
5 Epoch 1/5
6
7   256/60000 [.....] - ETA: 1:30 -
  loss: 0.6939
8   1280/60000 [.....] - ETA: 21s -
  loss: 0.6921
9   1792/60000 [.....] - ETA: 17s -
  loss: 0.6913
10  3072/60000 [>.....] - ETA: 11s -
  loss: 0.6889
11  4608/60000 [=>.....] - ETA: 7s -
  loss: 0.6850
12  5888/60000 [=>.....] - ETA: 6s -
  loss: 0.6800
13  6656/60000 [==>.....] - ETA: 6s -
  loss: 0.6759
14  7424/60000 [==>.....] - ETA: 5s -
  loss: 0.6706
15  8704/60000 [===>.....] - ETA: 5s -
  loss: 0.6588
16  9984/60000 [===>.....] - ETA: 4s -
  loss: 0.6431
17 11264/60000 [====>.....] - ETA: 4s -
  loss: 0.6243
18 12288/60000 [====>.....] - ETA: 4s -
  loss: 0.6077
19 13312/60000 [====>.....] - ETA: 3s -
  loss: 0.5908
20 14592/60000 [=====>.....] - ETA: 3s -
  loss: 0.5703
21 15872/60000 [=====>.....] - ETA: 3s -
  loss: 0.5513
22 16896/60000 [=====>.....] - ETA: 3s -
  loss: 0.5373
23 18176/60000 [=====>.....] - ETA: 3s -
  loss: 0.5214
24 19456/60000 [=====>.....] - ETA: 2s -
  loss: 0.5069
25 20480/60000 [=====>.....] - ETA: 2s -
  loss: 0.4966
```

```
26 21504/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4871  
27 22784/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4760  
28 24064/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4662  
29 25344/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4571  
30 26112/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4521  
31 27392/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4443  
32 28672/60000 [=====>.....] - ETA: 2s -  
    loss: 0.4370  
33 29952/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4304  
34 31232/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4243  
35 32512/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4187  
36 33792/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4135  
37 34560/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4106  
38 35840/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4059  
39 37376/60000 [=====>.....] - ETA: 1s -  
    loss: 0.4006  
40 38656/60000 [=====>.....] - ETA: 1s -  
    loss: 0.3965  
41 39936/60000 [=====>.....] - ETA: 1s -  
    loss: 0.3927  
42 41216/60000 [=====>.....] - ETA: 1s -  
    loss: 0.3892  
43 42240/60000 [=====>.....] - ETA: 1s -  
    loss: 0.3864  
44 43264/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3838  
45 44288/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3813  
46 45568/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3783  
47 47104/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3749  
48 47872/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3733  
49 48896/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3713  
50 50176/60000 [=====>.....] - ETA: 0s -  
    loss: 0.3688
```

```

51 51456/60000 [=====>.....] - ETA: 0s -
    loss: 0.3665
52 52736/60000 [=====>.....] - ETA: 0s -
    loss: 0.3642
53 54016/60000 [=====>....] - ETA: 0s -
    loss: 0.3621
54 55040/60000 [=====>...] - ETA: 0s -
    loss: 0.3604
55 56320/60000 [=====>..] - ETA: 0s -
    loss: 0.3584
56 57856/60000 [=====>..] - ETA: 0s -
    loss: 0.3561
57 59392/60000 [=====>.] - ETA: 0s -
    loss: 0.3540
58 60000/60000 [=====] - 4s 59us/
    step - loss: 0.3531 - val_loss: 0.2705
59 Epoch 2/5
60
61 256/60000 [.....] - ETA: 3s -
    loss: 0.2714
62 1536/60000 [.....] - ETA: 2s -
    loss: 0.2711
63 3072/60000 [>.....] - ETA: 2s -
    loss: 0.2698
64 4608/60000 [=>.....] - ETA: 2s -
    loss: 0.2700
65 6144/60000 [==>.....] - ETA: 2s -
    loss: 0.2704
66 7424/60000 [==>.....] - ETA: 2s -
    loss: 0.2708
67 8704/60000 [===>.....] - ETA: 2s -
    loss: 0.2708
68 10240/60000 [===>.....] - ETA: 1s -
    loss: 0.2708
69 10752/60000 [===>.....] - ETA: 2s -
    loss: 0.2708
70 12032/60000 [===>.....] - ETA: 2s -
    loss: 0.2702
71 13056/60000 [===>.....] - ETA: 2s -
    loss: 0.2702
72 14336/60000 [===>.....] - ETA: 1s -
    loss: 0.2698
73 15872/60000 [===>.....] - ETA: 1s -
    loss: 0.2698
74 17152/60000 [===>.....] - ETA: 1s -
    loss: 0.2696
75 18688/60000 [===>.....] - ETA: 1s -
    loss: 0.2695
76 20224/60000 [===>.....] - ETA: 1s -
    loss: 0.2693

```

```
77 21760/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2690  
78 23040/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2688  
79 24320/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2686  
80 25600/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2684  
81 27136/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2682  
82 28416/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2680  
83 29696/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2677  
84 31232/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2674  
85 32512/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2673  
86 33536/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2672  
87 34816/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2670  
88 36352/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2667  
89 37888/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2664  
90 39168/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2663  
91 40704/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2661  
92 42240/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2657  
93 43776/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2654  
94 45312/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2652  
95 46592/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2650  
96 47616/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2648  
97 48640/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2647  
98 49920/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2644  
99 51200/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2643  
100 52480/60000 [=====>....] - ETA: 0s -  
    loss: 0.2641  
101 54016/60000 [=====>...] - ETA: 0s -  
    loss: 0.2639
```

```
102 55552/60000 [=====>...] - ETA: 0s -  
    loss: 0.2636  
103 57088/60000 [=====>..] - ETA: 0s -  
    loss: 0.2633  
104 58368/60000 [=====>.] - ETA: 0s -  
    loss: 0.2632  
105 59648/60000 [=====>.] - ETA: 0s -  
    loss: 0.2629  
106 60000/60000 [=====] - 3s 44us/  
    step - loss: 0.2628 - val_loss: 0.2515  
107 Epoch 3/5  
108  
109   256/60000 [.....] - ETA: 3s -  
    loss: 0.2555  
110  1536/60000 [.....] - ETA: 2s -  
    loss: 0.2522  
111  2816/60000 [>.....] - ETA: 2s -  
    loss: 0.2524  
112  4096/60000 [=>.....] - ETA: 2s -  
    loss: 0.2520  
113  5376/60000 [=>.....] - ETA: 2s -  
    loss: 0.2516  
114  6912/60000 [==>.....] - ETA: 2s -  
    loss: 0.2511  
115  8448/60000 [===>.....] - ETA: 2s -  
    loss: 0.2513  
116  9728/60000 [===>.....] - ETA: 2s -  
    loss: 0.2507  
117 10752/60000 [===>.....] - ETA: 2s -  
    loss: 0.2505  
118 12288/60000 [====>.....] - ETA: 1s -  
    loss: 0.2504  
119 13824/60000 [====>.....] - ETA: 1s -  
    loss: 0.2503  
120 15104/60000 [====>.....] - ETA: 1s -  
    loss: 0.2502  
121 16384/60000 [====>.....] - ETA: 1s -  
    loss: 0.2500  
122 17920/60000 [====>.....] - ETA: 1s -  
    loss: 0.2498  
123 19200/60000 [====>.....] - ETA: 1s -  
    loss: 0.2497  
124 20480/60000 [====>.....] - ETA: 1s -  
    loss: 0.2494  
125 21760/60000 [====>.....] - ETA: 1s -  
    loss: 0.2491  
126 22784/60000 [====>.....] - ETA: 1s -  
    loss: 0.2489  
127 24064/60000 [====>.....] - ETA: 1s -  
    loss: 0.2487
```

```
128 25344/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2484  
129 26624/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2483  
130 27904/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2480  
131 29440/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2477  
132 30720/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2474  
133 31744/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2471  
134 33024/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2471  
135 34560/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2468  
136 36096/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2465  
137 37376/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2463  
138 38912/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2460  
139 40448/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2457  
140 41984/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2455  
141 43264/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2453  
142 44544/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2451  
143 45824/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2449  
144 47104/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2447  
145 48384/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2445  
146 49664/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2443  
147 50944/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2440  
148 52224/60000 [=====>....] - ETA: 0s -  
    loss: 0.2438  
149 53760/60000 [=====>....] - ETA: 0s -  
    loss: 0.2436  
150 55040/60000 [=====>...] - ETA: 0s -  
    loss: 0.2434  
151 56320/60000 [=====>..] - ETA: 0s -  
    loss: 0.2432  
152 57856/60000 [=====>..] - ETA: 0s -  
    loss: 0.2430
```

```
153 59392/60000 [=====>.] - ETA: 0s -  
    loss: 0.2427  
154 60000/60000 [=====] - 3s 44us/  
    step - loss: 0.2426 - val_loss: 0.2313  
155 Epoch 4/5  
156  
157 256/60000 [.....] - ETA: 3s -  
    loss: 0.2296  
158 1792/60000 [.....] - ETA: 2s -  
    loss: 0.2320  
159 3072/60000 [>.....] - ETA: 2s -  
    loss: 0.2318  
160 4352/60000 [=>.....] - ETA: 2s -  
    loss: 0.2320  
161 5632/60000 [=>.....] - ETA: 2s -  
    loss: 0.2312  
162 7168/60000 [==>.....] - ETA: 2s -  
    loss: 0.2311  
163 8192/60000 [===>.....] - ETA: 2s -  
    loss: 0.2311  
164 9728/60000 [===>.....] - ETA: 2s -  
    loss: 0.2310  
165 11264/60000 [====>.....] - ETA: 1s -  
    loss: 0.2308  
166 12800/60000 [====>.....] - ETA: 1s -  
    loss: 0.2300  
167 14080/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2300  
168 15360/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2298  
169 16896/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2295  
170 18432/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2294  
171 19456/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2293  
172 20480/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2291  
173 22016/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2289  
174 23552/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2289  
175 24832/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2288  
176 26112/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2288  
177 27648/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2286  
178 29184/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2283
```

```

179 30464/60000 [=====>.....] - ETA: 1s -
    loss: 0.2282
180 31744/60000 [=====>.....] - ETA: 1s -
    loss: 0.2280
181 33024/60000 [=====>.....] - ETA: 1s -
    loss: 0.2279
182 34304/60000 [=====>.....] - ETA: 1s -
    loss: 0.2277
183 35584/60000 [=====>.....] - ETA: 0s -
    loss: 0.2275
184 37120/60000 [=====>.....] - ETA: 0s -
    loss: 0.2274
185 38656/60000 [=====>.....] - ETA: 0s -
    loss: 0.2271
186 40192/60000 [=====>.....] - ETA: 0s -
    loss: 0.2268
187 41472/60000 [=====>.....] - ETA: 0s -
    loss: 0.2266
188 42752/60000 [=====>.....] - ETA: 0s -
    loss: 0.2265
189 44032/60000 [=====>.....] - ETA: 0s -
    loss: 0.2264
190 45568/60000 [=====>.....] - ETA: 0s -
    loss: 0.2262
191 46848/60000 [=====>.....] - ETA: 0s -
    loss: 0.2261
192 48128/60000 [=====>.....] - ETA: 0s -
    loss: 0.2259
193 49664/60000 [=====>.....] - ETA: 0s -
    loss: 0.2258
194 51200/60000 [=====>.....] - ETA: 0s -
    loss: 0.2256
195 52736/60000 [=====>....] - ETA: 0s -
    loss: 0.2254
196 54016/60000 [=====>...] - ETA: 0s -
    loss: 0.2252
197 55552/60000 [=====>...] - ETA: 0s -
    loss: 0.2250
198 57088/60000 [=====>..] - ETA: 0s -
    loss: 0.2248
199 58368/60000 [=====>.] - ETA: 0s -
    loss: 0.2246
200 59392/60000 [=====>.] - ETA: 0s -
    loss: 0.2245
201 60000/60000 [=====] - 3s 43us/
    step - loss: 0.2244 - val_loss: 0.2147
202 Epoch 5/5
203
204 256/60000 [.....] - ETA: 3s -
    loss: 0.2128

```



```
205 1536/60000 [.....] - ETA: 2s -  
    loss: 0.2137  
206 3072/60000 [>.....] - ETA: 2s -  
    loss: 0.2151  
207 4608/60000 [=>.....] - ETA: 2s -  
    loss: 0.2158  
208 5632/60000 [=>.....] - ETA: 2s -  
    loss: 0.2155  
209 6656/60000 [==>.....] - ETA: 2s -  
    loss: 0.2159  
210 8192/60000 [===>.....] - ETA: 2s -  
    loss: 0.2156  
211 9728/60000 [===>.....] - ETA: 2s -  
    loss: 0.2155  
212 11008/60000 [====>.....] - ETA: 2s -  
    loss: 0.2154  
213 12544/60000 [====>.....] - ETA: 1s -  
    loss: 0.2154  
214 14080/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2154  
215 15616/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2150  
216 16896/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2150  
217 18432/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2148  
218 19712/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2147  
219 21248/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2146  
220 22272/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2144  
221 23808/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2140  
222 25344/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2138  
223 26880/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2137  
224 28160/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2136  
225 29696/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2133  
226 30976/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2133  
227 32256/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2131  
228 33536/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2130  
229 34816/60000 [=====>.....] - ETA: 1s -  
    loss: 0.2128
```

```
230 36352/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2126  
231 37888/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2124  
232 39168/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2122  
233 40704/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2120  
234 42496/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2119  
235 44288/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2116  
236 45824/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2114  
237 47616/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2112  
238 48896/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2110  
239 50432/60000 [=====>.....] - ETA: 0s -  
    loss: 0.2108  
240 52224/60000 [=====>....] - ETA: 0s -  
    loss: 0.2106  
241 54272/60000 [=====>...] - ETA: 0s -  
    loss: 0.2104  
242 56320/60000 [=====>..] - ETA: 0s -  
    loss: 0.2102  
243 58112/60000 [=====>.] - ETA: 0s -  
    loss: 0.2100  
244 60000/60000 [=====] - 2s 40us/  
    step - loss: 0.2097 - val_loss: 0.2018  
245  
246 Process finished with exit code 0  
247
```