



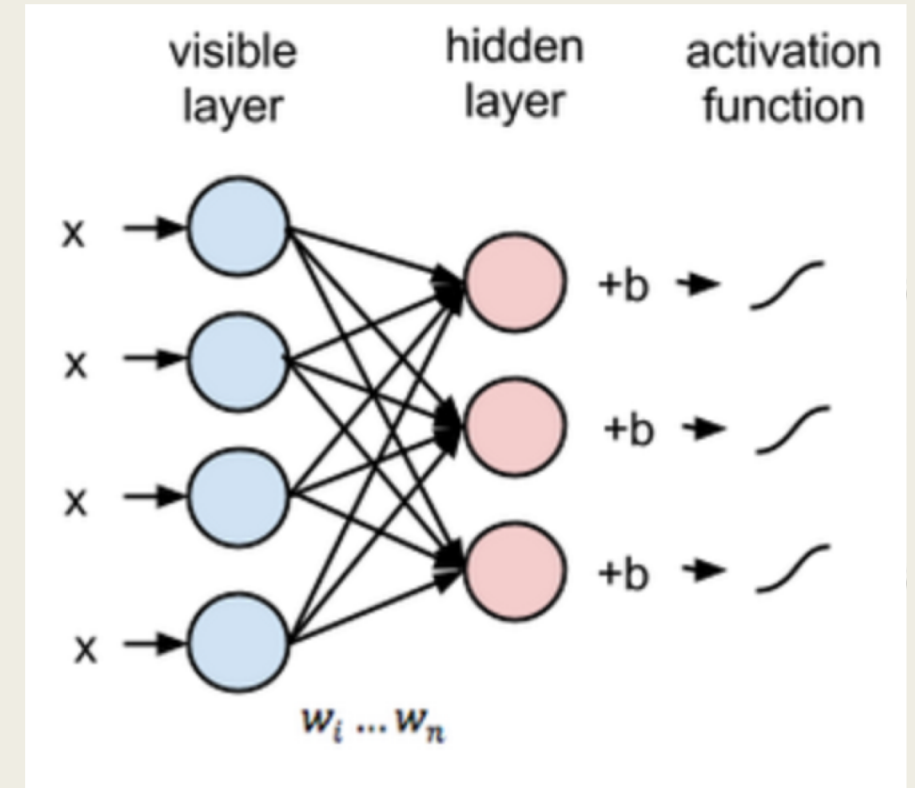
# DEEP LEARNING TO DETECT MEDICAL TREATMENT FRAUD

統研碩一 7107018013 郭又嘉

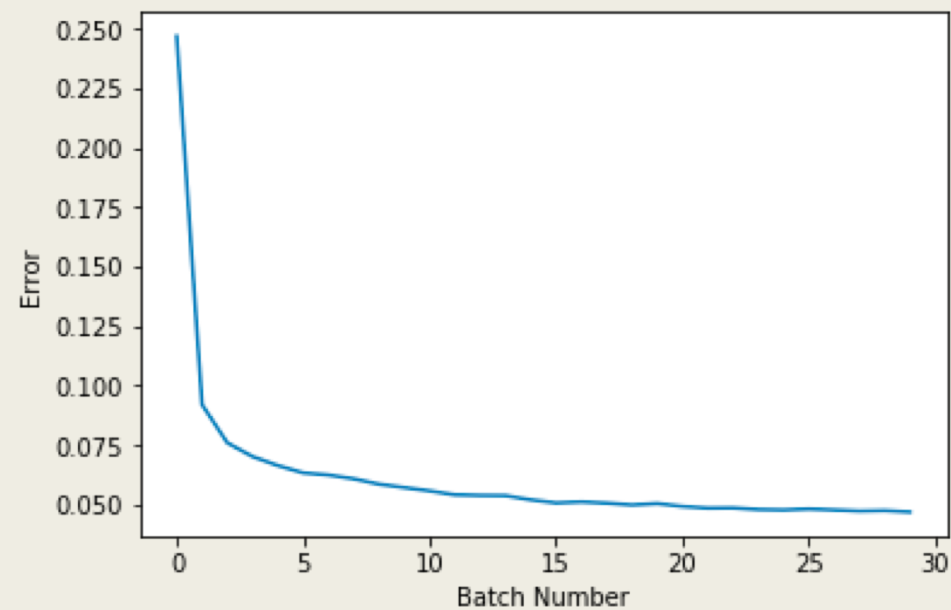
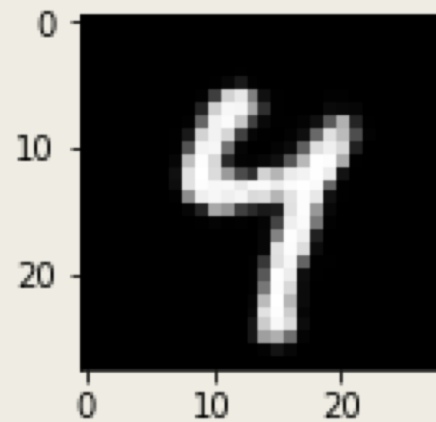
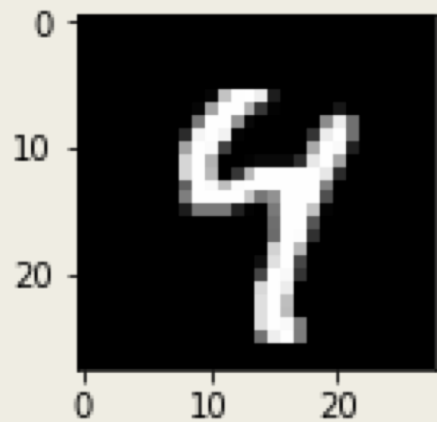
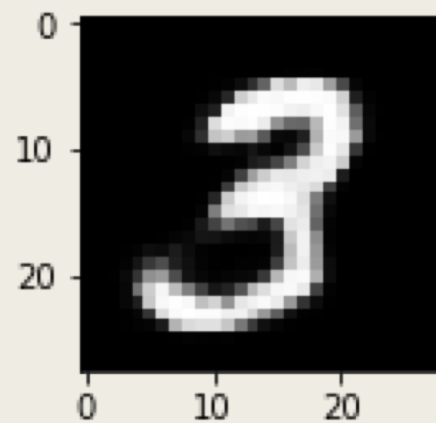
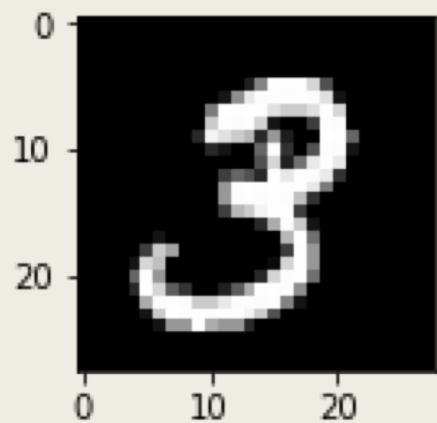


# Restricted Boltzmann Machine

- RBM為無監督學習
- 只有可視層、隱藏層的兩層結構，類似神經網路
- 目的：  
更新權重，讓重構出來的結果(v)接近原始的資料(x)
- 透過訓練，可找出資料中的重要的特徵
- 異常檢測

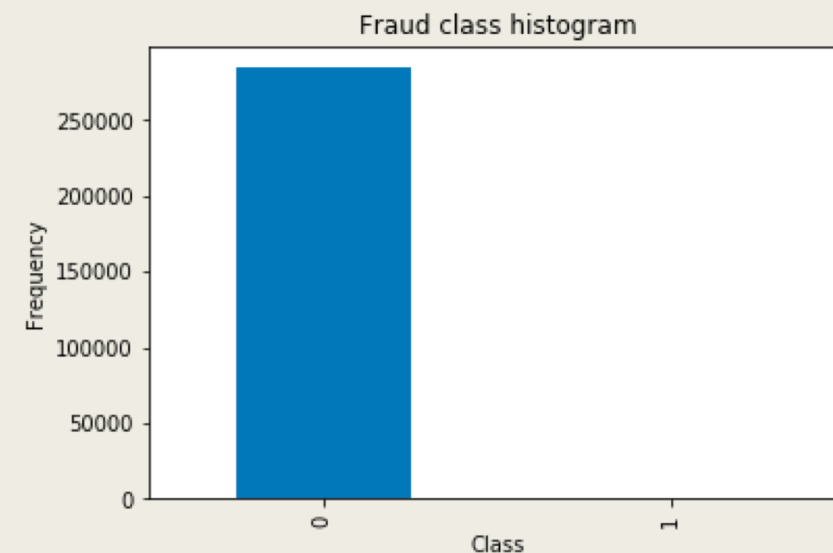


# MNIST



# Credit Card Fraud Detection

- 2013年9月在歐洲的持卡人利用信用卡進行的交易。
- 此數據集顯示兩天內發生的交易，284,807筆交易中有492個欺詐。數據高度不平衡，欺詐佔所有交易的0.172%。



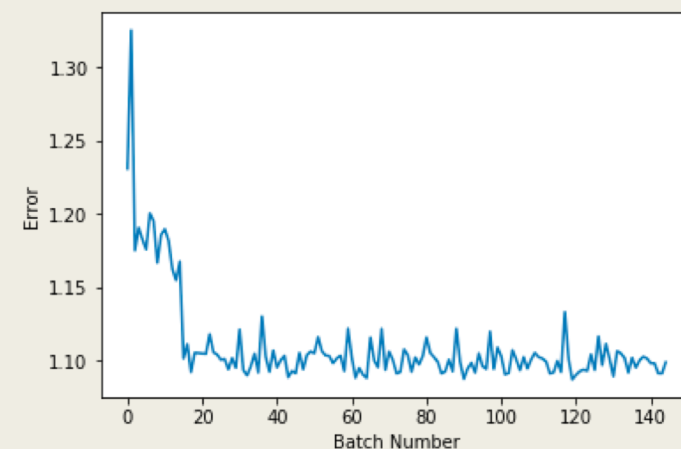
異常值比例（1=異常值）

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	...	V22	V23	V24	V25
0	-1.359807	-0.072781	2.536347	1.378155	-0.338321	0.462388	0.239599	0.098698	0.363787	0.090794	...	0.277838	-0.110474	0.066928	0.128539
1	1.191857	0.266151	0.166480	0.448154	0.060018	-0.082361	-0.078803	0.085102	-0.255425	-0.166974	...	-0.638672	0.101288	-0.339846	0.167170
2	-1.358354	-1.340163	1.773209	0.379780	-0.503198	1.800499	0.791461	0.247676	-1.514654	0.207643	...	0.771679	0.909412	-0.689281	-0.327642
3	-0.966272	-0.185226	1.792993	-0.863291	-0.010309	1.247203	0.237609	0.377436	-1.387024	-0.054952	...	0.005274	-0.190321	-1.175575	0.647376
4	-1.158233	0.877737	1.548718	0.403034	-0.407193	0.095921	0.592941	-0.270533	0.817739	0.753074	...	0.798278	-0.137458	0.141267	-0.206010

# Credit Card Fraud Detection

- mse小→原始資料與預測的匹配(差異很小)→正常值
- mse大→原始資料與預測差異很大→異常值

V23	V24	V25	V26	V27	V28	Class	normAmount	normTime	err
-0.110474	0.066928	0.128539	-0.189115	0.133558	-0.021053	0	0.244964	-1.996583	0.435781
0.101288	-0.339846	0.167170	0.125895	-0.008983	0.014724	0	-0.342475	-1.996583	0.406574
0.909412	-0.689281	-0.327642	-0.139097	-0.055353	-0.059752	0	1.160686	-1.996562	0.477631
-0.190321	-1.175575	0.647376	-0.221929	0.062723	0.061458	0	0.140534	-1.996562	0.445199
-0.137458	0.141267	-0.206010	0.502292	0.219422	0.215153	0	-0.073403	-1.996541	0.424604



# Credit Card Fraud Detection

調整→

$$rebalanced\_score = \left( \frac{mse - \min(mse)}{\max(mse) - \min(mse)} \right)^{\frac{1}{9.85}}$$

