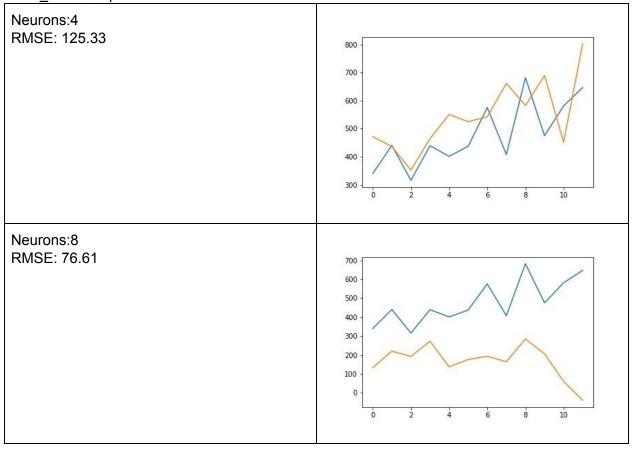
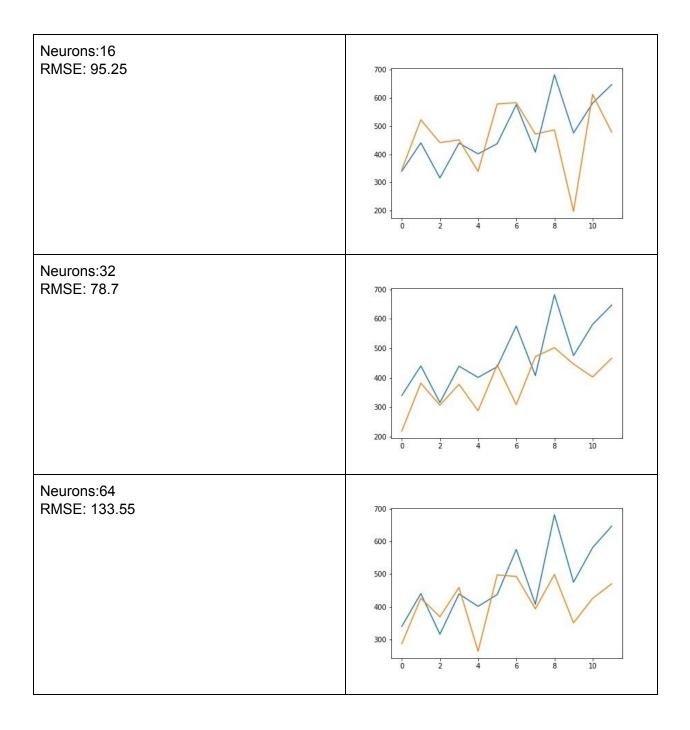
課堂活動 LSTM (2020/0602)

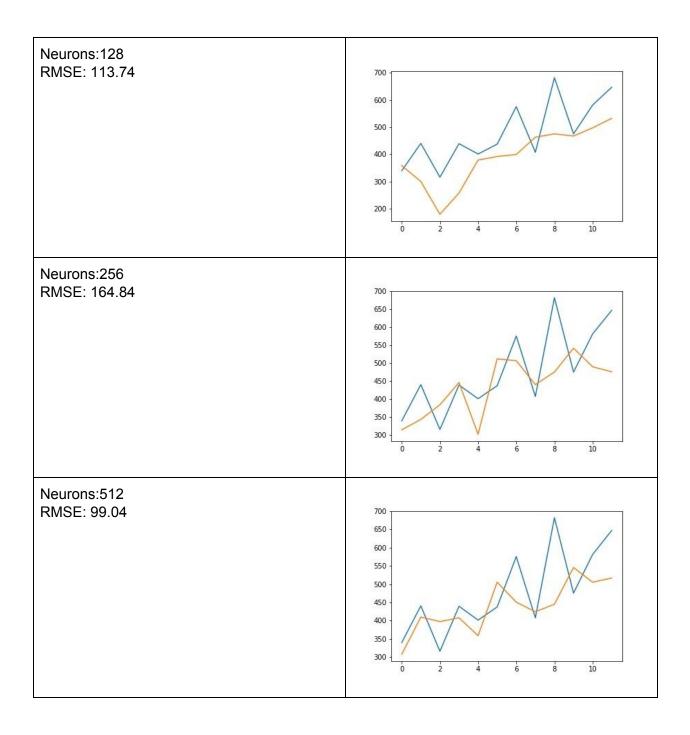
曾宏鈞 06160485 徐友笙 05360365 蔡毓丞 06370136 盧君彥 05360153

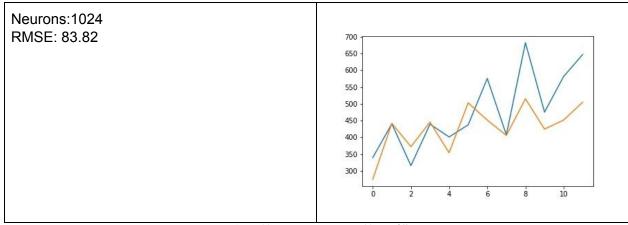
1.請修改Example1程式,用LSTM架構,進行月銷 售額預測。

batch_size:1, epoch:3000





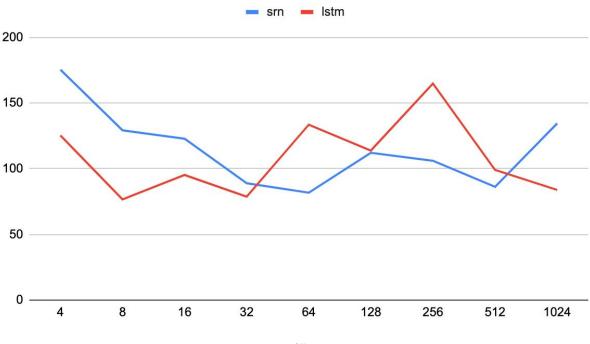




(縱軸)藍色為實際值,橘色為預測值、(橫軸)時間(月)

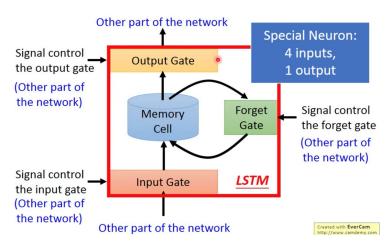
我們比較單一RNN網路(srn)及長短期記憶單元的RMSE可發現,LSTM在epoch數為4-32及1024的表現比較好。

srn與LSTM在不同epoch下RMSE的比較



縱軸為RMSE,橫軸為epoch數

心得

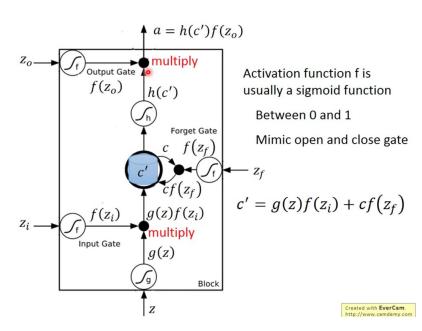


Input: 4個藍色箭頭

- 想被存進 memory cell 的值
- 控制 input gate 的訊號
- 控制 forget gate 的訊號
- 控制 output gate 的訊號

Output: other part of the network

LSTM,由三個不同的Gate組成,分別是input、Output、及forget,每一個Gate負責控制是否將其往後傳遞做計算,中間有一個Memory cell負責將值儲存起來,以利下一次的計算。

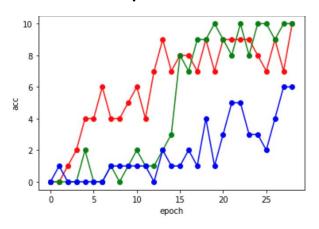


將Z與Zi,經過activation func(sigmoid),及來自forget gate的input,決定是否存進 memory cell。

因為有forget gate去控制是否要記憶進去,因此與RNN相比可以記住比較長時間點的資訊,也是 long short-term memory的由來,長的 短期記憶單元 。

參考 https://www.youtube.com/watch?v=xCGidAeyS4M

2.Example4 用LSTM架構, 進行加法訓練

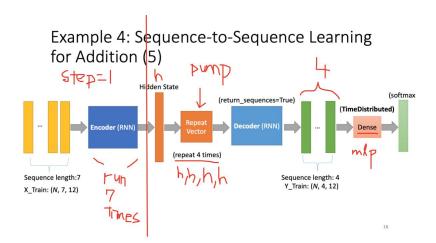


紅色: SimplerRNN

綠色:LSTM 藍色:GRU

縱軸acc為隨機抽10個數字對的次數,橫軸為第幾個epoch時 觀察實驗結果可發現,LSTM在15個epoch以後準確率最高、且穩定維持在10(全對),使用 SimpleRNN的準確率雖然在第三個表現最好,但15個epoch以後準確率卻卡在9,而沒有記憶單 元的GRU在此實驗中效果最差。

心得



在課堂中老師有說明到基本上此次學習數字加法是由以RNN為基礎的加法學習,圖為整個學習的步驟。

可看出我們使用encoder與 decoder的RNN來處理數字的編 碼及解碼,來使RNN可以順利地 學習。

Example 4: Sequence-to-Sequence Learning for Addition (1)

What is sequence-to-sequence learning?

```
Input: '3+361_'
Output: '364 '
```

- In this example, the input string is of length 7, and reversed
 - two 3-length numbers and one + sign
- The output is of length 4
- Need a coding table for '0.123456789+' (of length 12)

Input (reversed): [' 163+3', ' 88+71', ' 7+2', '356+153', '951+01']
Expected (not reversed): ['364', '105', '9', '1004', '169']

因為需要訓練加法時,需要 將資料去做詞嵌入,我們使 用one-hot encoding將數字轉 成詞向量,再經由RNN去學 習input、output及加法後成 果的關係。 Controlling for factors including career level, har still a 21006 of researchers put the pay discrepancy at as little as 5% (Pay Scale puts in controlled wage gap closer to 3%). Which is certainly better than 21% but begs the question: Would you be cool with a 3%-5% pay cut?

The statement of the cool with a 3%-5% pay cut?

The statement of the cool with a 3%-5% pay cut?

在控制包括職業水平、硬技能等因素時,一些研究及活然副走異样說到了5% (PayScale 則將受控工資差距縮小到3%)。哪一個肯定比21%更好,但提出了一個問題:減薪3%-5%會很酷嗎?

According to a 2011 study from Georgetown's Center on Education and the Workforce, "college-educated women working full time earn more than a half million dollars less than their male peers do over the course of a lifetime." That 3% adds up fast. And lower wages have negative implications beyond just a woman's current bank account: Future benefits like Social Security and how much you're able to sock away in retirement accounts depend on your wages. Earning 3% less throughout your lifetime will significantly impact the amount of your Social Security check and size of your nest eeg.