數位語音處理 HW2

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A. 環境設置：

OS: Ubuntu 16.04 LTS

B. 執行方式：

bash 00_clean_all.sh
bash 01_run_HCopy.sh
bash 02_run_HCompV.sh
bash 03_training.sh
bash 04_testing.sh

C. 程式、檔案架構：

00_clean_all.sh:

Remove the files created last time.

01_run_HCopy.sh:

Convert wave to 29 dimension MFCC.

02_run_HCompV.sh:

Compute global mean and variance of features.

03_training.sh:

Training models.

04_testing.sh:

Testing models.

proto:

Define the parameters of a HMM, including the number of states, the dimension of each state, and the transition Matrix of a HMM.

mix2_10.hed:

Define the number of Gaussian function to describe each distribution of a dimension of one state.

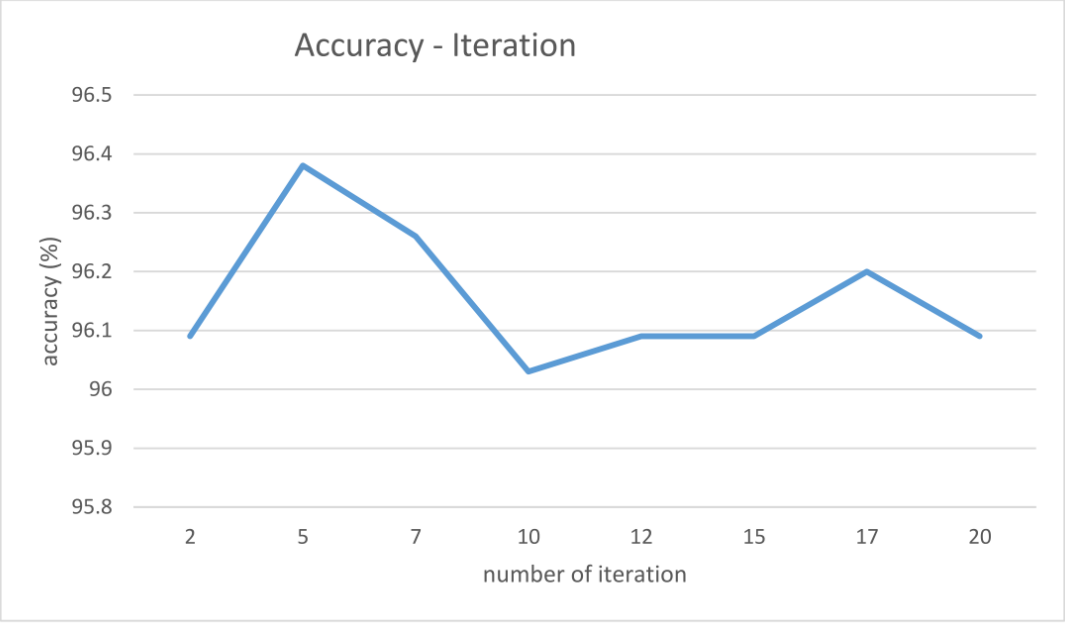
D. 結果分析：

```
====================== HTK Results Analysis =======================
  Date: Thu Nov 15 16:18:18 2018
  Ref : labels/answer.mlf
  Rec : result/result.mlf
------------------------ Overall Results --------------------------
SENT: %Correct=88.33 [H=424, S=56, N=480]
WORD: %Corr=96.61, Acc=96.14 [H=1679, D=37, S=22, I=8, N=1738]
===================================================================
```

After increasing the number of states from 5 to 15, changing the number of Gaussian describing each dimension of a state from 2 to 4, and increasing the number of iteration of training from 3 to 16, the accuracy increase from 74.34% to 96.14%.

Increase the number of states and the number of Gaussian describing each dimension usually increase the accuracy, but the increase of number of iteration has less positive effect on the accuracy. Sometimes the increase of number of iteration may low down the accuracy.

If we fix the number of states (15) and the number of Gaussian describing each dimension (4), and change the iteration, we can construct a graph like below.



We can see that the number of iteration effect the accuracy randomly.