DSP HW2-1 Report

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Result

I use the following parameters and get the following result. The final accuracy is 97.01%.

Train

```
numiters=20                                    # Number of iterations of training
maxiterinc=16                                  # Last iter to increase #Gaussion.
numgauss=128                                   # Initial num-Gauss (must be more than #states=3*phones).
totgauss=20000                                 # Target #Gaussians.
incgauss=$[($totgauss-$numgauss)/$maxiterinc] # per-iter increment for #Gauss
realign_iters="1 2 3 4 5";
scale_opts="--transition-scale=1.0 --acoustic-scale=0.1 --self-loop-scale=0.1"
```

Test

```
opt_acwt=0.2
test_beam=20.0
```

topo.proto

```
<Topology>
<TopologyEntry>
<ForPhones>
NONSILENCEPHONES
</ForPhones>
<State> 0 <PdfClass> 0 <Transition> 0 0.50 <Transition> 1 0.25 <Transition> 2 0.25 </State>
<State> 1 <PdfClass> 1 <Transition> 1 0.50 <Transition> 2 0.25 <Transition> 3 0.25 </State>
<State> 2 <PdfClass> 2 <Transition> 2 0.50 <Transition> 3 0.25 <Transition> 4 0.25 </State>
<State> 3 <PdfClass> 3 <Transition> 3 0.50 <Transition> 4 0.25 <Transition> 5 0.25 </State>
<State> 4 <PdfClass> 4 <Transition> 3 0.25 <Transition> 4 0.25 <Transition> 5 0.50 </State>
<State> 5 </State>
</TopologyEntry>
<TopologyEntry>
<ForPhones>
SILENCEPHONES
</ForPhones>
```

```
<State> 0 <PdfClass> 0 <Transition> 0 0.50 <Transition> 1 0.25 <Transition> 2 0.25 </State>
<State> 1 <PdfClass> 1 <Transition> 1 0.50 <Transition> 2 0.25 <Transition> 3 0.25 </State>
<State> 2 <PdfClass> 2 <Transition> 1 0.25 <Transition> 2 0.25 <Transition> 3 0.50 </State>
<State> 3 </State>
</TopologyEntry>
</Topology>
```

I tried several settings to increase the performance. By increasing the initial and total number of Gaussian, it improves to 94-96%. Also, adding more states and giving enough iteration of training can have better performance. As for the testing stage, setting `opt_acwt` to 0.2-0.3 would have better performance.

Challenge

Building the docker environment takes me a lot of time since I wrote this homework on the workstation, for which I don't have root permission. After solving the environmental issues, finding the correct parameters also takes me some time. It took a while until I got an acceptable result.