KeyWord Spotting on a MAX78000

Created a DataSet “reader” for the ML commos dataset

From Paper, Best Network would be DS-CNN or DS-DNN but depthwise networks are not supported on the MAX78000 only on the MAX78002. What a pity.

Now use CNN -> could use these from ai8x but they need way more memory

CRNN?

Build little CNN to get from Audio to MSFF

Testing CNNs for MAX

MAX has 64 AI cores, so it would be good to use networks with max 64 channels

Is the accuracy good enough compared to NN with 128 or 192 channels?

Let’s see speed and power consumption of each? What is too large for the micro con

Compare to KSWv3

Add mfcc CNN in front of cnn

KWSCNN with more than 64 with after a while just gets constant output

Kswv3 and kswv2 both aren't good for the part of the training set... only 72% unquantized

Lets a bigger dataset...

Add mfcc calculation to C code...

Use same data but again without

This is hard to do in that short time...

Fourie Transform via CNN

<https://sidsite.com/posts/fourier-nets/>

In principle Fourie Transorm should be easyly learnable

But how with 3x3 or 3 kernes

Laden von ganzem Datenset in deutsch

Mit melspec KWS20-v2, KWS20-v3 und KWSCNN64 und KWSCNN128

Alle auf dem Board analysieren, Power, Duration, Latenze, accuracy, number of calcuations

Alle 4 mit einander vergleichen

Bestes der 4 nehmen, auf dataset ohne mel loslassen

Accuracy? Anderes netzwerk nehmen wenns schlecht ist.

Sonst mfcc in C code... könnte zeitaufwendig sein

Sfft in c auf slices und dann frequenbänder anpassen... könnte sein dass ich da nochmal lernen muss mit neuen features

Super kleines cnn bauen um Sprache zu erkennen um dann erst laufen zu lassen... neues dataset benötigt... zeit!!!

With mfcc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network | KWS20 | KWS20-v2 | KWS20-v3 | KWSCNN64 | KWSCNN128 |
| Accuray uq. |  |  |  |  |  |
| Accuray quantiz. |  |  |  |  |  |
| Accuray on MAX |  |  |  |  |  |
| #Parameters |  |  |  |  |  |
| #Calculations |  |  |  |  |  |
| Time on Max |  |  |  |  |  |
| Power |  |  |  |  |  |
| Peak Power |  |  |  |  |  |
| Latency |  |  |  |  |  |

On timedomain

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Network | KWS20-v2 | KWS20-v3 | KWSCNN64 | KWSCNN128 |
| Accuray uq. |  |  |  |  |
| Accuray quantiz. |  |  |  |  |
| Accuray on MAX |  |  |  |  |
| #Parameters |  |  |  |  |
| #Calculations |  |  |  |  |
| Time on Max |  |  |  |  |
| Power |  |  |  |  |
| Peak Power |  |  |  |  |
| Latency |  |  |  |  |

Mfcc auf 2 left and right WITH KWSCNN (Num of Layers, Max Width) 50 epochs

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Network | 6, 64 | 6, 32 | 5, 64 | KWSCNN64 | KWSCNN128 |
| Accuray uq. |  |  |  |  |  |
| Accuray quantiz. |  |  |  |  |  |
| Accuray on MAX |  |  |  |  |  |
| #Parameters |  |  |  |  |  |
| #Calculations |  |  |  |  |  |
| Time on Max |  |  |  |  |  |
| Power |  |  |  |  |  |
| Peak Power |  |  |  |  |  |
| Latency |  |  |  |  |  |

Found out that the the KWSCNN is way too overpowered for left and right

This also leads to memory issus on the board... so now I will decrease it so far that it works good on the maxim

Max size of output: 32768 (0x8000)

Input size 1x128x64

Outputsize per layer till now

1. 16x126x62 (124992 >> 0x8000)
2. 32x63x31 (62496)
3. …
4. …

New Output

1. 16x63x31 (31248 < 0x8000)
2. 32x31x15
3. 64x15x7 (2240)
4. 46x7x3 (966 < 1024)
5. Linear 8 output but only 3 needed

Output must be 8 or 32

Max inputsize of Linear is 1024