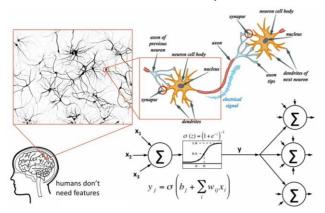
# Classification of Thai characters by Neural Network

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### 1. Background/Purpose

The Human recognizes over neuron systems in our brain are interesting to learn and apply such mechanism for an education, industry and livelihood.

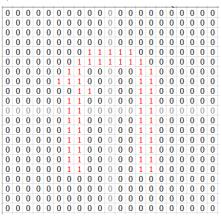


In my project, we use some partial neuron network model to recognize Thai characters over it. We need to understand some knowledge, such as

- (1) Neuron Systems
- (2) McCulloch & Pitts model
- (3) Error Back propagation
- (4) Sigmoid Function
- (5) C Language

# 2. Procedure/method

I have written 44 Thai characters in 21x21 pixel array, represent each character by "1" and background by "0" in Excel that show below.





Procedures are to understand and apply the graduated senior program for support input, output format and giving variable data by keyboard when the program is initialized.

```
#include <stdio.h>
#include <math.h>
#include <stdib.h>
#include <stdib.h>
#include <time.h> //fwfbf_[,1Žw'è

int i,n,p,width,height,neuron[3],count_min;
float S_min, Ssat_min;

//mallocŠÖ",É,æ,é"z-ñ錼

//out,le@¼
float ***mallocOut(int ix,int iz){
  float ***fOut;
  int i,j;

fout= (float***)malloc(ix*sizeof(float**));

for(i=0;i<ix;i++)
  fout[i]= (float**)malloc(neuron[i]*sizeof(float*));

for(i=0;i<ix;i++){
  fout[i]= (float**)malloc(neuron[i]*sizeof(float*));

for(i=0;i<ix;i++){
  fout[i]= (float**]</pre>
```

# (1) Classification Problem

Put 4 Thai characters in the program with 3 layers. Input 441 nodes, output 441 nodes and middle node we try various numbers to find the most optimize, that can recognize patterns by perfectly.

In this way, it is expected that input information might be encoded in the middle layer.

### (2) Identification Problem

Put all 44 Thai characters in the program. Identify each character by "teacher signal". Teacher signal is a signal sent to the neural network and trigger the neural network to give a result.

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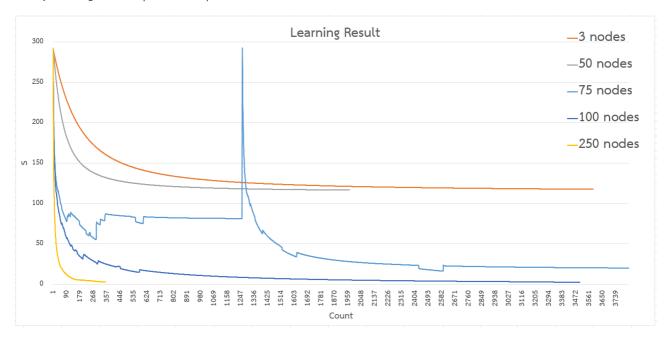
#### 3. Result

### (1) Classification Problem

After we try 250, 100, 75, 50 and 3 middle nodes, 100 nodes for 4 characters is the most optimize.

The graph shown the error measure, that nearly 0 will get more perfect output.

- (2) Understand the graduated senior program
- (3) Write 44 Thai characters in the array
- (4) Apply the program
- (5) Run the program for solving the problem
- (6) Get the result and optimize



We encode for getting smaller middle node and decode them, but it needs extremely fine learning and take a long time for processing.

#### (2) Identification Problem

For number of pattern and teacher signal we found the formula are

So, 44 pattern have 6 teacher signal, represented by 0 0 0 0 0 (n) to 1 0 1 1 0 0 ( $\mathfrak{g}$ ).

## 4. Conclusion

I have only C Programming Language skill. Another knowledge, such as Neural network, Sigmoid function, etc. All of them are my new things that interesting to learn.

I have success to do this project, such as

(1) Understand the theory and formula

### 5. Future work

We can get the middle node more complex and compress the data into each node.

We can use this model for Big data and Machine learning for industry.

# 6. Cultural Experience

It is my first class in the Japan that learns Japanese Language & Culture Class. I have gained a lot experience and learn a lot of Japanese character such as Hiragana, Katakana, some Kanji, Japanese traditional games with new Japanese friends. I have learned flower arrangement and Japanese tea ceremony too.

I have been around Tohoku Region such as Matsushima, Yamadera, Sendai City, Sakunami Onsen and Tohoku University. The place that I like the most is Sakunami Onsen. It is my first time in Onsen and get wonderful relax. I like Japanese food such as Otoro sushi, Gyu tongue and Sashimi. But not something like Natto.