

Lumped Deep Learning

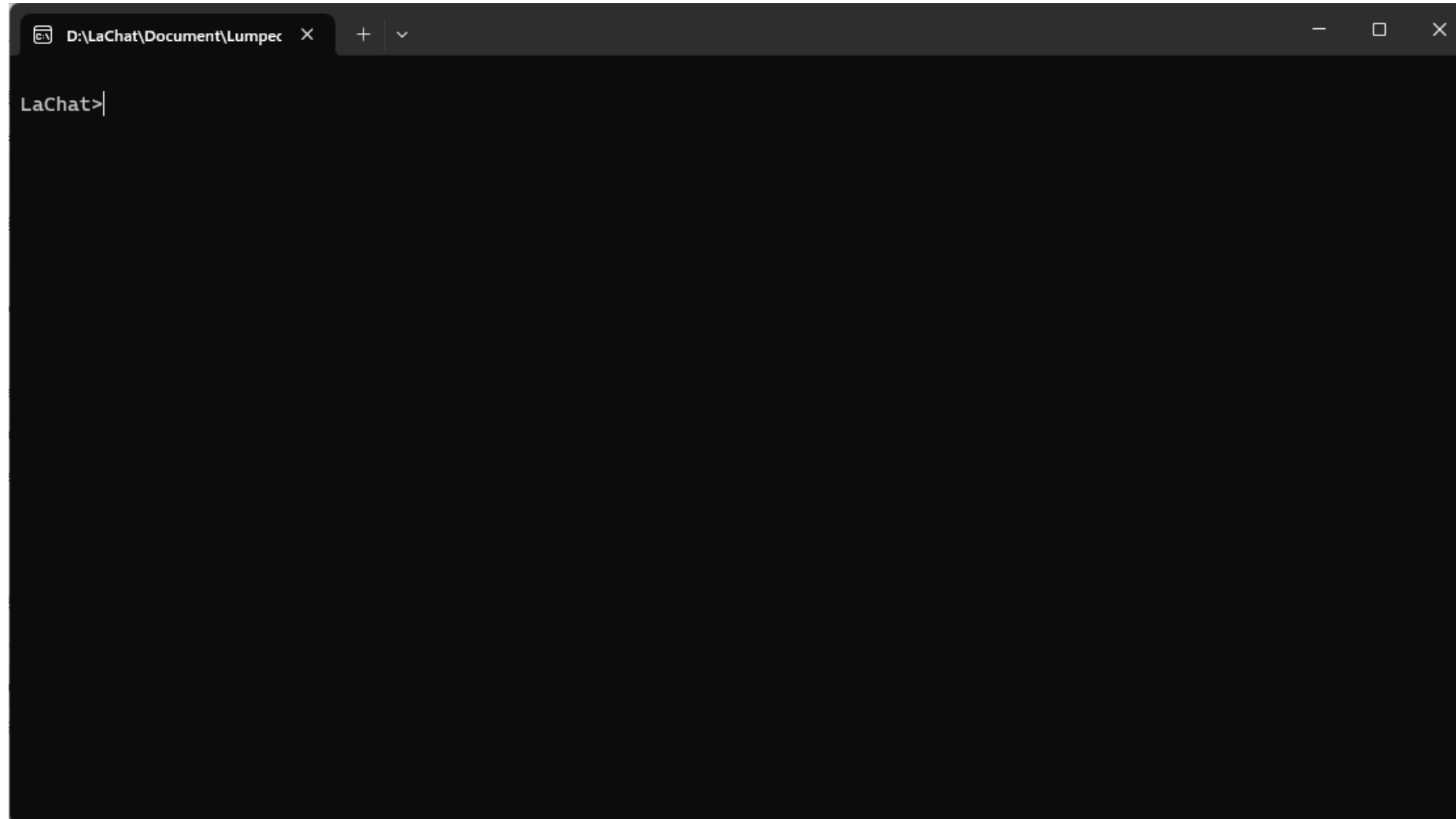
2024/5/12

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Professor

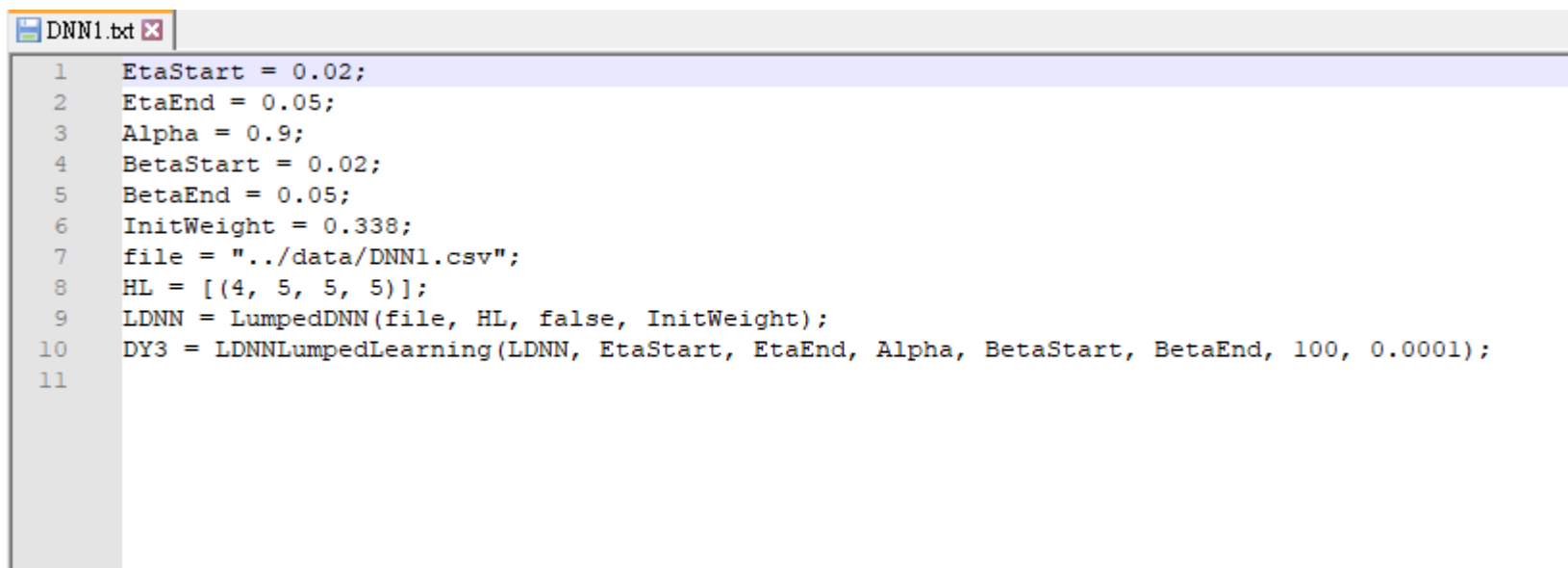
NYCU, ME

Execute ../bin/Lachat.exe (Console Mode)



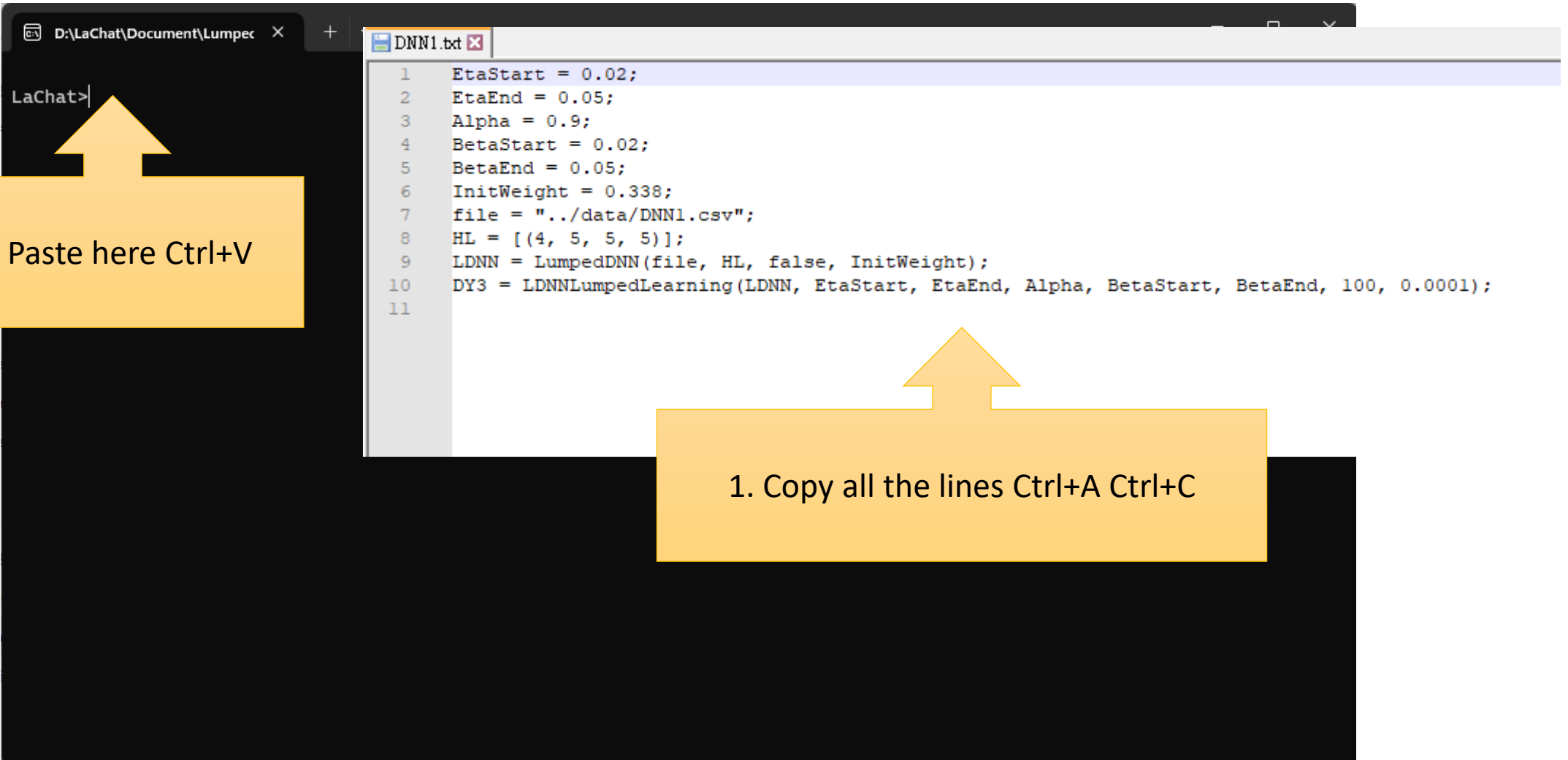
DNN1

../data/DNN1.txt



```
1  EtaStart = 0.02;
2  EtaEnd = 0.05;
3  Alpha = 0.9;
4  BetaStart = 0.02;
5  BetaEnd = 0.05;
6  InitWeight = 0.338;
7  file = "../data/DNN1.csv";
8  HL = [(4, 5, 5, 5)];
9  LDNN = LumpedDNN(file, HL, false, InitWeight);
10 DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart, BetaEnd, 100, 0.0001);
11
```

Execute Lachat.exe (Verification)

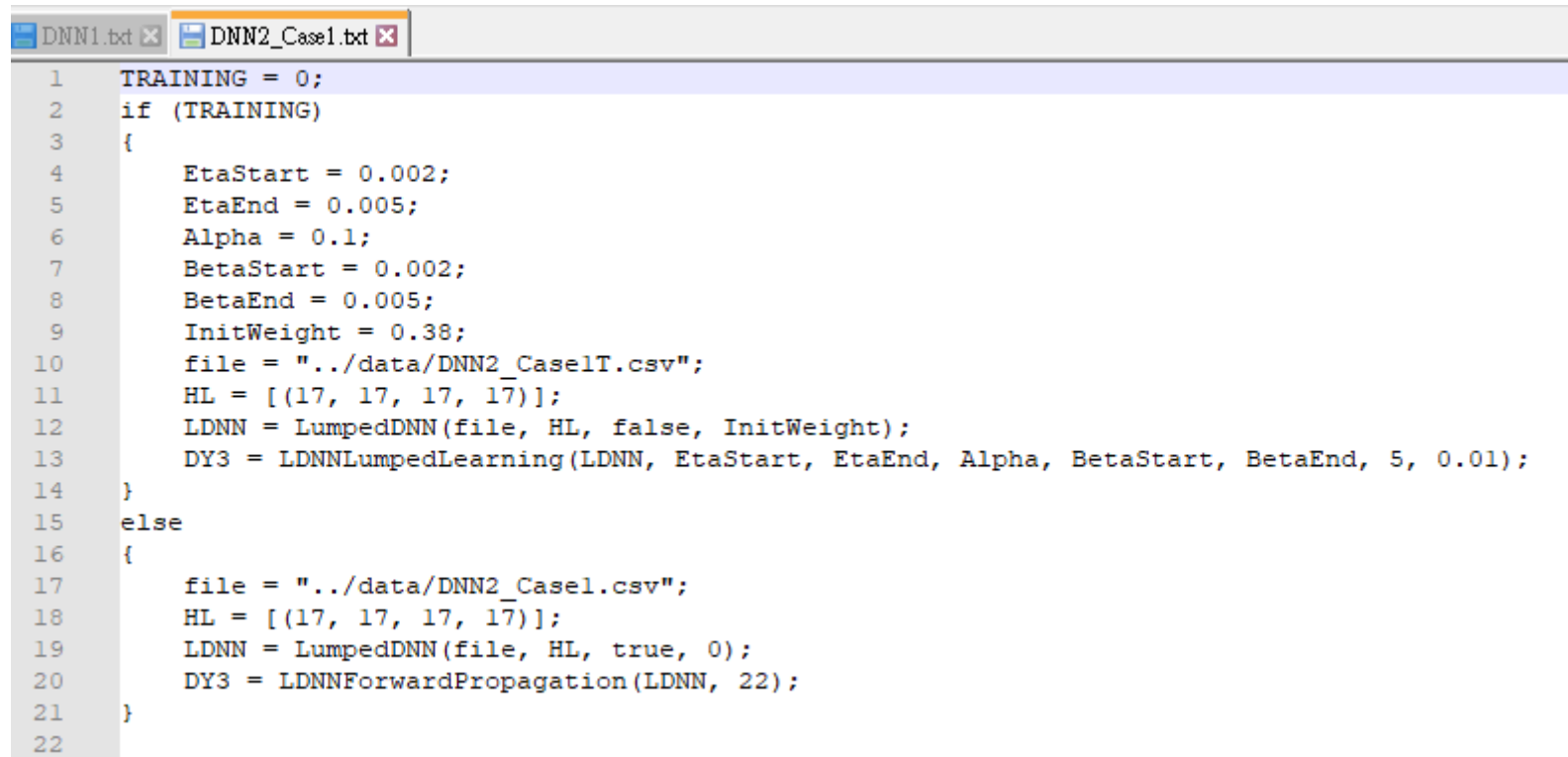


The screenshot shows a software interface with two windows. The background window is a command prompt titled 'D:\LaChat\Document\Lumpec' with the prompt 'LaChat>'. The foreground window is a text editor titled 'DNN1.txt' containing 11 lines of MATLAB code. An orange arrow points from a yellow box labeled '2. Paste here Ctrl+V' to the command prompt. Another orange arrow points from a yellow box labeled '1. Copy all the lines Ctrl+A Ctrl+C' to the text editor.

```
1  EtaStart = 0.02;  
2  EtaEnd = 0.05;  
3  Alpha = 0.9;  
4  BetaStart = 0.02;  
5  BetaEnd = 0.05;  
6  InitWeight = 0.338;  
7  file = "../data/DNN1.csv";  
8  HL = [(4, 5, 5, 5)];  
9  LDNN = LumpedDNN(file, HL, false, InitWeight);  
10 DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart, BetaEnd, 100, 0.0001);  
11
```

Case 1

../data/DNN2_Case1.txt



```
1 TRAINING = 0;
2 if (TRAINING)
3 {
4     EtaStart = 0.002;
5     EtaEnd = 0.005;
6     Alpha = 0.1;
7     BetaStart = 0.002;
8     BetaEnd = 0.005;
9     InitWeight = 0.38;
10    file = "../data/DNN2_Case1T.csv";
11    HL = [(17, 17, 17, 17)];
12    LDNN = LumpedDNN(file, HL, false, InitWeight);
13    DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart, BetaEnd, 5, 0.01);
14 }
15 else
16 {
17     file = "../data/DNN2_Case1.csv";
18     HL = [(17, 17, 17, 17)];
19     LDNN = LumpedDNN(file, HL, true, 0);
20     DY3 = LDNNForwardPropagation(LDNN, 22);
21 }
22
```

Execute Lachat.exe (Verification)

LaChat>

2. Paste here Ctrl+V

```
DNN1.txt x DNN2_Cas1.txt x
1 TRAINING = 0;
2 if (TRAINING)
3 {
4     EtaStart = 0.002;
5     EtaEnd = 0.005;
6     Alpha = 0.1;
7     BetaStart = 0.002;
8     BetaEnd = 0.005;
9     InitWeight = 0.38;
10    file = "../data/DNN2_Cas1T.csv";
11    HL = [(17, 17, 17, 17)];
12    LDNN = LumpedDNN(file, HL, false, InitWeight);
13    DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart, BetaEnd, 5, 0.01);
14 }
15 else
16 {
17     file = "../data/DNN2_Cas1.csv";
18     HL = [(17, 17, 17, 17)];
19     LDNN = LumpedDNN(file, HL, true, 0);
20     DY3 = LDNNForwardPropagation(LDNN, 22);
21 }
22
```

1. Copy all the lines Ctrl+A Ctrl+C

Results (Verification)

```
D:\LaChat\Document\Lumpec X + -
0.088 0.406 0.115 0.249 0.355 -0.302 0.282 0.030 0.028 0.106 -0.064 -0.616 0.216 -0.293 -0.266 0.157 -0.346
-0.811 -0.009 -0.076 0.701 -1.690 0.724 0.623 -1.479 -1.120 0.268 -3.193 -0.248 -0.001 -0.457 0.657 -0.242 0.566
-1.055 -0.008 0.850 0.430 0.637 0.130 0.940 -1.543 -1.408 0.242 -0.816 0.436 1.459 0.292 0.818 -1.370 -0.978
0.172 -0.131 0.162 0.759 0.118 -0.029 0.280 -0.878 -0.051 -0.021 -2.284 -0.698 0.707 0.036 0.669 -0.729 -0.108
-1.829 -0.556 1.474 -0.299 2.189 0.070 0.410 -1.893 -1.804 0.205 1.320 -0.488 1.526 0.793 0.859 -0.045 -1.486
-0.149 0.081 -0.069 0.155 -0.973 -0.390 0.462 -0.672 -0.105 0.042 -0.081 -1.633 0.889 -0.178 0.027 2.499 -0.244
0.868 1.010 -1.824 -0.097 -3.544 0.822 0.254 0.067 0.780 0.096 -1.810 2.010 -1.980 -1.544 -1.243 -0.637 1.707
-0.287 0.224 0.067 0.490 -0.443 0.466 0.442 -0.706 -0.578 0.163 -1.809 0.827 0.223 -0.118 0.467 -1.733 0.102
-0.789 -0.189 0.239 0.016 -0.727 0.089 0.196 -0.836 -0.675 0.031 -0.498 -0.946 0.397 0.124 0.454 1.434 0.112
-0.422 0.011 0.999 0.728 1.721 -0.476 0.440 -0.475 -0.763 0.112 -0.752 -0.057 1.513 0.742 0.850 -1.820 -0.895
1.448 0.389 1.535 1.156 8.636 -3.809 1.716 -0.519 0.937 -0.193 3.214 -2.665 5.131 0.126 0.823 -1.969 -4.793
Cost = 0.018918 0.054215

DY3 =
-0.051 -0.067 -0.050 -0.066 -0.070 -0.065 -0.051 -0.072 -0.056 -0.063 -0.063 -0.055 -0.064 -0.053 -0.071 -0.055 -0.054 -0.055 -0.060 -0.074 -0.051
0.120
0.003 0.003 0.003 0.003 0.003 0.003 0.004 0.003 0.003 0.004 -0.001 -0.003 0.000 -0.003 -0.003 -0.000 -0.001 -0.002 -0.003 0.001 -0.000 0.015
0.009 -0.015 0.014 -0.006 -0.018 0.004 0.015 -0.016 0.010 -0.013 -0.011 0.012 0.001 0.011 -0.016 0.012 0.012 0.009 0.003 -0.020 0.019 0.105
-0.002 -0.003 -0.003 -0.002 -0.006 -0.002 -0.003 -0.006 -0.001 -0.008 -0.000 -0.001 -0.002 0.003 -0.005 0.001 -0.000 0.003 -0.004 -0.006 0.005 -0.0
17
0.001 -0.002 -0.002 0.000 -0.003 0.002 0.003 -0.003 -0.002 -0.001 0.001 0.003 0.003 0.001 -0.003 0.004 0.002 0.002 -0.001 -0.001 0.003 0.023
-0.001 -0.004 0.006 -0.003 -0.005 -0.003 0.006 -0.005 0.003 -0.002 -0.003 0.001 -0.002 0.003 -0.006 -0.000 0.002 0.003 -0.002 -0.007 0.006 0.097
-0.002 -0.002 0.002 0.002 0.000 0.002 0.003 -0.001 0.002 0.002 0.000 0.000 -0.001 0.002 -0.002 0.002 0.002 0.002 -0.000 -0.003 0.003 0.031
0.003 0.003 0.003 0.004 0.003 0.002 0.008 0.003 0.003 0.008 0.001 -0.000 0.001 -0.000 -0.004 0.004 0.001 0.001 -0.004 0.002 0.003 0.062
-0.001 0.001 -0.003 0.003 -0.002 -0.000 0.004 -0.003 -0.001 0.002 -0.001 -0.003 -0.002 -0.002 -0.004 0.001 -0.003 -0.001 -0.004 -0.003 0.002 0.019
0.003 0.003 0.004 0.003 0.004 0.002 0.006 0.004 0.003 0.006 0.001 -0.001 0.002 -0.001 -0.003 0.003 0.001 0.000 -0.003 0.003 0.001 0.050
0.003 0.001 -0.000 -0.000 -0.005 -0.002 -0.005 -0.005 -0.002 -0.006 -0.002 -0.002 -0.002 -0.003 -0.005 0.002 -0.003 -0.003 -0.004 -0.004 0.002 0.00
1
0.003 0.003 -0.002 0.003 -0.004 0.003 -0.002 -0.003 -0.002 -0.002 -0.001 0.002 0.003 -0.003 -0.003 0.002 -0.001 -0.002 -0.003 0.001 -0.001 0.012
-0.003 -0.004 -0.003 -0.002 -0.001 0.002 0.007 0.002 -0.002 0.007 0.001 0.003 0.002 0.002 0.003 0.003 0.004 0.003 0.002 0.002 0.003 0.067
0.001 0.002 -0.000 0.003 0.004 0.002 0.006 0.003 0.003 0.006 -0.000 -0.002 -0.001 -0.001 -0.003 0.002 0.001 0.002 -0.003 0.001 0.003 0.025
0.003 0.003 0.002 0.002 0.002 0.002 0.003 0.002 0.002 0.003 0.001 -0.001 -0.001 -0.000 -0.001 -0.000 -0.001 -0.000 -0.002 0.002 -0.002 0.011
0.003 0.004 -0.003 0.004 0.001 0.003 0.004 -0.003 0.003 0.004 0.000 -0.004 -0.001 -0.003 -0.004 0.000 -0.002 -0.001 -0.005 -0.001 0.003 0.013
0.001 -0.003 0.006 -0.000 -0.007 -0.002 -0.002 -0.007 0.004 -0.009 0.003 -0.000 -0.002 0.006 -0.008 -0.000 0.003 0.005 -0.000 -0.008 0.008 0.028
```

Execute Lachat.exe (Verification)

The screenshot shows a code editor with two tabs: 'DNN1.txt' and 'DNN2_Cas1.txt'. The 'DNN2_Cas1.txt' tab is active, displaying a C++ program. The first line of the program is 'TRAINING = 0;', which is circled in red. An orange arrow points from this line to a yellow box containing the instruction '1. Change the line into TRAINING = 1;'. Another orange arrow points from a yellow box containing '3. Paste here Ctrl+V' to the 'LaChat>' prompt in a terminal window on the left. A third orange arrow points from a yellow box containing '2. Copy all the lines Ctrl+A Ctrl+C' to the code editor. The code in the editor is as follows:

```
1 TRAINING = 0;
2 if (TRAINING)
3 {
4     EtaStart = 0.002;
5     EtaEnd = 0.005;
6     Alpha = 0.1;
7     BetaStart = 0.002;
8     BetaEnd = 0.005;
9     InitWeight = 0.38;
10    file = "../data/DNN2_Cas1T.csv";
11    HL = [(17, 17, 17, 17)];
12    LDNN = LumpedDNN(file, HL, false, InitWeight);
13    DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart, BetaEnd, 5, 0.01);
14 }
15 else
16 {
17     file = "../data/DNN2_Cas1.csv";
18     HL = [(17, 17, 17, 17)];
19     LDNN = LumpedDNN(file, HL, true, 0);
20     DY3 = LDNNForwardPropagation(LDNN, 22);
21 }
22
```


Case 2

Procedures

- Go to the sub-folder ../data
- Open DNN2_case2.txt
- Copy the lines into the lachat.exe
- The symbiosis result is stored in d:/LDNN.txt and also on the screen

Your Own Application

Create File DNN1.csv using MS EXCEL

[X0]=	4	14											
4	7	2	-6	-9	10	4	10	-4	-6	-1	-5	-9	10	-1	
7	-10	-2	-9	-5	5	0	1	-6	-1	-9	-6	10	6	3	
-7	10	-8	-9	2	-5	-6	-8	6	-9	3	-1	-2	-2	5	
-10	-9	1	4	7	-4	5	3	-3	5	-9	4	-10	-5	-8	
[YD]=	5	14											
-9	-6	-8	-3	-1	5	-1	6	-8	-8	9	0	3	9	5	
8	8	-2	-6	5	-7	-7	4	-4	-9	-3	9	2	-6	-7	
1	2	-2	2	-5	4	9	6	2	-9	8	10	-10	8	9	
8	1	-7	-7	-8	8	0	5	6	0	1	7	-6	-10	7	
-8	8	4	0	-6	-10	-10	3	10	-7	-2	10	-2	6	-2	
7	2	-3	-3	4	-3	1	1	2	-10	4	-9	-3	-3	1	

Create File DNN1.txt

```
EtaStart = 0.02;  
EtaEnd = 0.05;  
Alpha = 0.9;  
BetaStart = 0.02;  
BetaEnd = 0.05;  
InitWeight = 0.338;  
file = "../data/DNN1.csv";  
HL = [(4, 5, 5, 5)];  
LDNN = LumpedDNN(file, HL, false, InitWeight);  
DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart,  
BetaEnd, 100, 0.0001);
```

Execute Lachat.exe (Training)

The screenshot shows a terminal window with the title bar "D:\LaChat\Document\Lumpec". The prompt is "LaChat>". A white box contains the following code:

```
EtaStart = 0.02;  
EtaEnd = 0.05;  
Alpha = 0.9;  
BetaStart = 0.02;  
BetaEnd = 0.05;  
InitWeight = 0.338;  
file = "../data/DNN1.csv";  
HL = [(4, 5, 5, 5)];  
LDNN = LumpedDNN(file, HL, false, InitWeight);  
DY3 = LDNNLumpedLearning(LDNN, EtaStart, EtaEnd, Alpha, BetaStart, BetaEnd, 100, 0.0001);
```

Two yellow callout boxes with arrows point to the terminal:

- Box 1 (bottom right): "1. Copy all the lines Ctrl+A Ctrl+C" with an arrow pointing to the code box.
- Box 2 (left): "2. Paste here" with an arrow pointing to the terminal prompt.

