ΝΕΥΡΩΝΙΚΑ ΔΙΚΤΥΑ

ΛΑΒΝΤΑΝΙΤΗ ΚΩΣΤΑΝΤΣΑ

ΤΣΑΠΙΚΟΥΝΗ ΓΕΩΡΓΙΑ

ΔΗΜΗΤΡΗΣ ΑΠΟΣΤΟΛΟΣ ΠΑΤΣΙΟΥ ΤΕΡΖΙΔΗΣ

- ΑΣΚΗΣΗ 1

	H1	**H2**	**H3**	**S**	**tanh**	**relu**	**B=40**	**B=400**	**ΠΟΣΟΣΤΟ ΕΠΙΤΥΧΙΑΣ**
1ο ΠΕΙΡΑΜΑ	10	30	7		X			X	0.0%
2Ο ΠΕΙΡΑΜΑ	15	15	15	X				X	43.55%
3ο ΠΕΙΡΑΜΑ	20	20	20	X			X		56.39%

Στο συγκεκριμένο νευρωνικό δίκτυο έχουμε εφαρμόσει για όλες τις εξόδους τη λογιστικη σιγμοειδή συνάρτηση.Η καλύτερη γενικευτική ικανότητα που βρήκαμε από το dataset test είναι 56.39%.Στο δίκτυο που δημιουργήσαμε καλούμε στη κλάση pt την συνάρτηση gradient η οποία μας βοηθάει στην εκπαίδευση του MLP. Συγκεκριμένα , για να μπορέσει να εκπαιδευτεί το MLP είναι απαραίτητο να γίνεται ενημέρωση των βαρών μέσω της backpropagation με σκοπό όταν καλούμε τη gradient να γίνεται ελαχιστοποίηση του τετραγωνικού σφάλματος . Τέλος , στην άσκηση που σας παραδώσαμε γνωρίζουμε ότι το τετραγωνικό σφάλμα θα έπρεπε να μειώνεται καθώς επίσης και το ποσοστό επιτυχίας να έδινε καλύτερα αποτελέσματα. Ωστοσο, δε καταφέραμε να εντοπίσουμε το λάθος που κάναμε στη συγκεκριμένη υλοποίηση του MLP.

Εκτέλεση προγράμματος:

Επιπρόσθετα, για να παραχθούν σωστά τα δεδομένα πρέπει να εκτελεστεί πρώτα το αρχείο dataset.java και έπειτα να εκτελεστούν τα αρχεία pt.java, το οποίο περιέχει τη main κλάση του κώδικα μας, και Level.java loadData.java MLP.java Neuron.java .

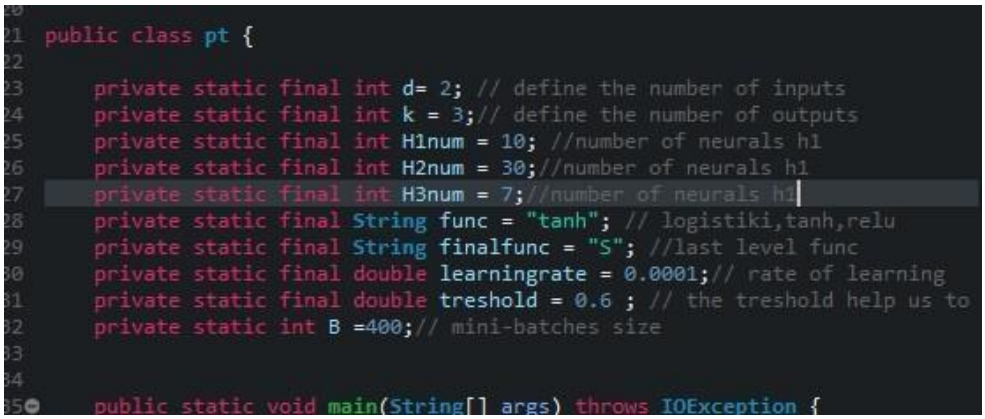
Εντολή μεταγλώτισης:

- Javac dataset.java
- Java dataset

- Javac pt.java Level.java loadData.java MLP.java Neuron.java
- Java pt

Screenshots προγράμματος:

Κλείνοντας , σας παραθέτουμε τα screenshots των αποτελεσμάτων του κώδικα

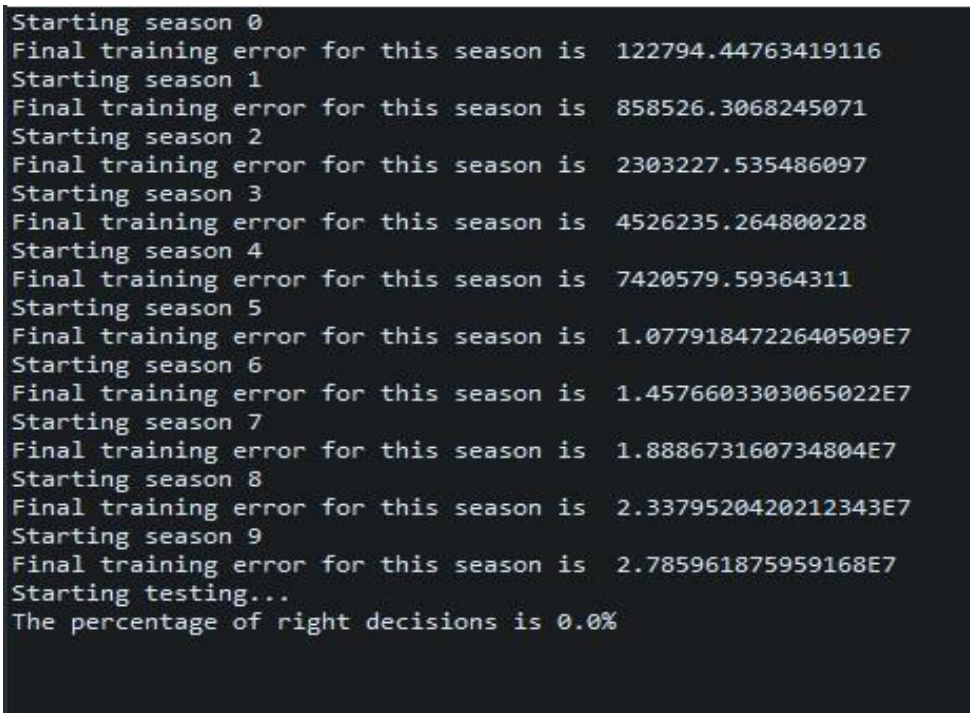


```
public class pt {

    private static final int d= 2; // define the number of inputs
    private static final int k = 3;// define the number of outputs
    private static final int H1num = 10; //number of neurals h1
    private static final int H2num = 30;//number of neurals h1
    private static final int H3num = 7;//number of neurals h1
    private static final String func = "tanh"; // logistiki,tanh,relu
    private static final String finalfunc = "S"; //last level func
    private static final double learningrate = 0.0001;// rate of learning
    private static final double treshold = 0.6 ; // the treshold help us to
    private static int B =400;// mini-batches size


    public static void main(String[] args) throws IOException {
```

Εικόνα 1



```
Starting season 0
Final training error for this season is  122794.44763419116
Starting season 1
Final training error for this season is  858526.3068245071
Starting season 2
Final training error for this season is  2303227.535486097
Starting season 3
Final training error for this season is  4526235.264800228
Starting season 4
Final training error for this season is  7420579.59364311
Starting season 5
Final training error for this season is  1.07791847226405O9E7
Starting season 6
Final training error for this season is  1.4576603303065022E7
Starting season 7
Final training error for this season is  1.8886731607348O4E7
Starting season 8
Final training error for this season is  2.33795204202123 43E7
Starting season 9
Final training error for this season is  2.785961875959168E7
Starting testing...
The percentage of right decisions is 0.0%
```

Εικόνα 2

```
private static final int d= 2; // define the number of inputs
private static final int k = 3;// define the number of outputs
private static final int H1num = 15; //number of neurals h1
private static final int H2num = 15;
private static final int H3num = 15 ;
private static final String func = "S"; // logistiki,tanh,relu
private static final String finalfunc = "S"; //last level func
private static final double learningrate = 0.05;// rate of learning
private static final double treshold = 0.1 ; // the treshold help us t
private static int B =400;// mini-batches size
```

Εικόνα 3

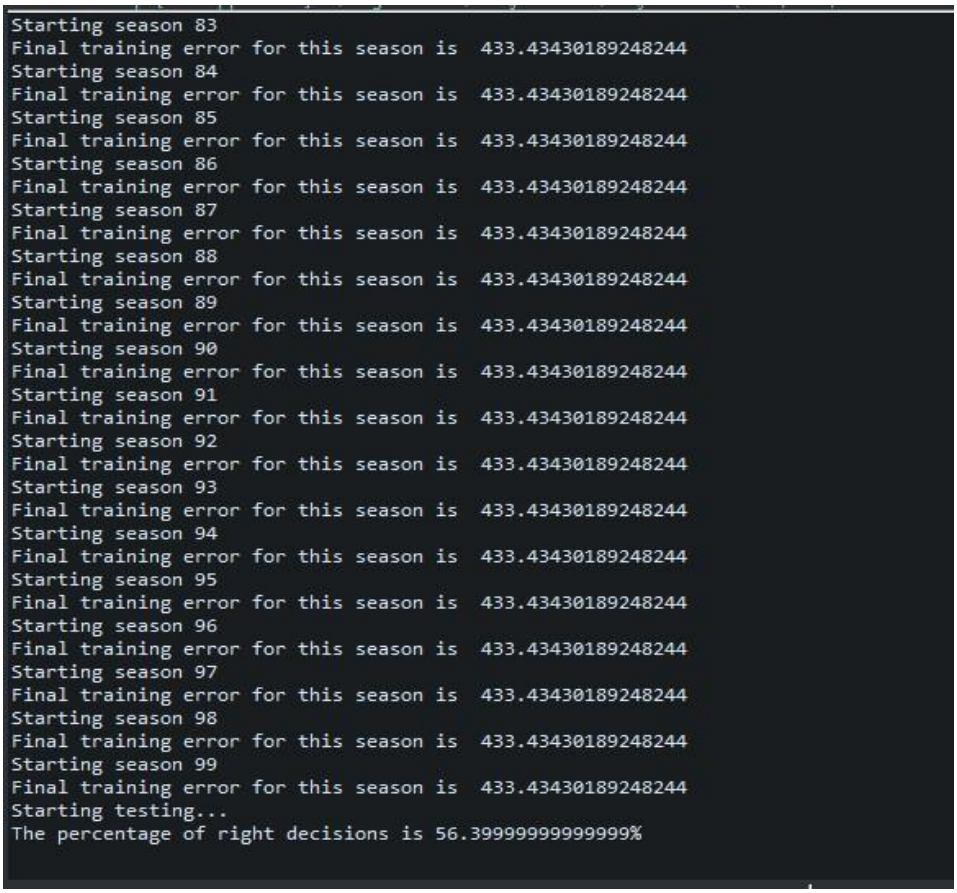
```
Starting season 0
Final training error for this season is  146960.02853906184
Starting season 1
Final training error for this season is  415131.168926182
Starting season 2
Final training error for this season is  408684.4005032484
Starting season 3
Final training error for this season is  408587.0371188938
Starting season 4
Final training error for this season is  408585.3593253797
Starting season 5
Final training error for this season is  408585.32525975903
Starting season 6
Final training error for this season is  408585.32451445435
Starting season 7
Final training error for this season is  408585.32449419226
Starting season 8
Final training error for this season is  408585.32449360867
Starting season 9
Final training error for this season is  408585.324493588
Starting testing...
The percentage of right decisions is 43.55%
```

Εικόνα 4

```
public class pt {

    private static final int d= 2; // define the number of inputs
    private static final int k = 3;// define the number of outputs
    private static final int H1num = 20; //number of neurals h1
    private static final int H2num = 20;
    private static final int H3num = 20 ;
    private static final String func = "S"; // logistiki,tanh,relu
    private static final String finalfunc = "S"; //last level func
    private static final double learningrate = 0.1;// rate of learning
    private static final double treshold = 0.01 ; // the treshold help us to
    private static int B =40;// mini-batches size
```

Εικόνα 5


Starting season 83
Final training error for this season is 433.43430189248244
Starting season 84
Final training error for this season is 433.43430189248244
Starting season 85
Final training error for this season is 433.43430189248244
Starting season 86
Final training error for this season is 433.43430189248244
Starting season 87
Final training error for this season is 433.43430189248244
Starting season 88
Final training error for this season is 433.43430189248244
Starting season 89
Final training error for this season is 433.43430189248244
Starting season 90
Final training error for this season is 433.43430189248244
Starting season 91
Final training error for this season is 433.43430189248244
Starting season 92
Final training error for this season is 433.43430189248244
Starting season 93
Final training error for this season is 433.43430189248244
Starting season 94
Final training error for this season is 433.43430189248244
Starting season 95
Final training error for this season is 433.43430189248244
Starting season 96
Final training error for this season is 433.43430189248244
Starting season 97
Final training error for this season is 433.43430189248244
Starting season 98
Final training error for this season is 433.43430189248244
Starting season 99
Final training error for this season is 433.43430189248244
Starting testing...
The percentage of right decisions is 56.39999999999999%

Εικόνα 6