Least Fitting Method

Aim

Write code for fitting a straight line for given data.

1.

x	1	2	3	4	5	6
y	2.4	3.1	3.5	4.2	5.0	6.0

2.

x	0	1	2	3	4
y	1.0	2.9	4.8	6.7	8.6

Algorithm

1. Give the header file.
2. Then make the user to input the no. of data pair of x and y, using array function and for loop.
3. Then generate a table for all the data that is x, y, xy, x^2.
4. Then using the for loop we will calculate the sum and the by using the formula of a and b.
5. Give the values of a and b.
6. Then write the final equation that we get of straight

Code

```
#include<bits/stdc++.h>

using namespace std;


int main()
{
    int n;
    float x[100], y[100], xx[100],xy[100]; //using array function
    cout<< "\t\t\t\t\t\t.................Calculates the best fit value using
least square method in y=a+bx..............\n";
    cout<< "Enter number of data pairs:\n";
    cin>>n;
    cout<<"Enter value pair:\n"<<endl;

    for (int i=0; i<n; i++)  //for-loop for data input
```

```
    {
        cout<<"Data "<<i+1<<": " <<endl;
        cout<<"x: ";
        cin>>x[i];
        cout<<"y: ";
        cin>>y[i];
    }
    cout<< "\n\nData input completed.\n The value table: "<<endl;
    cout<<"\t\tx\t\ty\t\txy\t\txx"<<endl;
    for (int i=0; i<n; i++)  //for-loop for table generation
    {
        xy[i]=x[i]*y[i];
        xx[i]=x[i]*x[i];
        cout<<"\t\t"<<x[i] <<
"\t\t"<<y[i]<<"\t\t"<<xy[i]<<"\t\t"<<xx[i]<<endl;
    }

    float sumy=0, sumx=0, sumxy=0, sumxx=0;
    for (int i=0; i<n; i++)
    {
        sumy+= y[i];
        sumx+= x[i];
        sumxy+= y[i]*x[i];
        sumxx+= x[i]*x[i];
    }
    cout<<"\t\tsumx\t\tsumy\t\tsumxy\t\tsumxx " <<endl;
    cout<< "\t\t"<<sumx<< "\t\t"   << sumy<< "\t\t"<< sumxy<< "\t\t"<< sumxx<<
endl;
    float a=(sumx*sumxy-sumy*sumxx)/(sumx*sumx-n*sumxx); //formula for finding
the value of a and here n is the number of pair
    float b=(sumy*sumx-n*sumxy)/(sumx*sumx-n*sumxx);     //formula for value
of b

    cout<<"\n\nThe calculated value of a and b is : "<< a<< " and "<< b<<
"."<<endl;
    cout<<"\n\nThe best fit value of curve is : y = "<< a<< " + "<< b<<
"x.\n\n"<<endl;


}
```

Output

For 1st Data :

```
.....Calculates the best fit value using least square method in y=a+bx.....
Enter number of data pairs:
6
Enter value pair:

Data 1:
x: 1
y: 2.4
Data 2:
x: 2
y: 3.1
Data 3:
x: 3
y: 3.5
Data 4:
x: 4
y: 4.2
Data 5:
x: 5
y: 5.0
Data 6:
x: 6
y: 6.0


Data input completed.
 The value table:
               x             y             xy            xx
               1             2.4           2.4           1
               2             3.1           6.2           4
               3             3.5           10.5          9
               4             4.2           16.8          16
               5             5             25            25
               6             6             36            36
               sumx          sumy          sumxy         sumxx
               21            24.2          96.9          91


The calculated value of a and b is : 1.59333 and 0.697143.


The best fit value of curve is : y = 1.59333 + 0.697143x.
```

For data 2:

```
.....Calculates the best fit value using least square method in y=a+bx.....
Enter number of data pairs:
5
Enter value pair:

Data 1:
x: 0
y: 1
Data 2:
x: 1
y: 2.9
Data 3:
x: 2
y: 4.8
Data 4:
x: 3
y: 6.7
Data 5:
x: 4
y: 8.6


Data input completed.
 The value table:
               x             y             xy            xx
               0             1             0             0
               1             2.9           2.9           1
               2             4.8           9.6           4
               3             6.7           20.1          9
               4             8.6           34.4          16
               sumx          sumy          sumxy         sumxx
               10            24            67            30


The calculated value of a and b is : 1 and 1.9.


The best fit value of curve is : y = 1 + 1.9x.
```

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Graph