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Assignment No. 3(2)

Aim:- Write C++ program to display some basic statistical details like mean, standard deviation and percentile of any dataset.

Theory:-

- **Mean:-**

Mean is also known as average of all the numbers in the data set which is calculated by -

$$\text{Mean} = \frac{\text{Sum of all data values}}{\text{Number of data values}}$$

$$\bar{x} = \frac{\Sigma x}{n}$$

$$\bar{x} = \frac{x_1 + x_2 + \cdots + x_n}{n}$$

- **Standard deviation:-**

It is a measure of dispersion of observation within dataset relative to their mean. It is square root of the variance and denoted by(σ) sigma.

Standard deviation is expressed in the same unit as the values in the dataset so it measure how much observations of the data set differs from its mean.

$$\sigma = \sqrt{\frac{\Sigma (x_i - u)^2}{N}}$$

σ = population standard deviation

N = the size of the population

x_i = each value from the population

μ = the population mean.

- Percentile :-

A percentile is a term that describes how a score compares to other scores from the same set.

It is calculated by,

$$P_x = \frac{X(n+1)}{100}$$

P_x = The value at which x percentage of data lie below that value

n = Total number of observations.

* Code :-

```
#include<iostream>
#include<cmath>
using namespace std;
void percentile (int arr[] ,int n)
{
        int i, j, count ,percent ;
        for (int i=0; i<n ; i++)
        {
                count = 0;
                for (int j=0 ; j<n ; j++)
                {
                        if (arr[i]>arr[j])
                        {
                                count ++;
                        }
```

```
            }

            percent = (count*100)/(n-1);
            cout << " percentile of the student "<< i+1 << "="<< percent;
            cout<<endl;
            }
        }
}

int main()
{
        int studentMarks[5] = {12,60,80,71,30};
        int n=5;
        float sum = 0.0, mean, variance=0.0, stdDeviation;
        int i;
        for(i=0; i<5; ++i)
        sum+= studentMarks[i];
        mean = sum/5;
        for(i=0; i<5; ++i)
        variance += pow(studentMarks[i]-mean,2);
        variance = variance/5;
        stdDeviation = sqrt(variance);
        cout <<"The Student marks are: ";
        for(i=0; i<5; ++i)
        cout << studentMarks[i] << " ";
        cout << endl;
        cout <<" Mean of the marks is " << mean ;
        cout << endl;
        cout <<" The standard deviation of the marks from mean is "<<
        stdDeviation;
        cout << endl;
```

```
    percentile(studentMarks, n);
    return 0;
}
```

* Output :-

```
The student marks are : 12 60 80 71 30
Mean of the marks is 50.6
The standard deviation of the marks from mean is 25.625
percentile of the student 1 = 0
percentile of the student 2 = 50
percentile of the student 3 = 100
percentile of the student 4 = 75
percentile of the student 5 = 25
```