

4. Variance

```
def variance():
    sepalLen = generateList(dataSet, "SepalLengthCm")
    sepalWid = generateList(dataSet, "SepalWidthCm")
    petalLen = generateList(dataSet, "PetalLengthCm")
    petalWid = generateList(dataSet, "PetalWidthCm")

    var_mean = mean()
    sepalLenVar = 0
    sepalWidVar = 0
    petalLenVar = 0
    petalWidVar = 0

    SLmean = var_mean[0]
    sepalLenVar = sum((i - SLmean) ** 2 for i in sepalLen) / len(sepalLen)

    SWmean = var_mean[1]
    sepalWidVar = sum((i - SWmean) ** 2 for i in sepalWid) / len(sepalWid)

    PLmean = var_mean[2]
    petalLenVar = sum((i - PLmean) ** 2 for i in petalLen) / len(petalLen)

    PWmean = var_mean[3]
    petalWidVar = sum((i - PWmean) ** 2 for i in petalWid) / len(petalWid)

    print(f'Variance Sepallen: {sepalLenVar}, , Variance SepalWid: {sepalWidVar}\nVariance petalLen: {petalLenVar},
    return sepalLenVar, sepalWidVar, petalLenVar, petalWidVar
```

```
Variance Sepallen: 0.6811222222222222, , Variance SepalWid: 0.18675066666666667
Variance petalLen: 3.0924248888888854, Variance petalWid: 0.5785315555555559
```

4. Standard Deviation

```
def standarDev():
    variance_var = variance()
    return f'Standard Deviation Sepallen: {variance_var[0] ** 0.5}, Standard Deviation SepalWid: {variance_var[1] **
```

```
Standard Deviation Sepallen: 0.8253012917851409, Standard Deviation SepalWid: 0
.4321465800705435
Standard Deviation petalLen: 1.7585291834055201, Standard Deviation petalWid: 0.
760612618588172
```

5.Quartile Range

```
def quartileRange():
    sepalLen = generateList(dataSet, "SepalLengthCm")
    sepalWid = generateList(dataSet, "SepalWidthCm")
    petalLen = generateList(dataSet, "PetalLengthCm")
    petalWid = generateList(dataSet, "PetalWidthCm")

    return f'Qurtile Range Sepallen: {max(sepalLen) - min(sepalLen)} Qurtile Range SepalWid: {max(sepalWid) - min(sep
print(mean())
```

```
Qurtile Range Sepallen: 3.6000000000000005 Qurtile Range SepalWid: 2.40000000000
00004
Qurtile Range petalLen: 5.9 Qurtile Range petalWid: 2.4
```

Conclusion:

Therefore the given statistical operations were done successfully without using any pre defined libraries after applying the concepts of categorical and numerical variables. Also during our experiment we found that contingency tables cannot be formed without having 2 categorical variables.