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Program Structures & Algorithms

Fall 2021

Assignment No. 1

- ⊙ **Task (List down the tasks performed in the Assignment)**

  Radom Walk

- ⊙ **Relationship Conclusion:** $d = \sqrt{n}$

- ⊙ **$Evidence to support the conclusion:**

1. **Output (Snapshot of Code output in the terminal)**

```
<terminated> RandomWalk [Java Application] /Library/Java/JavaVirtualMachines/jdk1.8.0_162.jdk/Contents/Home/bin/j
We walked 25 steps in 60 experiments and the mean distance is  4.4156944084039695
We walked 100 steps in 60 experiments and the mean distance is  8.941403827977977
We walked 1600 steps in 60 experiments and the mean distance is  35.72083205934917
We walked 160000 steps in 60 experiments and the mean distance is  384.60981318580787
We walked 250000 steps in 60 experiments and the mean distance is  430.45897689985526
We walked 1000000 steps in 60 experiments and the mean distance is  962.2042879063238
```

2. **Graphical Representation(Observations from experiments should be tabulated and analyzed by plotting graphs(usually in excel) to arrive on the relationship conclusion)**

$$d_1 = \sqrt{(x_1 - 0)^2 + (y_1 - 0)^2 d^2}$$

$$= \frac{1}{p}\left(\sum_{i=1}^{p} (x_{i1} + x_{i2} + x_{i3} + \cdots + x_{in})^2\right.$$

$$\left. +(y_{i1} + y_{i2} + y_{i3} + \cdots + y_{in})^2\right)$$
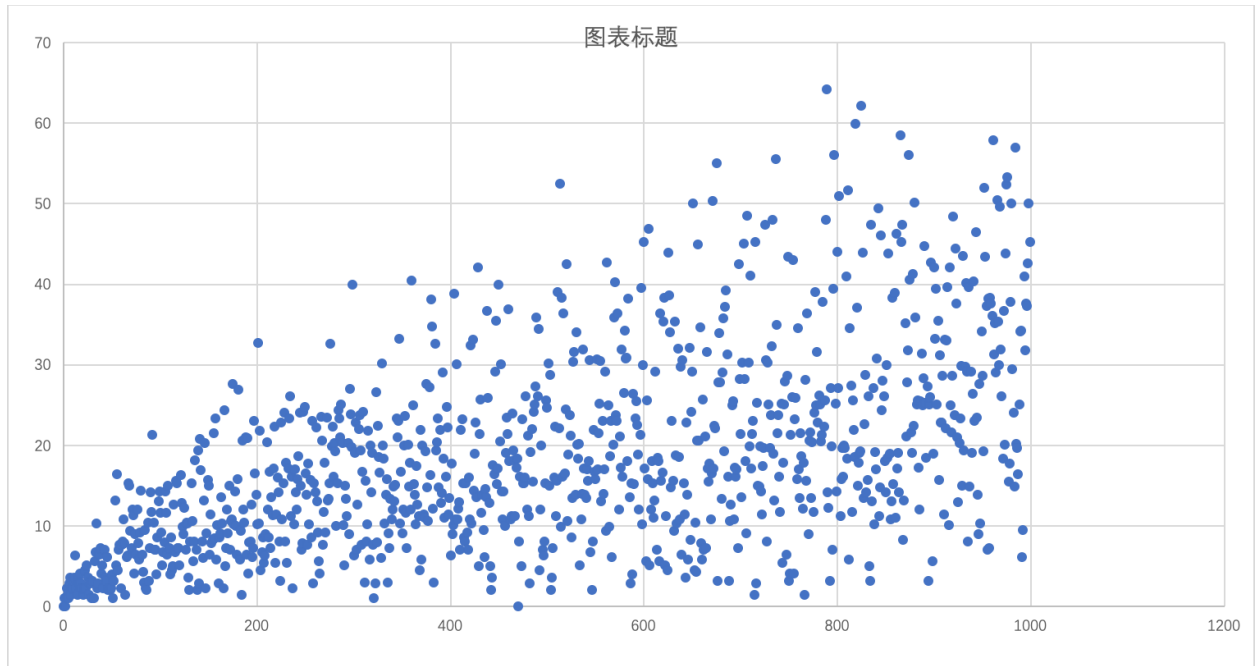
$$d1 = \frac{1}{p}\sum_{i=1}^{p} (x_{i1}^2 + x_{i1}x_{i2} + x_{i1}x_{i3} + \cdots + x_{i2}^2 + x_{i1}x_{i2}$$

$$+ \cdots x_{in}^2 + y_{i1}^2 + y_{i1}y_{i2} + y_{i1}y_{i3} + \cdots + y_{i2}^2$$
$$+ y_{i1}y_{i2} + \cdots y_{in}^2)$$

$$d^2 = \frac{1}{p}\sum_{i=1}^{p} (x_{i1}^2 + x_{i1}x_{i2} + x_{i1}x_{i3} + \cdots + x_{i2}^2 + x_{i1}x_{i2}$$

$$+ \cdots x_{in}^2 + y_{i1}^2 + y_{i1}y_{i2} + y_{i1}y_{i3} + \cdots + y_{i2}^2$$
$$+ y_{i1}y_{i2} + \cdots y_{in}^2)$$

$$d^2 = \frac{1}{p}\sum_{i=1}^{p} (x_{i1}^2 + y_{i1}^2 + x_{i2}^2 + y_{i2}^2 + \cdots x_{in}^2 + y_{in}^2)$$

$$d^2 = \frac{1}{p}\sum_{i=1}^{p} (n)$$

$$d^2 = n$$

$$d = \sqrt{n}$$

图表标题

Unit tests result:(Snapshot of successful unit test run)