Program Structures and Algorithms
Spring 2024

NAME: PRANAV ARUN KAPSE
NUID: 002871241
GITHUB LINK: https://github.com/kapsep/INFO6205_PSA

TASK: Assignment 1 (Random Walk)

1. **Conclusion regarding d and m's relationship:**

   In the random walk experiment, there appears to be an increasing pattern in the relationship between the Euclidean distance (d) and the number of steps (m). In normal circumstances, the drunkard's mean distance traveled tends to increase as the number of steps increases. In other words, the observed trend shows that as the number of steps (m) in the random walk experiment rises, the Euclidean distance from the beginning point (lamp post) increases on average.

   But the random walk's stochastic character includes an element of uncertainty. Every step is selected at random, and as a result, there may be differences between measurements. As a result, for a given step count, certain studies may show distances that are shorter than expected.

   This behavior can be expressed mathematically and is frequently denoted by the formula:
   d = c. $\sqrt{m}$
   where d is nothing but Euclidean distance, n is number of steps and c is a constant that depends on the parameters of the random walk.

2. Evidence for above d and m's relationship:

a. Clustered Column:

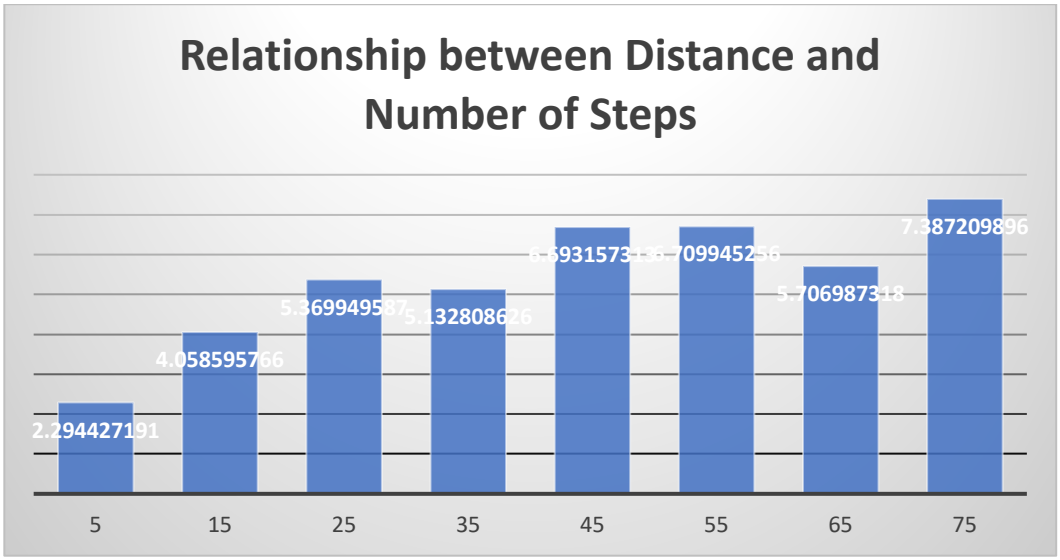

Fig: Clustered Column describes relationship between Distance(d) and no of steps(m).

b. Scatter Diagram:

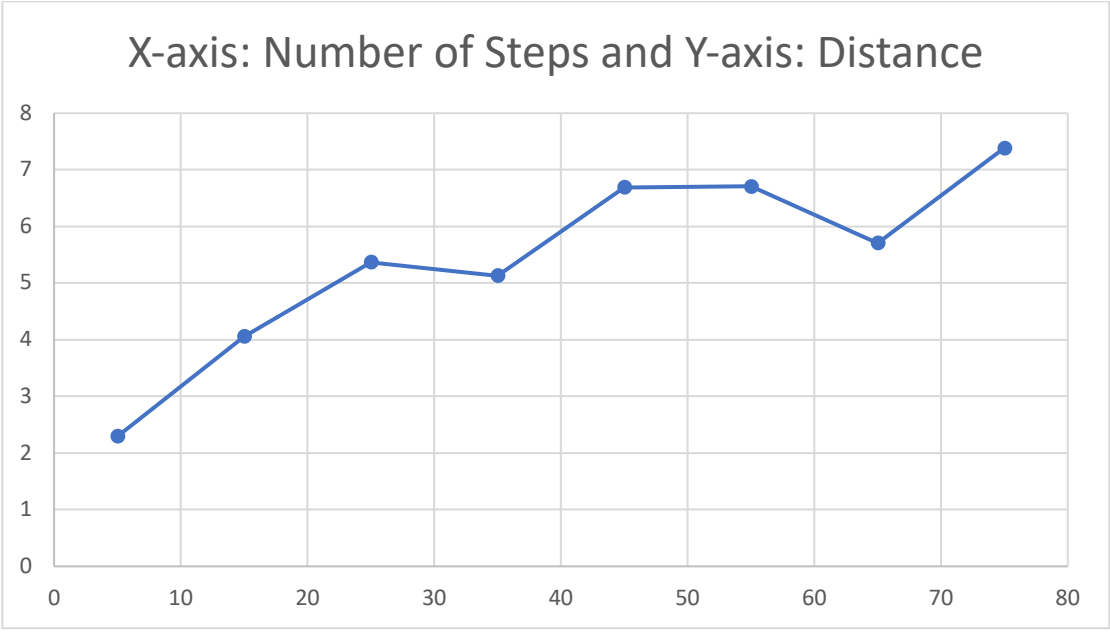

Fig: Scatter diagram describes relationship between Distance(d) and no of steps(m).

c. Output Console

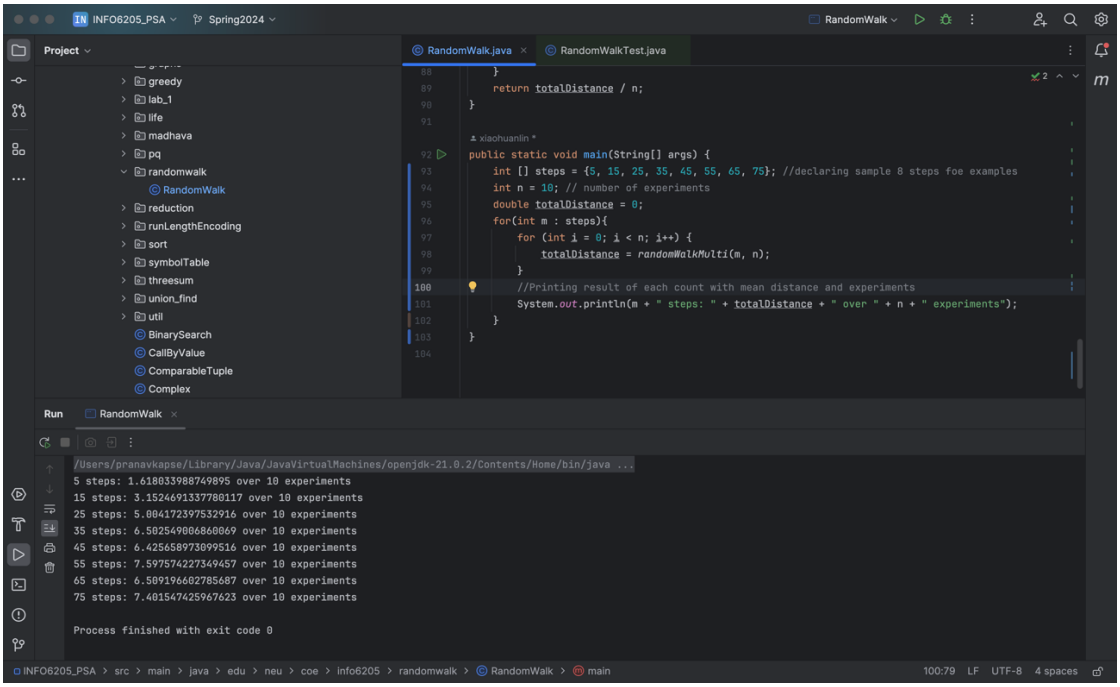

Fig: Output Console for given steps

3. Unit tests passing

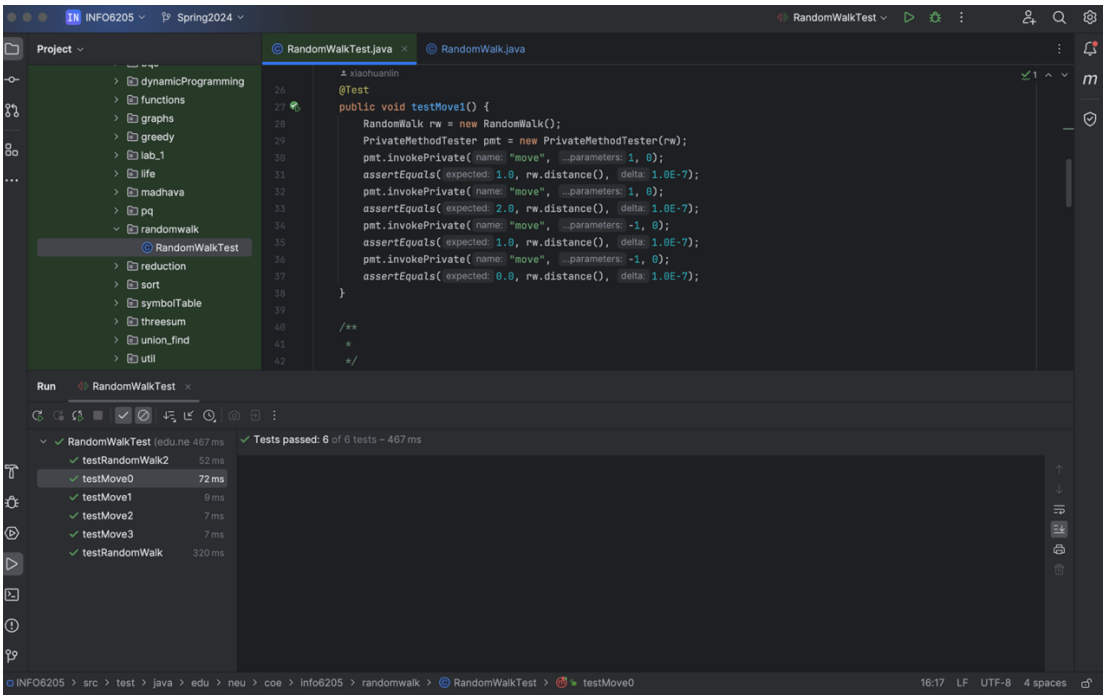

Fig: All Unit tests passing result (IntelliJ)