Program Structures and Algorithms

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GITHUB LINK:

**Task: Assignment 1 (Random Walk)**

**Relationship Conclusion: the expected distance E(d) is on the order of**

**Evidence to support that conclusion:**

For each step, let:

The movement on the x-axis (with right as the positive direction) X, which can take values −1,0,1, with probabilities P(X = -1) = P(X = 1) = ¼ and P(X = 0) = ½. The movement on the y-axis Y is exactly same as the x-axis movement, which is P(Y = -1) = P(Y = 1) = ¼ and P(Y = 0) = ½.

For X or Y, the expected value E(X)=E(Y)=0 (since the probabilities of moving left or right, and up or down are equal), and the variance Var(X) = Var(Y) = E() –.

**E() =**

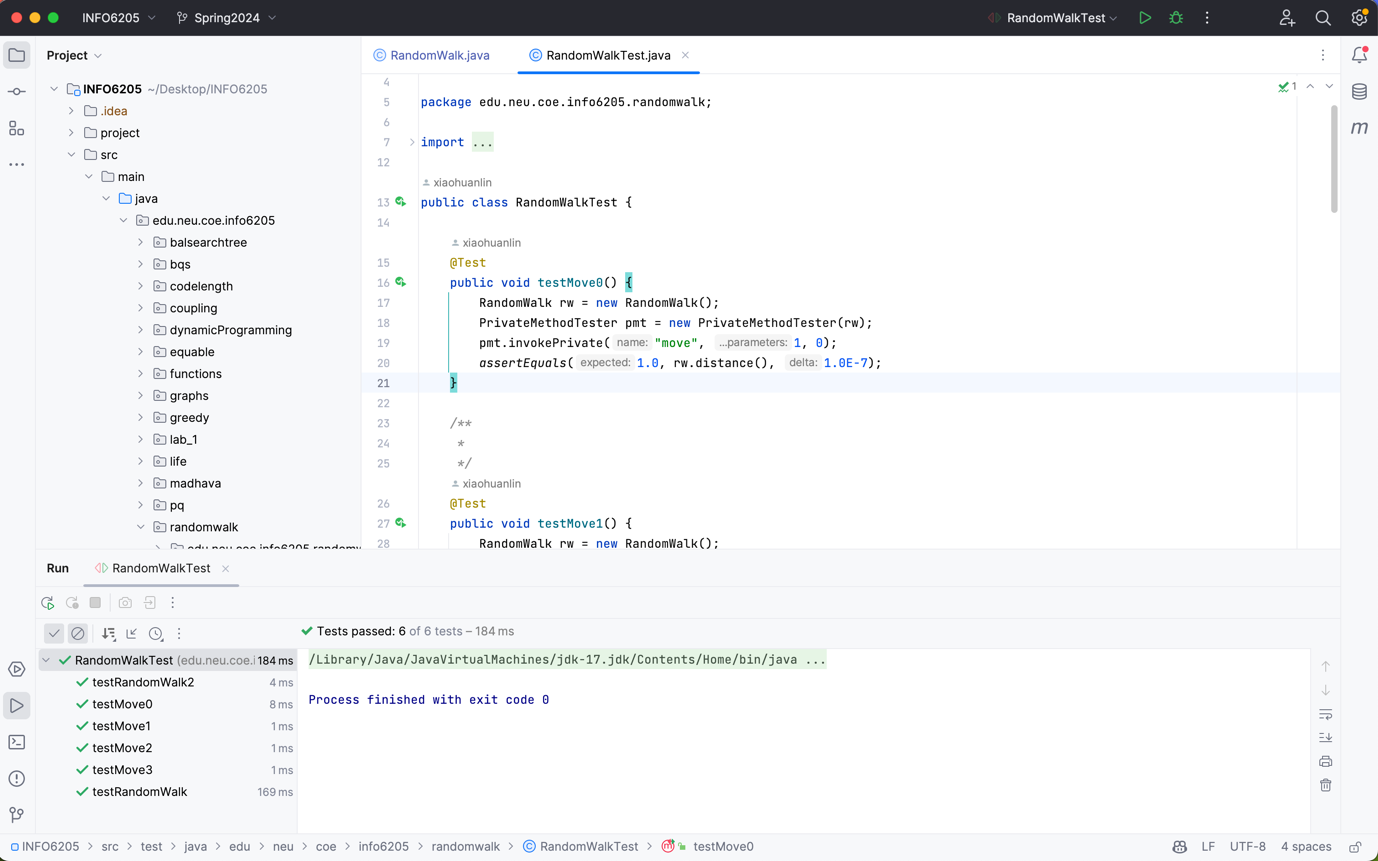
Hence, Var(X) = Var(Y) = ½

After m steps, the variances of andwill be m times the variance of a single step, which is m/2.

Finally, the Euclidean distance from the origin after m steps is the square root of the sum of the squares of and , that is,

From an expectation point of view, E() = E( + E() = Var( + Var( m

**Unit Test Screenshots:**

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