3. Using KNN to manually calculate the distance and predict the result.
   - This is the tranining data and the test data:

Accelerometer Data			Gyroscope Data			Fall (+), Not (-)
x	y	z	x	y	z	+/-
1	2	3	2	1	3	-
2	1	3	3	1	2	-
1	1	2	3	2	2	-
2	2	3	3	2	1	-
6	5	7	5	6	7	+
5	6	6	6	5	7	+
5	6	7	5	7	6	+
7	6	7	6	5	6	+
7	6	5	5	6	7	??

Find the value of K

N = 8

K = $\sqrt{N} = \sqrt{8} \approx 3$

Diagram of the Input Data

Suppose we determine K = 3 (we will use 3 nearest neighbors) as parameter of this algorithm.

- Then we calculate the distance between the query-instance and all the training samples.
  - Because we use only quantitative X_i, we can use Euclidean distance.
- Suppose the query instance have coordinates (X_1^q, X_2^q) and the coordinate of training sample is (X_1^t, X_2^t) then square Euclidean distance is
  - $$d_{tq}^2 = (X_1^t - X_1^q)^2 + (X_2^t - X_2^q)^2 + (X_3^t - X_3^q)^2$$

Find the K-nearest neighbors

	A	B	C	D	E	F	G	H	I
1	Accelerometer Data			Gyroscope Data			Fall(+),Not(-)	Distance Accelerometer= (TargetX1-DataX1)^2 +(TargetX2-DataX2)^2+(TargetX3-DataX3)^2	Distance Accelerometer= (TargetX1-DataX1)^2 +(TargetX2-DataX2)^2+(TargetX3-DataX3)^2
2	x	y	z	x	y	z	+/-		
3	1	2	3	2	1	3	-	56	50
4	2	1	3	3	1	2	-	54	54
5	1	1	2	3	2	2	-	70	45
6	2	2	3	3	2	1	-	45	56
7	6	5	7	5	6	7	+	6	0
8	5	6	6	6	5	7	+	5	2
9	5	6	7	5	7	6	+	8	2
10	7	6	7	6	5	6	+	4	3
11	7	6	5	5	6	7	+		
12									