Exercise 6

(a)

First normalize the attributes to [0, 1]

1. By observing, the 3 nearest neighbors closest to Day1 are: Day2 with distance 2/21 with wind 'Strong'; Day8 with distance 1/21 with wind 'Weak'; Day14 with distance 23/21 with wind 'Strong'; Hence we label Wind of Day1 'Strong'.

1. By observing, the 3 nearest neighbors closest to Day5 are: Day10 with distance 0 with Temperature 4/7; Day4 with distance 1 with Temperature 5/7; Day9 with distance 1 with Temperature 10/21; We take the average of these 3 days temperature 37/63.

1. By observing, the 3 nearest neighbors closest to Day7 are: Day12 with distance 13/21 with Humidity 'High'; Day3 with distance 41/21 with Humidity 'High'; Since two of the nearest 3 neighbors with Humidity 'High', we label Humidity of Day7 'High'.

1. By observing, the 3 nearest neighbors closest to Day11 are: Day16 with distance 22/21 with PlayTennis 'Yes'; Day9 with distance 23/21 with PlayTennis 'Yes'; Day15 with distance 8/7 with PlayTennis 'No'; Hence we label PlayTennis of Day11 'Yes'.

1. By observing, the 3 nearest neighbors closest to Day13 are: Day16 with distance 5/21 with Outlook 'Sunny'; Day10 with distance 2/7 with Outlook 'Rain'; Day9 with distance 8/21 with Outlook 'Sunny'; Hence we label PlayTennis of Day11 'Sunny'.

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
Day1	Sunny	6/7	High	Strong	No
Day2	Sunny	20/21	High	Strong	No
Day3	Overcast	1	High	Weak	Yes
Day4	Rain	5/7	High	Weak	Yes
Day5	Rain	37/63	Normal	Weak	Yes
Day6	Rain	4/21	Normal	Strong	No
Day7	Overcast	0	High	Strong	Yes
Day8	Sunny	17/21	High	Weak	No
Day9	Sunny	10/21	Normal	Weak	Yes
Day10	Rain	4/7	Normal	Weak	Yes
Day11	Sunny	4/7	Normal	Strong	Yes
Day12	Overcast	13/21	High	Strong	Yes
Day13	Sunny	6/7	Normal	Weak	Yes
Day14	Rain	16/21	High	Strong	No
Day15	Sunny	5/7	Normal	Weak	No
Day16	Sunny	13/21	Normal	Weak	Yes

(b) the classification labels (PlayTennis) haven't to be included. The attributes Day, Outlook, Temperature, Humidity, Wind are objective attributes, and PlayTennis attribute is not, it's subjective and decided by people.

(c) the nearest neighbor of Day17 is Day1 with distance 1/7. Hence we classify attribute of PlayTennis of Day17 to 'No'.

Day	Outlook	Temperature	Humidity	Wind	PlayTennis
Day17	Sunny	5/7	High	Strong	

(d) when k≥11, the assignment change compared to k=1:

k=2, the 2 nearest neighbors of Day17 is Day1 and Day2, both of them with PlayTennis 'No'. Hence Day17 is classified to 'No';

k=3, the 3 nearest neighbors of Day17 is Day1, Day2 and Day14, all of them with PlayTennis 'No'. Hence Day17 is classified to 'No';

k=4, the 4 nearest neighbors of Day17 is Day1, Day2, Day14 and Day12, 3 of them with PlayTennis 'No', 1 of them with 'Yes'. Hence Day17 is classified to 'No';

k=5, the 5 nearest neighbors of Day17 is Day1, Day2, Day14, Day12 and Day8, 4 of them with PlayTennis 'No', 1 of them with 'Yes'. Hence Day17 is classified to 'No';

k=6, the 6 nearest neighbors of Day17 is Day1, Day2, Day14, Day12, Day8 and Day11, 4 of them with PlayTennis 'No', 2 of them with 'Yes'. Hence Day17 is classified to 'No';

k=7, the 7 nearest neighbors of Day17 is Day1, Day2, Day14, Day12, Day8, Day11 and Day7, 4 of them with PlayTennis 'No', 3 of them with 'Yes'. Hence Day17 is classified to 'No';

k=8, the 8 nearest neighbors of Day17 is Day1, Day2, Day14, Day12, Day8, Day11, Day7 and Day15, 5 of them with PlayTennis 'No', 3 of them with 'Yes'. Hence Day17 is classified to 'No';

k=9, the 9 nearest neighbors of Day17 is Day1, Day2, Day14, Day12, Day8, Day11, Day7, Day15 and Day4, 5 of them with PlayTennis 'No', 4 of them with 'Yes'. Hence Day17 is classified to 'No';

k=10, the 10 nearest neighbors of Day17 is Day1, Day2, Day14, Day12, Day8, Day11, Day7, Day15, Day4 and Day16, 5 of them with PlayTennis 'No', 5 of them with 'Yes'. Hence Day17 is classified to 'Yes\No';

k=11, the 11 nearest neighbors of Day17 is Day1, Day2, Day14, Day12, Day8, Day11, Day7, Day15, Day4, Day16 and Day13, 5 of them with PlayTennis 'No', 6 of them with 'Yes'. Hence Day17 is classified to 'Yes';