Homework 3: Data Preparation

CPE232 Data Models

Project setup

In [3]:
```
# pip install matplotlib
```

In [3]:
```
import matplotlib.pyplot as plt
```

In [4]:
```
import pandas as pd

df = pd.read_csv('bike_sharing_demand.csv')
```

In [5]:
```
df.head()
```

Out[5]:

	season	year	month	hour	holiday	weekday	workingday	weather	temp	feel_te
0	spring	0	1	0	False	6	False	clear	9.84	14.3
1	spring	0	1	1	False	6	False	clear	9.02	13.6
2	spring	0	1	2	False	6	False	clear	9.02	13.6
3	spring	0	1	3	False	6	False	clear	9.84	14.3
4	spring	0	1	4	False	6	False	clear	9.84	14.3

In [6]:
```
url = "https://kmutt.me/"
```

🔎 The Secret URL Challenge!

Welcome, brave explorer! Your mission, should you choose to accept it, is to uncover a hidden phrase scattered across the questions below. Each question holds a vital clue—a word or phrase—that will bring you closer to unlocking the **Secret URL**!

🦹 Once you have gathered all the hidden words, combine them **in order** and attach them to this URL:
🔗 `https://kmutt.me/[your_combined_phrase]`

For example, if you discover the words `['quest', 'begin']`, your final URL will be:
✨ `https://kmutt.me/questbegin` ✨

Are you ready to solve the mystery and reveal the secret link? Let the adventure begin! 🚀🔐

In [7]:
```
df.describe()
```

Out[7]:

	year	month	hour	weekday	temp	feel_temp	humidity	wind
count	200.0	200.0	200.000000	200.000000	200.000000	200.000000	170.000000	200.0
mean	0.0	1.0	11.455000	3.160000	9.389000	11.689600	0.559059	13.7
std	0.0	0.0	6.832377	2.235933	3.713618	4.580663	0.176368	8.6
min	0.0	1.0	0.000000	0.000000	3.280000	3.030000	0.280000	0.0
25%	0.0	1.0	6.000000	1.000000	6.560000	9.090000	0.422500	7.0
50%	0.0	1.0	11.000000	3.000000	8.200000	10.985000	0.510000	12.9
75%	0.0	1.0	17.000000	5.000000	10.660000	13.635000	0.690000	19.2
max	0.0	1.0	23.000000	6.000000	18.860000	22.725000	1.000000	36.9

Clue 1: 📜 A Note from the Keeper of the Winds 🌫️💨

"Traveler, the first clue hides in the mist! To uncover it, follow these steps carefully:" \

1. Find the moment when the wind was strongest during misty weather. \
2. Look at that row and gather the numbers hidden in the hour and count columns. \
3. Add 65 to each number and turn them into letters. but divide count by 3. \
4. Arrange them in the order given by hour and count to reveal the hidden phrase! \

"Solve this mystery, and you will take the first step toward unlocking the secret URL!" 🔐✨

🐵 Monkey Mode Activated! 🍌

1. Ooo ooo! Find rows where weather is 'mist'! 🌫️🐿️ \
2. Pick the row with the BIGGEST windspeed! 💨💨 \
3. Grab hour and count columns and divide count by 3! 🕒🔢 \
4. Add 65 to each number! ➕6️⃣5️⃣ \
5. Turn those numbers into LETTERS! 🔤🐵 \

✨ Ooo OOO! Secret phrase unlocked! 🚀🔑

In [8]:
```
#  Find the moment when the wind was strongest during misty weather.
max_wind_speed_in_misty_weather = df[df["weather"] == "misty"]["windspeed"].max(
target_row = df[(df["weather"] == "misty") & (df["windspeed"] == max_wind_speed_

# get the hour and count of the target row
hour, count = target_row["hour"].values[0] + 65, target_row["count"].values[0]//

# just change the hour and count to the corresponding ascii character
result = str(chr(hour)) + str(chr(count))

# concatenate the result to the url
```

```
url = url + result
print("your current url is: ", url)
```

```
your current url is:  https://kmutt.me/LU
```

🔍 Clue 2: The Hidden Words in the Weather ⛈️

The next piece of the puzzle lies in the unique weathers that were observed! To find the clue:

1. Look at all the different weather conditions recorded in the dataset.
2. Take the last two word of each unique weather type you find.
3. The combination of these words will lead you to the next step in your adventure!
4. ✨ Unravel this mystery, and you'll be one step closer to the secret URL! 🚀🔐

Monkey Mode 🐵🍌

1. Ooo ooo! Find all the different weather types! ⛈️
2. Get the LAST TWO word of each one! 🦁🐿️
3. Combine the words to move closer to the secret! 🔐✨

🍌 Monkey magic will lead you to the next clue! 🐵

In [9]:
```
# get the unique values of the target column
unique_values = df["weather"].unique()
# ['clear', 'misty', 'rain']

# get the last two characters of each unique value
last_two_chars = []
for value in unique_values:
    last_two_chars.append(value[-2:])

# join all the last two characters
result = ''.join(last_two_chars)

# concatenate the result to the url
url = url + result

print("your current url is: ", url)
```

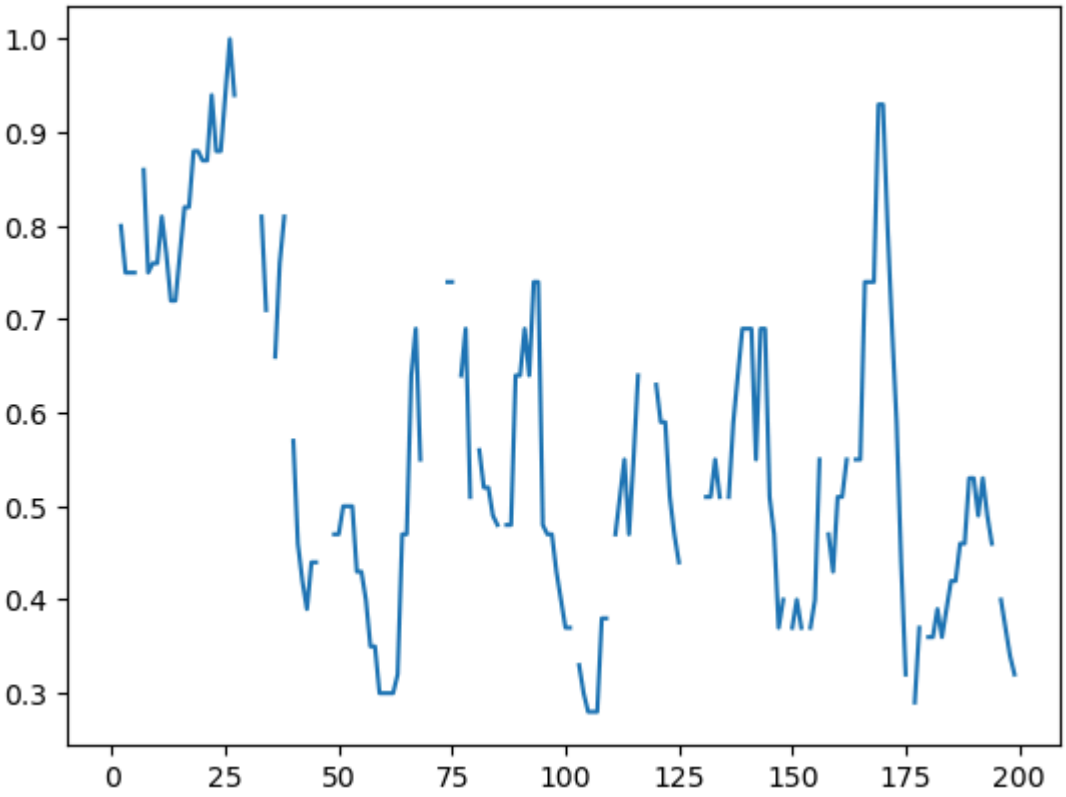
```
your current url is:  https://kmutt.me/LUartyin
```

Clue 3: The missing Humidity 🌡️

Someone tried to hide a secret message in the humidity levels! you need to see this!!

In [10]:
```
df["humidity"].plot()
```

Out[10]:
```
<Axes: >
```



In [11]:
```
df["humidity"]
```

Out[11]:
```
0      0.81
1       NaN
2      0.80
3      0.75
4      0.75
       ...
195     NaN
196    0.40
197    0.37
198    0.34
199    0.32
Name: humidity, Length: 200, dtype: float64
```

In [12]:
```
df["humidity"].mean()
```

Out[12]:
```
0.5590588235294117
```

Missing value in the `humidity` column make their average weird.
Find the missing numbers and combine them to reveal the next part of the secret URL!

Monkey Mode 🐵🍌

1. Ooo ooo! Find the missing numbers in the humidity column! 🌡️🐿️
2. Combine the missing numbers to reveal the next part of the secret URL! 🔐✨

🍌 This is too easy for us. You too you also can do it! 🐿️🐿️🐵

In [13]:
```
# get the number of missing values in humidity column
missing_values = df["humidity"].isnull().sum()

# concatenate the missing values to the url
```

```
url = url + str(missing_values)

print("your current url is: ", url)
```

```
your current url is:  https://kmutt.me/LUartyin30
```

Clue 4: Make the Hum(idity)an back!

Yes! we got a number of missing humidity from the previous clue. Now, we need to make it back to the original data. This is too hard? Don't worry about it you can do it without my help.

In [14]:
```
# do it by yourself
# create function that interpolate the missing values in humidity column

# loop through the humidity column
def interpolate_humidity(df):
    for i in range(len(df["humidity"])):
        if pd.isnull(df["humidity"][i]):
            df["humidity"][i] = (df["humidity"][i-1] + df["humidity"][i+1]) / 2
    return df
```

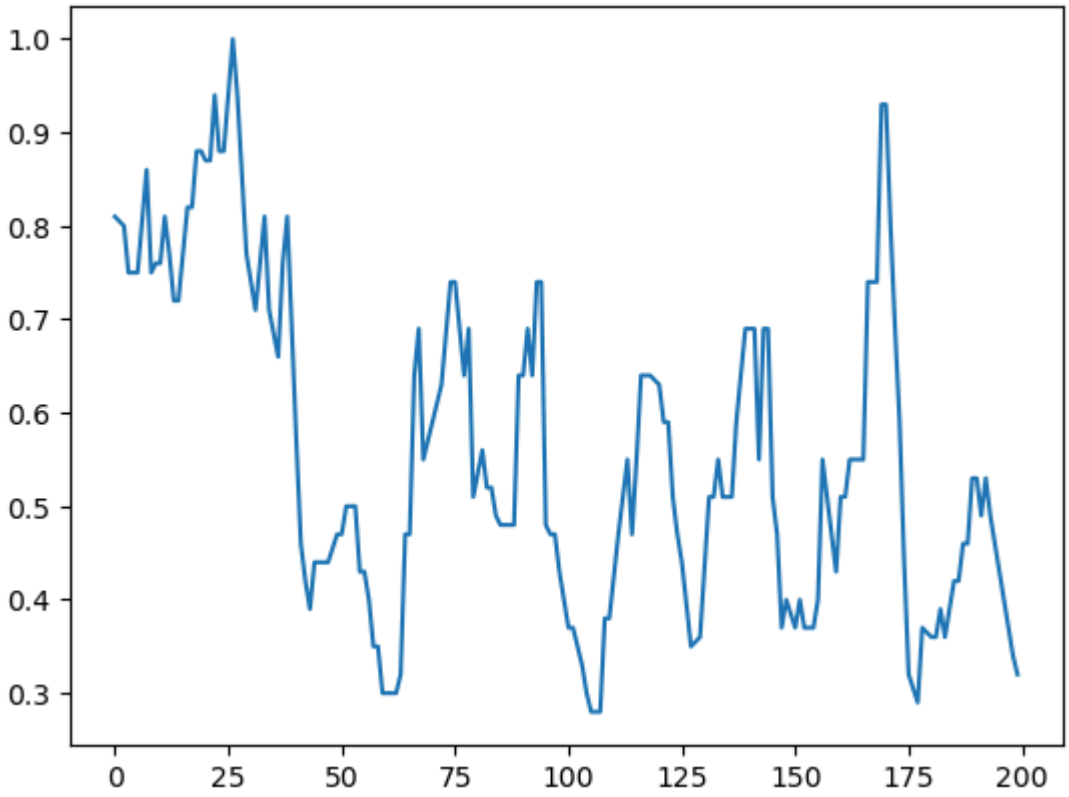
In [34]:
```
df = interpolate_humidity(df)
```

In [16]:
```
df["humidity"].unique()
```

Out[16]:
```
array([0.81 , 0.805, 0.8  , 0.75 , 0.805, 0.86 , 0.76 , 0.77 , 0.72 ,
       0.82 , 0.88 , 0.87 , 0.94 , 1.   , 0.855, 0.74 , 0.71 , 0.685,
       0.66 , 0.69 , 0.57 , 0.46 , 0.42 , 0.39 , 0.44 , 0.455, 0.47 ,
       0.5  , 0.43 , 0.4  , 0.35 , 0.3  , 0.32 , 0.64 , 0.55 , 0.57 ,
       0.59 , 0.61 , 0.63 , 0.51 , 0.535, 0.56 , 0.52 , 0.49 , 0.48 ,
       0.37 , 0.33 , 0.28 , 0.38 , 0.425, 0.635, 0.395, 0.355, 0.36 ,
       0.435, 0.385, 0.93 , 0.305, 0.29 , 0.365, 0.53 , 0.43 , 0.34 ])
```

In [17]:
```
df["humidity"].plot()
```

Out[17]:
```
<Axes: >
```



now, find the average of the humidity column and add it to the missing value. Then, you will find the next part of the secret URL!

In [18]:
```
average_humidity = df["humidity"].mean()

average_humidity
```

Out[18]:
```
0.5575249999999999
```

oh, I forgot to tell you. We only use first 3 decimal places of the average value.

In [19]:
```
# get first 3 decimal of the average humidity
result = str(int(average_humidity*1000))

# concatenate the result to the url
url = url + result

print("your current url is: ", url)
```

```
your current url is:  https://kmutt.me/LUartyin30557
```

Clue 5: The Secret Message from the different weathers 🌩️

We almost there! Find an average of each weather type in the dataset. Then use the ascii number of the sum between `clear` weather and difference of `misty` and `rain` weather to reveal the next part of the secret URL!

Monkey Mode 🐵🍌

1. Find the average of each weather type! 🌩️🐿️

2. Use the ASCII number of the sum between `clear` weather and difference of `misty` and `rain` weather! 🔢 🔠
3. Combine the numbers to reveal the next part of the secret URL! 🔐 ✨

💫 You're almost there! Keep going! 🚀 🐿️ 🐿️

In [20]:
```
# use groupby to get the average count of each weather
average_count = df.groupby("weather")["count"].mean()

# get the average count of clear, misty, and rain weather
clear_avg = average_count["clear"]
misty_avg = average_count["misty"]
rain_avg = average_count["rain"]


# get the groupby_character follow by instructions
groupby_character = int(clear_avg) + int(misty_avg) - int(rain_avg)
groupby_character = chr(groupby_character)

# concatenate the groupby_character to the url
url = url + groupby_character

print("your current url is: ", url)
```

```
your current url is:  https://kmutt.me/LUartyin30557L
```

Clue 6: Fusion! 🌌

You've made it this far! Now, You just need to combine the dataframe and and get the standard deviation of `Number of employees` column. then put it in `decode` tools to reveal the final part of the secret URL!

Monkey Mode 🐵 💫

1. Combine the dataframe and get the standard deviation of `Number of employees` column! 🌌 🐿️
2. Use the standard deviation as a phrase to unlock the final part of the secret URL! 🔐 ✨
3. Put the phrase in the `decode` tools to reveal the final part of the secret URL! 🚀 🔑

💫 Don't be afraid.We will stay with you! 🙈 🙉 🙊 🐵

In [22]:
```
organizations_1 = pd.read_csv('organizations-1.csv')
organizations_2 = pd.read_csv('organizations-2.csv')
organizations_3 = pd.read_csv('organizations-3.csv')
```

In [23]:
```
organizations_1.head()
```

Out[23]:

	Index	Organization Id	Name	Website	Country	Descript
0	1	FAB0d41d5b5d22c	Ferrell LLC	https://price.net/	Papua New Guinea	Horizo empowe knowledgeb
1	2	6A7EdDEA9FaDC52	Mckinney, Riley and Day	http://www.hall-buchanan.info/	Finland	User-cer system-wo lever
2	3	0bFED1ADAE4bcC1	Hester Ltd	http://sullivan-reed.com/	China	Switch scal morator
3	4	2bFC1Be8a4ce42f	Holder-Sellers	https://becker.com/	Turkmenistan	De-enginee syste artif intellige
4	5	9eE8A6a4Eb96C24	Mayer Group	http://www.brewer.com/	Mauritius	Synchron needs-ba challe

In [24]:
```
def decode(value: float):
    value = str(int(value))

    return chr(int(value[:2]) + int(value[2:]))
```

In [25]:
```
# concat them together and get standard deviation of the column "employees"
organizations = pd.concat([organizations_1, organizations_2, organizations_3])
# get the standard deviation of the column "employees"
employees_std = organizations["Number of employees"].std()
# show standard deviation
employees_std
```

Out[25]: 2850.8597994927136

In [26]:
```
url = url + decode(employees_std) # your variable that contains the standard dev
# print(decode(employees_std))
print("your current url is: ", url)
```

```
your current url is:  https://kmutt.me/LUartyin30557LN
```

Final Clue: Pokemon configuration 😺🦹‍♀️

You just need to add a new column call `stat` that will have a condition below:

1. stat calculate from `Attack` + `Defense` + `Speed` + `Sp. Atk` + `Sp. Def` + `HP`
2. If it have type `Normal`, `Grass`, `Fire` or `Water`. Attack will increase by 10%.
3. If it have type `Electric`, `Ice`, `Fighting` or `Poison`. Defense will increase by 10%.

4. If it have type `Ground` , `Flying` , `Psychic` or `Bug` . Speed will increase by 10%.
5. If it have type `Rock` , `Ghost` , `Dragon` or `Dark` . Sp. Atk will increase by 10%.
6. If It have `speed` more than 100. Sp. Def will increase by 50%.
7. If it is a `legendary` pokemon. HP will increase by 100.

Then, group by `Type 1` and find the average of `stat` column. This Clue is **important** you must do it, but I will give you the final part of the secret URL. The final part of the secret URL is `pikachu` .

In [35]:
```
pokemon = pd.read_csv("pokemon.csv")
pokemon.head()
```

Out[35]:

	#	Name	Type 1	Type 2	Total	HP	Attack	Defense	Sp. Atk	Sp. Def	Speed	Gene
0	1	Bulbasaur	Grass	Poison	318	45	49	49	65	65	45	
1	2	Ivysaur	Grass	Poison	405	60	62	63	80	80	60	
2	3	Venusaur	Grass	Poison	525	80	82	83	100	100	80	
3	3	VenusaurMega Venusaur	Grass	Poison	625	80	100	123	122	120	80	
4	4	Charmander	Fire	NaN	309	39	52	43	60	50	65	

In [36]:
```
# complete the Final Clue

def calculate_stat(row):
    stat = row["Attack"] + row["Defense"] + row["Speed"] + row["Sp. Atk"] + row[

    # Define type-based modifications
    attack_boost = ["Normal", "Grass", "Fire", "Water"]
    defense_boost = ["Electric", "Ice", "Fighting", "Poison"]
    speed_boost = ["Ground", "Flying", "Psychic", "Bug"]
    sp_atk_boost = ["Rock", "Ghost", "Dragon", "Dark"]

    # Check both Type 1 and Type 2 for modifications
    if row["Type 1"] in attack_boost or row["Type 2"] in attack_boost:
        row["Attack"] *= 1.1
    if row["Type 1"] in defense_boost or row["Type 2"] in defense_boost:
        row["Defense"] *= 1.1
    if row["Type 1"] in speed_boost or row["Type 2"] in speed_boost:
        row["Speed"] *= 1.1
    if row["Type 1"] in sp_atk_boost or row["Type 2"] in sp_atk_boost:
        row["Sp. Atk"] *= 1.1

    # Speed condition
    if row["Speed"] > 100:
        row["Sp. Def"] *= 1.5

    # Legendary condition
    if row["Legendary"]:
        row["HP"] += 100

    # Recalculate stat after modifications
```

```
    stat = row["Attack"] + row["Defense"] + row["Speed"] + row["Sp. Atk"] + row[

    return stat

# Create the stat column
pokemon["stat"] = pokemon.apply(calculate_stat, axis=1)

# Group by Type 1 and find the average of stat column
stat_avg = pokemon.groupby("Type 1")["stat"].mean()

print(stat_avg)
```

```
Type 1
Bug         394.291304
Dark        473.574194
Dragon      621.740625
Electric    474.172727
Fairy       419.764706
Fighting    429.766667
Fire        485.307692
Flying      580.050000
Ghost       462.118750
Grass       441.222857
Ground      466.575000
Ice         458.350000
Normal      419.938776
Poison      410.417857
Psychic     528.412281
Rock        478.136364
Steel       512.388889
Water       446.978571
Name: stat, dtype: float64
```

In [29]:
```
url = url + "pikachu"

print("your final url is: ", url)
```

```
your final url is:  https://kmutt.me/LUartyin30557LNpikachu
```

Final Mission (Optional)

Access the secret URL and complete your quest! 🚀 🔓

Question: What is the final secret URL?

Ans: https://www.youtube.com/watch?v=dQw4w9WgXcQ

Enjoy the adventure! 🌟

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