[1]:
```
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
import numpy as np
import warnings
warnings.filterwarnings("ignore")

from scipy import stats
```

[2]:
```
df = pd.read_csv("data.xlsx - Sheet1.csv")
df
```

[2]:

	Unnamed: 0	ID	Salary	DOJ	DOL	Designation	JobCity	Gender	DOB
0	train	203097	420000.0	6/1/12 0:00	present	senior quality engineer	Bangalore	f	2/19/90 0:00
1	train	579905	500000.0	9/1/13 0:00	present	assistant manager	Indore	m	10/4/89 0:00
2	train	810601	325000.0	6/1/14 0:00	present	systems engineer	Chennai	f	8/3/92 0:00
3	train	267447	1100000.0	7/1/11 0:00	present	senior software engineer	Gurgaon	m	12/5/89 0:00
4	train	343523	200000.0	3/1/14 0:00	3/1/15 0:00	get	Manesar	m	2/27/91 0:00
…	…	…	…	…	…	…	…	…	…
3993	train	47916	280000.0	10/1/11 0:00	10/1/12 0:00	software engineer	New Delhi	m	4/15/87 0:00
3994	train	752781	100000.0	7/1/13 0:00	7/1/13 0:00	technical writer	Hyderabad	f	8/27/92 0:00
3995	train	355888	320000.0	7/1/13 0:00	present	associate software engineer	Bangalore	m	7/3/91 0:00
3996	train	947111	200000.0	7/1/14 0:00	1/1/15 0:00	software developer	Asifabadbanglore	f	3/20/92 0:00
3997	train	324966	400000.0	2/1/13 0:00	present				

```
3997      senior systems engineer           Chennai      f  2/26/91 0:00

      10percentage  … ComputerScience  MechanicalEngg  ElectricalEngg  \
0            84.30  …               -1              -1              -1
1            85.40  …               -1              -1              -1
2            85.00  …               -1              -1              -1
3            85.60  …               -1              -1              -1
4            78.00  …               -1              -1              -1
…              …  …              …               …               …
3993         52.09  …               -1              -1              -1
3994         90.00  …               -1              -1              -1
3995         81.86  …               -1              -1              -1
3996         78.72  …              438              -1              -1
3997         70.60  …               -1              -1              -1

     TelecomEngg  CivilEngg  conscientiousness agreeableness extraversion  \
0             -1         -1             0.9737        0.8128       0.5269
1             -1         -1            -0.7335        0.3789       1.2396
2             -1         -1             0.2718        1.7109       0.1637
3             -1         -1             0.0464        0.3448      -0.3440
4             -1         -1            -0.8810       -0.2793      -1.0697
…           …          …                 …             …           …
3993          -1         -1            -0.1082        0.3448       0.2366
3994          -1         -1            -0.3027        0.8784       0.9322
3995          -1         -1            -1.5765       -1.5273      -1.5051
3996          -1         -1            -0.1590        0.0459      -0.4511
3997          -1         -1            -1.1128       -0.2793      -0.6343

      nueroticism  openess_to_experience
0         1.35490                -0.4455
1        -0.10760                 0.8637
2        -0.86820                 0.6721
3        -0.40780                -0.9194
4         0.09163                -0.1295
…           …                    …
3993      0.64980                -0.9194
3994      0.77980                -0.0943
3995     -1.31840                -0.7615
3996     -0.36120                -0.0943
3997      1.32553                -0.6035

[3998 rows x 39 columns]
```

[3]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3998 entries, 0 to 3997
```

```
Data columns (total 39 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   Unnamed: 0             3998 non-null   object
 1   ID                     3998 non-null   int64
 2   Salary                 3998 non-null   float64
 3   DOJ                    3998 non-null   object
 4   DOL                    3998 non-null   object
 5   Designation            3998 non-null   object
 6   JobCity                3998 non-null   object
 7   Gender                 3998 non-null   object
 8   DOB                    3998 non-null   object
 9   10percentage           3998 non-null   float64
 10  10board                3998 non-null   object
 11  12graduation           3998 non-null   int64
 12  12percentage           3998 non-null   float64
 13  12board                3998 non-null   object
 14  CollegeID              3998 non-null   int64
 15  CollegeTier            3998 non-null   int64
 16  Degree                 3998 non-null   object
 17  Specialization         3998 non-null   object
 18  collegeGPA             3998 non-null   float64
 19  CollegeCityID          3998 non-null   int64
 20  CollegeCityTier        3998 non-null   int64
 21  CollegeState           3998 non-null   object
 22  GraduationYear         3998 non-null   int64
 23  English                3998 non-null   int64
 24  Logical                3998 non-null   int64
 25  Quant                  3998 non-null   int64
 26  Domain                 3998 non-null   float64
 27  ComputerProgramming    3998 non-null   int64
 28  ElectronicsAndSemicon  3998 non-null   int64
 29  ComputerScience        3998 non-null   int64
 30  MechanicalEngg         3998 non-null   int64
 31  ElectricalEngg         3998 non-null   int64
 32  TelecomEngg            3998 non-null   int64
 33  CivilEngg              3998 non-null   int64
 34  conscientiousness      3998 non-null   float64
 35  agreeableness          3998 non-null   float64
 36  extraversion           3998 non-null   float64
 37  nueroticism            3998 non-null   float64
 38  openess_to_experience  3998 non-null   float64
dtypes: float64(10), int64(17), object(12)
memory usage: 1.2+ MB
```

[4]:
```
df = df.drop('Unnamed: 0', axis=1)
```

[5]:
```
df.columns
```

[5]:
```
Index(['ID', 'Salary', 'DOJ', 'DOL', 'Designation', 'JobCity', 'Gender', 'DOB',
       '10percentage', '10board', '12graduation', '12percentage', '12board',
       'CollegeID', 'CollegeTier', 'Degree', 'Specialization', 'collegeGPA',
       'CollegeCityID', 'CollegeCityTier', 'CollegeState', 'GraduationYear',
       'English', 'Logical', 'Quant', 'Domain', 'ComputerProgramming',
       'ElectronicsAndSemicon', 'ComputerScience', 'MechanicalEngg',
       'ElectricalEngg', 'TelecomEngg', 'CivilEngg', 'conscientiousness',
       'agreeableness', 'extraversion', 'nueroticism',
       'openess_to_experience'],
      dtype='object')
```

[6]:
```
df.columns = df.columns.str.lower()
```

[7]:
```
df.head()
```

[7]:

	id	salary	doj	dol	designation	\
0	203097	420000.0	6/1/12 0:00	present	senior quality engineer	
1	579905	500000.0	9/1/13 0:00	present	assistant manager	
2	810601	325000.0	6/1/14 0:00	present	systems engineer	
3	267447	1100000.0	7/1/11 0:00	present	senior software engineer	
4	343523	200000.0	3/1/14 0:00	3/1/15 0:00	get	

	jobcity	gender	dob	10percentage	\
0	Bangalore	f	2/19/90 0:00	84.3	
1	Indore	m	10/4/89 0:00	85.4	
2	Chennai	f	8/3/92 0:00	85.0	
3	Gurgaon	m	12/5/89 0:00	85.6	
4	Manesar	m	2/27/91 0:00	78.0	

	10board	…	computerscience	mechanicalengg	\
0	board ofsecondary education,ap	…	-1	-1	
1	cbse	…	-1	-1	
2	cbse	…	-1	-1	
3	cbse	…	-1	-1	
4	cbse	…	-1	-1	

	electricalengg	telecomengg	civilengg	conscientiousness	agreeableness	\
0	-1	-1	-1	0.9737	0.8128	
1	-1	-1	-1	-0.7335	0.3789	
2	-1	-1	-1	0.2718	1.7109	
3	-1	-1	-1	0.0464	0.3448	
4	-1	-1	-1	-0.8810	-0.2793	

	extraversion	nueroticism	openess_to_experience
0	0.5269	1.35490	-0.4455

```
1        1.2396     -0.10760                0.8637
2        0.1637     -0.86820                0.6721
3       -0.3440     -0.40780               -0.9194
4       -1.0697      0.09163               -0.1295

[5 rows x 38 columns]
```

[8]:
```
df['doj'] = pd.to_datetime(df['doj'])
```

[9]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 3998 entries, 0 to 3997
Data columns (total 38 columns):
 #   Column                 Non-Null Count  Dtype
---  ------                 --------------  -----
 0   id                     3998 non-null   int64
 1   salary                 3998 non-null   float64
 2   doj                    3998 non-null   datetime64[ns]
 3   dol                    3998 non-null   object
 4   designation            3998 non-null   object
 5   jobcity                3998 non-null   object
 6   gender                 3998 non-null   object
 7   dob                    3998 non-null   object
 8   10percentage           3998 non-null   float64
 9   10board                3998 non-null   object
 10  12graduation           3998 non-null   int64
 11  12percentage           3998 non-null   float64
 12  12board                3998 non-null   object
 13  collegeid              3998 non-null   int64
 14  collegetier            3998 non-null   int64
 15  degree                 3998 non-null   object
 16  specialization         3998 non-null   object
 17  collegegpa             3998 non-null   float64
 18  collegecityid          3998 non-null   int64
 19  collegecitytier        3998 non-null   int64
 20  collegestate           3998 non-null   object
 21  graduationyear         3998 non-null   int64
 22  english                3998 non-null   int64
 23  logical                3998 non-null   int64
 24  quant                  3998 non-null   int64
 25  domain                 3998 non-null   float64
 26  computerprogramming    3998 non-null   int64
 27  electronicsandsemicon  3998 non-null   int64
 28  computerscience        3998 non-null   int64
 29  mechanicalengg         3998 non-null   int64
 30  electricalengg         3998 non-null   int64
```

```
 31  telecomengg            3998 non-null   int64
 32  civilengg              3998 non-null   int64
 33  conscientiousness      3998 non-null   float64
 34  agreeableness          3998 non-null   float64
 35  extraversion           3998 non-null   float64
 36  nueroticism            3998 non-null   float64
 37  openess_to_experience  3998 non-null   float64
dtypes: datetime64[ns](1), float64(10), int64(17), object(10)
memory usage: 1.2+ MB
```

[10]:
```
df.shape
```

[10]:
```
(3998, 38)
```

1 Data Cleaning

[11]:
```
unique_cities = df['jobcity'].unique()
unique_cities
```

[11]:
```
array(['Bangalore', 'Indore', 'Chennai', 'Gurgaon', 'Manesar',
       'Hyderabad', 'Banglore', 'Noida', 'Kolkata', 'Pune', '-1',
       'mohali', 'Jhansi', 'Delhi', 'Hyderabad ', 'Bangalore ', 'noida',
       'delhi', 'Bhubaneswar', 'Navi Mumbai', 'Mumbai', 'New Delhi',
       'Mangalore', 'Rewari', 'Gaziabaad', 'Bhiwadi', 'Mysore', 'Rajkot',
       'Greater Noida', 'Jaipur', 'noida ', 'HYDERABAD', 'mysore',
       'THANE', 'Maharajganj', 'Thiruvananthapuram', 'Punchkula',
       'Bhubaneshwar', 'Pune ', 'coimbatore', 'Dhanbad', 'Lucknow',
       'Trivandrum', 'kolkata', 'mumbai', 'Gandhi Nagar', 'Una',
       'Daman and Diu', 'chennai', 'GURGOAN', 'vsakhapttnam', 'pune',
       'Nagpur', 'Bhagalpur', 'new delhi - jaisalmer', 'Coimbatore',
       'Ahmedabad', 'Kochi/Cochin', 'Bankura', 'Bengaluru', 'Mysore ',
       'Kanpur ', 'jaipur', 'Gurgaon ', 'bangalore', 'CHENNAI',
       'Vijayawada', 'Kochi', 'Beawar', 'Alwar', 'NOIDA', 'Greater noida',
       'Siliguri ', 'raipur', 'gurgaon', 'Bhopal', 'Faridabad', 'Jodhpur',
       'udaipur', 'Muzaffarpur', 'Kolkata`', 'Bulandshahar', 'Haridwar',
       'Raigarh', 'Visakhapatnam', 'Jabalpur', 'hyderabad', 'Unnao',
       'KOLKATA', 'Thane', 'Aurangabad', 'Belgaum', 'gurgoan', 'Dehradun',
       'Rudrapur', 'Jamshedpur', 'vizag', 'Nouda', 'Dharamshala',
       'Banagalore', 'Hissar', 'Ranchi', 'BANGALORE', 'Madurai', 'Gurga',
       'Chandigarh', 'Australia', ' Chennai', 'CHEYYAR', 'Mumbai ',
       'sonepat', 'Ghaziabad', 'Pantnagar', 'Siliguri', 'mumbai ',
       'Jagdalpur', 'Chennai ', 'angul', 'Baroda', ' ariyalur', 'Jowai',
       'Kochi/Cochin, Chennai and Coimbatore', 'bhubaneswar', 'Neemrana',
       'VIZAG', 'Tirupathi', 'Lucknow ', 'Ahmedabad ', 'Bhubneshwar',
       'Noida ', 'pune ', 'Calicut', 'Gandhinagar', 'LUCKNOW', 'Dubai',
       'bengaluru', 'MUMBAI', 'Ahmednagar', 'Nashik', 'New delhi',
```

```
       'Bellary', 'Ludhiana', 'New Delhi ', 'Muzaffarnagar', 'BHOPAL',
       'Gurgoan', 'Gagret', 'Indirapuram, Ghaziabad', 'Gwalior',
       'new delhi', 'TRIVANDRUM', 'Chennai & Mumbai', 'Rajasthan',
       'Sonipat', 'Bareli', 'Kanpur', 'Hospete', 'Miryalaguda', ' mumbai',
       'Dharuhera', 'lucknow', 'meerut', 'dehradun', 'Ganjam', 'Hubli',
       'bangalore ', 'NAVI MUMBAI', 'ncr', 'Agra', 'Trichy',
       'kudankulam ,tarapur', 'Ongole', 'Sambalpur', 'Pondicherry',
       'Bundi', 'SADULPUR,RAJGARH,DISTT-CHURU,RAJASTHAN', 'AM', 'Bikaner',
       'Vadodara', 'BAngalore', 'india', 'Asansol', 'Tirunelvelli',
       'Ernakulam', 'DELHI', 'Bilaspur', 'Chandrapur', 'Nanded',
       'Dharmapuri', 'Vandavasi', 'Rohtak', 'trivandrum', 'Nagpur ',
       'Udaipur', 'Patna', 'banglore', 'indore', 'Salem', 'Nasikcity',
       'Gandhinagar ', 'Technopark, Trivandrum', 'Bharuch', 'Tornagallu',
       'Raipur', 'Kolkata ', 'Jaspur', 'Burdwan', 'Bhubaneswar ',
       'Shimla', 'ahmedabad', 'Gajiabaad', 'Jammu', 'Shahdol',
       'Muvattupuzha', 'Al Jubail,Saudi Arabia', 'Kalmar, Sweden',
       'Secunderabad', 'A-64,sec-64,noida', 'Ratnagiri', 'Jhajjar',
       'Gulbarga', 'hyderabad(bhadurpally)', 'Nalagarh', 'Chandigarh ',
       'Jaipur ', 'Jeddah Saudi Arabia', ' Delhi', 'PATNA', 'SHAHDOL',
       'Chennai, Bangalore', 'Bhopal ', 'Jamnagar', 'PUNE', 'Tirupati',
       'Gonda', 'jamnagar', 'chennai ', 'orissa', 'kharagpur',
       'Trivandrum ', 'Navi Mumbai , Hyderabad', 'Joshimath',
       'chandigarh', 'Bathinda', 'Johannesburg', 'kala amb ', 'Karnal',
       'LONDON', 'Kota', 'Panchkula', 'Baddi HP', 'Nagari',
       'Mettur, Tamil Nadu ', 'Durgapur', 'pondi', 'Surat', 'Kurnool',
       'kolhapur', 'Madurai ', 'GREATER NOIDA', 'Bhilai', ' Pune',
       'hderabad', 'KOTA', 'thane', 'Vizag', 'Bahadurgarh',
       'Rayagada, Odisha', 'kakinada', 'GURGAON', 'Varanasi', 'punr',
       'Nellore', 'patna', 'Meerut', 'hyderabad ', 'Sahibabad', 'Howrah',
       'BHUBANESWAR', 'Trichur', 'Ambala', 'Khopoli', 'keral', 'Roorkee',
       'Greater NOIDA', 'Navi mumbai', 'ghaziabad', 'Allahabad',
       'Delhi/NCR', 'Panchkula ', 'Ranchi ', 'Jalandhar', 'manesar',
       'vapi', 'PILANI', 'muzzafarpur', 'RAS AL KHAIMAH', 'bihar',
       'singaruli', 'KANPUR', 'Banglore ', 'pondy', 'Mohali', 'Phagwara',
       ' Mumbai', ' bangalore', 'GURAGAON', 'Baripada', 'MEERUT',
       'Yamuna Nagar', 'shahibabad', 'sampla', 'Guwahati', 'Rourkela',
       'Banaglore', 'Vellore', 'Dausa', 'latur (Maharashtra )',
       'NEW DELHI', 'kanpur', 'Mainpuri', 'karnal', 'Dammam', 'Haldia',
       'sambalpur', 'RAE BARELI', 'ranchi', 'jAipur', 'BANGLORE',
       'Patiala', 'Gorakhpur', 'new dehli', 'BANGALORE ', 'Ambala City',
       'Karad', 'Rajpura', 'Pilani', 'haryana', 'Asifabadbanglore'],
      dtype=object)
```

[12]:
```
df.jobcity = df.jobcity.str.strip().str.lower()

unique_cities_cleaned = df['jobcity'].unique()
print(unique_cities_cleaned)
```

```
['bangalore' 'indore' 'chennai' 'gurgaon' 'manesar' 'hyderabad' 'banglore'
 'noida' 'kolkata' 'pune' '-1' 'mohali' 'jhansi' 'delhi' 'bhubaneswar'
 'navi mumbai' 'mumbai' 'new delhi' 'mangalore' 'rewari' 'gaziabaad'
 'bhiwadi' 'mysore' 'rajkot' 'greater noida' 'jaipur' 'thane'
 'maharajganj' 'thiruvananthapuram' 'punchkula' 'bhubaneshwar'
 'coimbatore' 'dhanbad' 'lucknow' 'trivandrum' 'gandhi nagar' 'una'
 'daman and diu' 'gurgoan' 'vsakhapttnam' 'nagpur' 'bhagalpur'
 'new delhi - jaisalmer' 'ahmedabad' 'kochi/cochin' 'bankura' 'bengaluru'
 'kanpur' 'vijayawada' 'kochi' 'beawar' 'alwar' 'siliguri' 'raipur'
 'bhopal' 'faridabad' 'jodhpur' 'udaipur' 'muzaffarpur' 'kolkata``'
 'bulandshahar' 'haridwar' 'raigarh' 'visakhapatnam' 'jabalpur' 'unnao'
 'aurangabad' 'belgaum' 'dehradun' 'rudrapur' 'jamshedpur' 'vizag' 'nouda'
 'dharamshala' 'banagalore' 'hissar' 'ranchi' 'madurai' 'gurga'
 'chandigarh' 'australia' 'cheyyar' 'sonepat' 'ghaziabad' 'pantnagar'
 'jagdalpur' 'angul' 'baroda' 'ariyalur' 'jowai'
 'kochi/cochin, chennai and coimbatore' 'neemrana' 'tirupathi'
 'bhubneshwar' 'calicut' 'gandhinagar' 'dubai' 'ahmednagar' 'nashik'
 'bellary' 'ludhiana' 'muzaffarnagar' 'gagret' 'indirapuram, ghaziabad'
 'gwalior' 'chennai & mumbai' 'rajasthan' 'sonipat' 'bareli' 'hospete'
 'miryalaguda' 'dharuhera' 'meerut' 'ganjam' 'hubli' 'ncr' 'agra' 'trichy'
 'kudankulam ,tarapur' 'ongole' 'sambalpur' 'pondicherry' 'bundi'
 'sadulpur,rajgarh,distt-churu,rajasthan' 'am' 'bikaner' 'vadodara'
 'india' 'asansol' 'tirunelvelli' 'ernakulam' 'bilaspur' 'chandrapur'
 'nanded' 'dharmapuri' 'vandavasi' 'rohtak' 'patna' 'salem' 'nasikcity'
 'technopark, trivandrum' 'bharuch' 'tornagallu' 'jaspur' 'burdwan'
 'shimla' 'gajiabaad' 'jammu' 'shahdol' 'muvattupuzha'
 'al jubail,saudi arabia' 'kalmar, sweden' 'secunderabad'
 'a-64,sec-64,noida' 'ratnagiri' 'jhajjar' 'gulbarga'
 'hyderabad(bhadurpally)' 'nalagarh' 'jeddah saudi arabia'
 'chennai, bangalore' 'jamnagar' 'tirupati' 'gonda' 'orissa' 'kharagpur'
 'navi mumbai , hyderabad' 'joshimath' 'bathinda' 'johannesburg'
 'kala amb' 'karnal' 'london' 'kota' 'panchkula' 'baddi hp' 'nagari'
 'mettur, tamil nadu' 'durgapur' 'pondi' 'surat' 'kurnool' 'kolhapur'
 'bhilai' 'hderabad' 'bahadurgarh' 'rayagada, odisha' 'kakinada'
 'varanasi' 'punr' 'nellore' 'sahibabad' 'howrah' 'trichur' 'ambala'
 'khopoli' 'keral' 'roorkee' 'allahabad' 'delhi/ncr' 'jalandhar' 'vapi'
 'pilani' 'muzzafarpur' 'ras al khaimah' 'bihar' 'singaruli' 'pondy'
 'phagwara' 'guragaon' 'baripada' 'yamuna nagar' 'shahibabad' 'sampla'
 'guwahati' 'rourkela' 'banaglore' 'vellore' 'dausa'
 'latur (maharashtra )' 'mainpuri' 'dammam' 'haldia' 'rae bareli'
 'patiala' 'gorakhpur' 'new dehli' 'ambala city' 'karad' 'rajpura'
 'haryana' 'asifabadbanglore']
```

[13]:
```
city_mapping = {
    'bangalore': 'Bangalore',
    'banglore': 'Bangalore',
    'banagalore': 'Bangalore',
```

```
    'bengaluru': 'Bangalore',
    'asifabadbanglore':'Bangalore',
    'indore': 'Indore',
    'chennai': 'Chennai',
    'gurgaon': 'Gurgaon',
    'gurgoan': 'Gurgaon',
    'gurga': 'Gurgaon',
    'manesar': 'Manesar',
    'hyderabad': 'Hyderabad',
    'hderabad': 'Hyderabad',
    'hyderabad(bhadurpally)': 'Hyderabad',
    'noida': 'Noida',
    'nouda': 'Noida',
    'kolkata': 'Kolkata',
    'kolkata`': 'Kolkata',
    'pune': 'Pune',
    '-1': 'Unknown',
    'mohali': 'Mohali',
    'jhansi': 'Jhansi',
    'delhi': 'Delhi',
    'new delhi': 'New Delhi',
    'bhubaneswar': 'Bhubaneswar',
    'bhubaneshwar': 'Bhubaneswar',
    'navi mumbai': 'Navi Mumbai',
    'mumbai': 'Mumbai',
    'mangalore': 'Mangalore',
    'rewari': 'Rewari',
    'gaziabaad': 'Ghaziabad',
    'ghaziabad': 'Ghaziabad',
    'bhiwadi': 'Bhiwadi',
    'mysore': 'Mysore',
    'rajkot': 'Rajkot',
    'greater noida': 'Greater Noida',
    'jaipur': 'Jaipur',
    'thane': 'Thane',
    'maharajganj': 'Maharajganj',
    'thiruvananthapuram': 'Thiruvananthapuram',
    'punchkula': 'Panchkula',
    'coimbatore': 'Coimbatore',
    'dhanbad': 'Dhanbad',
    'lucknow': 'Lucknow',
    'trivandrum': 'Thiruvananthapuram',
    'gandhi nagar': 'Gandhinagar',
    'una': 'Una',
    'daman and diu': 'Daman and Diu',
    'vsakhapttnam': 'Visakhapatnam',
    'nagpur': 'Nagpur',
```

```
    'bhagalpur': 'Bhagalpur',
    'new delhi - jaisalmer': 'New Delhi',
    'ahmedabad': 'Ahmedabad',
    'kochi/cochin': 'Kochi',
    'bankura': 'Bankura',
    'kanpur': 'Kanpur',
    'vijayawada': 'Vijayawada',
    'kochi': 'Kochi',
    'beawar': 'Beawar',
    'alwar': 'Alwar',
    'siliguri': 'Siliguri',
    'raipur': 'Raipur',
    'bhopal': 'Bhopal',
    'faridabad': 'Faridabad',
    'jodhpur': 'Jodhpur',
    'udaipur': 'Udaipur',
    'muzaffarpur': 'Muzaffarpur',
    'bulandshahar': 'Bulandshahar',
    'haridwar': 'Haridwar',
    'raigarh': 'Raigarh',
    'visakhapatnam': 'Visakhapatnam',
    'jabalpur': 'Jabalpur',
    'unnao': 'Unnao',
    'aurangabad': 'Aurangabad',
    'belgaum': 'Belgaum',
    'dehradun': 'Dehradun',
    'rudrapur': 'Rudrapur',
    'jamshedpur': 'Jamshedpur',
    'vizag': 'Visakhapatnam',
    'nouda': 'Noida',
    'dharamshala': 'Dharamshala',
    'hissar': 'Hisar',
    'ranchi': 'Ranchi',
    'madurai': 'Madurai',
    'chandigarh': 'Chandigarh',
    'australia': 'Australia',
    'cheyyar': 'Cheyyar',
    'sonepat': 'Sonepat',
    'pantnagar': 'Pantnagar',
    'jagdalpur': 'Jagdalpur',
    'angul': 'Angul',
    'baroda': 'Vadodara',
    'ariyalur': 'Ariyalur',
    'jowai': 'Jowai',
    'neemrana': 'Neemrana',
    'tirupathi': 'Tirupati',
    'bhubneshwar': 'Bhubaneswar',
```

```
    'calicut': 'Kozhikode',
    'gandhinagar': 'Gandhinagar',
    'dubai': 'Dubai',
    'ahmednagar': 'Ahmednagar',
    'nashik': 'Nashik',
    'bellary': 'Bellary',
    'ludhiana': 'Ludhiana',
    'muzaffarnagar': 'Muzaffarnagar',
    'gagret': 'Gagret',
    'indirapuram, ghaziabad': 'Ghaziabad',
    'gwalior': 'Gwalior',
    'chennai & mumbai': 'Chennai',
    'rajasthan': 'Rajasthan',
    'sonipat': 'Sonipat',
    'bareli': 'Bareli',
    'hospete': 'Hospete',
    'miryalaguda': 'Miryalaguda',
    'dharuhera': 'Dharuhera',
    'meerut': 'Meerut',
    'ganjam': 'Ganjam',
    'hubli': 'Hubli',
    'ncr': 'NCR',
    'agra': 'Agra',
    'trichy': 'Tiruchirappalli',
    'kudankulam ,tarapur': 'Kudankulam',
    'ongole': 'Ongole',
    'sambalpur': 'Sambalpur',
    'pondicherry': 'Puducherry',
    'bundi': 'Bundi',
    'sadulpur,rajgarh,distt-churu,rajasthan': 'Rajasthan',
    'am': 'Am',
    'bikaner': 'Bikaner',
    'vadodara': 'Vadodara',
    'india': 'India',
    'asansol': 'Asansol',
    'tirunelvelli': 'Tirunelveli',
    'ernakulam': 'Ernakulam',
    'bilaspur': 'Bilaspur',
    'chandrapur': 'Chandrapur',
    'nanded': 'Nanded',
    'dharmapuri': 'Dharmapuri',
    'vandavasi': 'Vandavasi',
    'rohtak': 'Rohtak',
    'patna': 'Patna',
    'salem': 'Salem',
    'nasikcity': 'Nashik',
    'technopark, trivandrum': 'Trivandrum',
```

```
    'bharuch': 'Bharuch',
    'tornagallu': 'Tornagallu',
    'jaspur': 'Jaspur',
    'burdwan': 'Burdwan',
    'shimla': 'Shimla',
    'gajiabaad': 'Ghaziabad',
    'jammu': 'Jammu',
    'shahdol': 'Shahdol',
    'muvattupuzha': 'Muvattupuzha',
    'al jubail,saudi arabia': 'Al Jubail',
    'kalmar, sweden': 'Kalmar',
    'secunderabad': 'Secunderabad',
    'a-64,sec-64,noida': 'Noida',
    'ratnagiri': 'Ratnagiri',
    'jhajjar': 'Jhajjar',
    'gulbarga': 'Gulbarga',
    'hyderabad(bhadurpally)': 'Hyderabad',
    'nalagarh': 'Nalagarh',
    'jeddah saudi arabia': 'Jeddah',
    'chennai, bangalore': 'Chennai',
    'jamnagar': 'Jamnagar',
    'tirupati': 'Tirupati',
    'gonda': 'Gonda',
    'orissa': 'Odisha',
    'kharagpur': 'Kharagpur',
    'navi mumbai , hyderabad': 'Navi Mumbai',
    'joshimath': 'Joshimath',
    'bathinda': 'Bathinda',
    'johannesburg': 'Johannesburg',
    'kala amb': 'Kala Amb',
    'karnal': 'Karnal',
    'london': 'London',
    'kota': 'Kota',
    'dehraj': 'Dehradun',
    'melbourne': 'Melbourne',
    'moradabad': 'Moradabad',
    'delhi-gurgaon': 'Delhi',
    'ambala': 'Ambala',
    'faridkot': 'Faridkot',
    'rohtak, haryana': 'Rohtak',
    'khammam': 'Khammam',
    'khurda': 'Khurda',
    'jhalawar': 'Jhalawar',
    'kaithal': 'Kaithal',
    'sonbhadra': 'Sonbhadra',
    'fatehgarh sahib': 'Fatehgarh Sahib',
    'kaithal-haryana': 'Kaithal',
```

```
    'bhilwara': 'Bhilwara',
    'coimbatore, tirupur': 'Coimbatore',
    'sri ganganagar': 'Sri Ganganagar',
    'manipal': 'Manipal',
    'tirupathi': 'Tirupati',
    'kharagpur, west bengal': 'Kharagpur',
    'kolkata': 'Kolkata',
    'trichy-tiruchirappalli': 'Tiruchirappalli',
}
```

[14]:
```
df['jobcity'] = df['jobcity'].replace(city_mapping)
```

[15]:
```
df['jobcity'] = df.jobcity.str.strip().str.lower()
```

[16]:
```
df
```

[16]:

	id	salary	doj	dol	designation	\
0	203097	420000.0	2012-06-01	present	senior quality engineer	
1	579905	500000.0	2013-09-01	present	assistant manager	
2	810601	325000.0	2014-06-01	present	systems engineer	
3	267447	1100000.0	2011-07-01	present	senior software engineer	
4	343523	200000.0	2014-03-01	3/1/15 0:00	get	
…	…	…	…	…	…	
3993	47916	280000.0	2011-10-01	10/1/12 0:00	software engineer	
3994	752781	100000.0	2013-07-01	7/1/13 0:00	technical writer	
3995	355888	320000.0	2013-07-01	present	associate software engineer	
3996	947111	200000.0	2014-07-01	1/1/15 0:00	software developer	
3997	324966	400000.0	2013-02-01	present	senior systems engineer	

	jobcity	gender	dob	10percentage	\
0	bangalore	f	2/19/90 0:00	84.30	
1	indore	m	10/4/89 0:00	85.40	
2	chennai	f	8/3/92 0:00	85.00	
3	gurgaon	m	12/5/89 0:00	85.60	
4	manesar	m	2/27/91 0:00	78.00	
…	…	…	…	…	
3993	new delhi	m	4/15/87 0:00	52.09	
3994	hyderabad	f	8/27/92 0:00	90.00	
3995	bangalore	m	7/3/91 0:00	81.86	
3996	bangalore	f	3/20/92 0:00	78.72	
3997	chennai	f	2/26/91 0:00	70.60	

	10board	…	computerscience	mechanicalengg	\
0	board ofsecondary education,ap	…	-1	-1	
1	cbse	…	-1	-1	
2	cbse	…	-1	-1	
3	cbse	…	-1	-1	

```
4                                cbse  …               -1              -1
…                                …  …                …               …
3993                             cbse  …               -1              -1
3994                     state board  …               -1              -1
3995                      bse,odisha  …               -1              -1
3996                     state board  …              438              -1
3997                             cbse  …               -1              -1

     electricalengg  telecomengg  civilengg conscientiousness agreeableness  \
0                -1           -1         -1            0.9737         0.8128
1                -1           -1         -1           -0.7335         0.3789
2                -1           -1         -1            0.2718         1.7109
3                -1           -1         -1            0.0464         0.3448
4                -1           -1         -1           -0.8810        -0.2793
…               …            …          …                …              …
3993             -1           -1         -1           -0.1082         0.3448
3994             -1           -1         -1           -0.3027         0.8784
3995             -1           -1         -1           -1.5765        -1.5273
3996             -1           -1         -1           -0.1590         0.0459
3997             -1           -1         -1           -1.1128        -0.2793

      extraversion  nueroticism  openess_to_experience
0           0.5269      1.35490                -0.4455
1           1.2396     -0.10760                 0.8637
2           0.1637     -0.86820                 0.6721
3          -0.3440     -0.40780                -0.9194
4          -1.0697      0.09163                -0.1295
…            …          …                     …
3993        0.2366      0.64980                -0.9194
3994        0.9322      0.77980                -0.0943
3995       -1.5051     -1.31840                -0.7615
3996       -0.4511     -0.36120                -0.0943
3997       -0.6343      1.32553                -0.6035

[3998 rows x 38 columns]
```

[17]:
```
# Replace date values with "Left" in dol
df['dol'] = df['dol'].apply(lambda x: "Left" if x != "present" else x)
```

[18]:
```
df.head()
```

[18]:
```
       id     salary        doj      dol                designation    jobcity  \
0  203097   420000.0 2012-06-01  present   senior quality engineer  bangalore
1  579905   500000.0 2013-09-01  present         assistant manager     indore
2  810601   325000.0 2014-06-01  present          systems engineer    chennai
3  267447  1100000.0 2011-07-01  present  senior software engineer    gurgaon
4  343523   200000.0 2014-03-01     Left                       get    manesar
```

```
  gender           dob  10percentage                          10board  …  \
0      f  2/19/90 0:00          84.3  board ofsecondary education,ap  …
1      m  10/4/89 0:00          85.4                            cbse  …
2      f   8/3/92 0:00          85.0                            cbse  …
3      m  12/5/89 0:00          85.6                            cbse  …
4      m  2/27/91 0:00          78.0                            cbse  …

   computerscience  mechanicalengg electricalengg  telecomengg  civilengg  \
0               -1              -1             -1           -1         -1
1               -1              -1             -1           -1         -1
2               -1              -1             -1           -1         -1
3               -1              -1             -1           -1         -1
4               -1              -1             -1           -1         -1

  conscientiousness agreeableness  extraversion  nueroticism  \
0            0.9737        0.8128        0.5269      1.35490
1           -0.7335        0.3789        1.2396     -0.10760
2            0.2718        1.7109        0.1637     -0.86820
3            0.0464        0.3448       -0.3440     -0.40780
4           -0.8810       -0.2793       -1.0697      0.09163

   openess_to_experience
0                -0.4455
1                 0.8637
2                 0.6721
3                -0.9194
4                -0.1295

[5 rows x 38 columns]
```

[19]:
```
df['dol'].value_counts()
```

[19]:
```
dol
Left       2123
present    1875
Name: count, dtype: int64
```

[20]:
```
df.salary.mean().round(2)
```

[20]:
```
307699.85
```

[21]:
```
df.salary.max()
```

[21]:
```
4000000.0
```

[22]:
```
df.salary.min()
```

[22]:
```
35000.0
```

[23]:
```
df.gender.value_counts()
```

[23]:
```
gender
m    3041
f     957
Name: count, dtype: int64
```

[24]:
```
df.computerscience = df.computerscience.replace(-1,0)
df.mechanicalengg = df.mechanicalengg.replace(-1,0)
df.electricalengg = df.electricalengg.replace(-1,0)
df.telecomengg = df.telecomengg.replace(-1,0)
df.civilengg = df.civilengg.replace(-1,0)
```

[25]:
```
df.head()
```

[25]:

	id	salary	doj	dol	designation	jobcity	\
0	203097	420000.0	2012-06-01	present	senior quality engineer	bangalore	
1	579905	500000.0	2013-09-01	present	assistant manager	indore	
2	810601	325000.0	2014-06-01	present	systems engineer	chennai	
3	267447	1100000.0	2011-07-01	present	senior software engineer	gurgaon	
4	343523	200000.0	2014-03-01	Left	get	manesar	

	gender	dob	10percentage	10board	…	\
0	f	2/19/90 0:00	84.3	board ofsecondary education,ap	…	
1	m	10/4/89 0:00	85.4	cbse	…	
2	f	8/3/92 0:00	85.0	cbse	…	
3	m	12/5/89 0:00	85.6	cbse	…	
4	m	2/27/91 0:00	78.0	cbse	…	

	computerscience	mechanicalengg	electricalengg	telecomengg	civilengg	\
0	0	0	0	0	0	
1	0	0	0	0	0	
2	0	0	0	0	0	
3	0	0	0	0	0	
4	0	0	0	0	0	

	conscientiousness	agreeableness	extraversion	nueroticism	\
0	0.9737	0.8128	0.5269	1.35490	
1	-0.7335	0.3789	1.2396	-0.10760	
2	0.2718	1.7109	0.1637	-0.86820	
3	0.0464	0.3448	-0.3440	-0.40780	
4	-0.8810	-0.2793	-1.0697	0.09163	

	openess_to_experience
0	-0.4455

```
1                 0.8637
2                 0.6721
3                -0.9194
4                -0.1295

[5 rows x 38 columns]
```

[26]:
```
df['salary'].describe()
```

[26]:
```
count    3.998000e+03
mean     3.076998e+05
std      2.127375e+05
min      3.500000e+04
25%      1.800000e+05
50%      3.000000e+05
75%      3.700000e+05
max      4.000000e+06
Name: salary, dtype: float64
```

[27]:
```
pd.options.display.float_format = '{:,.0f}'.format

# Display the describe() output for the 'salary' column
df.describe().transpose()
```

[27]:

	count	mean	\
id	3,998	663,795	
salary	3,998	307,700	
doj	3998	2013-07-02 11:04:10.325162496	
10percentage	3,998	78	
12graduation	3,998	2,008	
12percentage	3,998	74	
collegeid	3,998	5,157	
collegetier	3,998	2	
collegegpa	3,998	71	
collegecityid	3,998	5,157	
collegecitytier	3,998	0	
graduationyear	3,998	2,012	
english	3,998	502	
logical	3,998	502	
quant	3,998	513	
domain	3,998	1	
computerprogramming	3,998	353	
electronicsandsemicon	3,998	95	
computerscience	3,998	92	
mechanicalengg	3,998	24	
electricalengg	3,998	17	
telecomengg	3,998	33	

civilengg	3,998	4
conscientiousness	3,998	-0
agreeableness	3,998	0
extraversion	3,998	0
nueroticism	3,998	-0
openess_to_experience	3,998	-0

	min	25%	\
id	11,244	334,284	
salary	35,000	180,000	
doj	1991-06-01 00:00:00	2012-10-01 00:00:00	
10percentage	43	72	
12graduation	1,995	2,007	
12percentage	40	66	
collegeid	2	494	
collegetier	1	2	
collegegpa	6	66	
collegecityid	2	494	
collegecitytier	0	0	
graduationyear	0	2,012	
english	180	425	
logical	195	445	
quant	120	430	
domain	-1	0	
computerprogramming	-1	295	
electronicsandsemicon	-1	-1	
computerscience	0	0	
mechanicalengg	0	0	
electricalengg	0	0	
telecomengg	0	0	
civilengg	0	0	
conscientiousness	-4	-1	
agreeableness	-6	-0	
extraversion	-5	-1	
nueroticism	-3	-1	
openess_to_experience	-7	-1	

	50%	75%	\
id	639,600	990,480	
salary	300,000	370,000	
doj	2013-11-01 00:00:00	2014-07-01 00:00:00	
10percentage	79	86	
12graduation	2,008	2,009	
12percentage	74	83	
collegeid	3,879	8,818	
collegetier	2	2	
collegegpa	72	76	

collegecityid	3,879	8,818
collegecitytier	0	1
graduationyear	2,013	2,014
english	500	570
logical	505	565
quant	515	595
domain	1	1
computerprogramming	415	495
electronicsandsemicon	-1	233
computerscience	0	0
mechanicalengg	0	0
electricalengg	0	0
telecomengg	0	0
civilengg	0	0
conscientiousness	0	1
agreeableness	0	1
extraversion	0	1
nueroticism	-0	1
openess_to_experience	-0	1

	max	std
id	1,298,275	363,218
salary	4,000,000	212,737
doj	2015-12-01 00:00:00	NaN
10percentage	98	10
12graduation	2,013	2
12percentage	99	11
collegeid	18,409	4,802
collegetier	2	0
collegegpa	100	8
collegecityid	18,409	4,802
collegecitytier	1	0
graduationyear	2,017	32
english	875	105
logical	795	87
quant	900	122
domain	1	0
computerprogramming	840	205
electronicsandsemicon	612	158
computerscience	715	175
mechanicalengg	623	98
electricalengg	676	87
telecomengg	548	105
civilengg	516	37
conscientiousness	2	1
agreeableness	2	1
extraversion	3	1

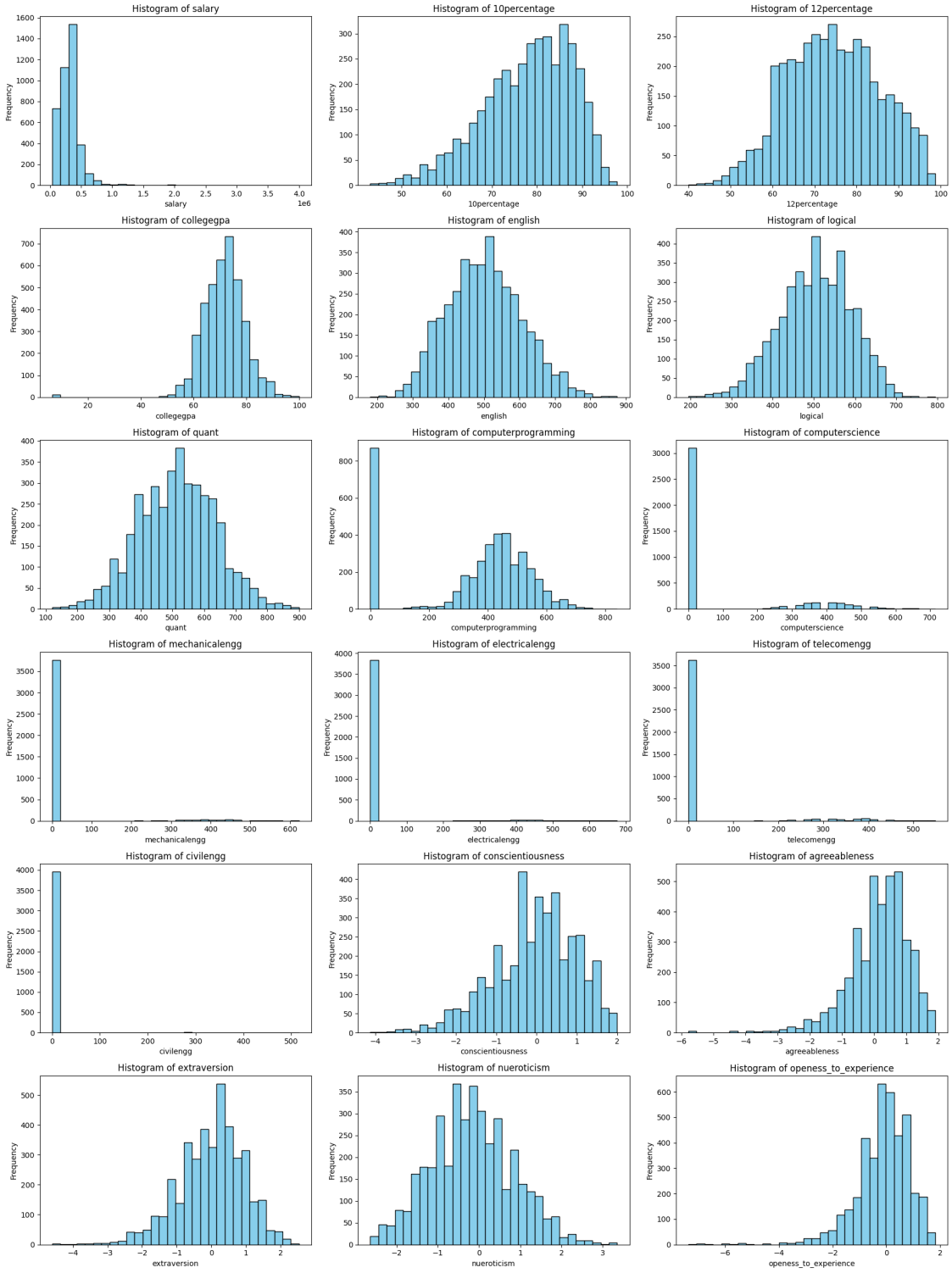
```
nueroticism                          3       1
openess_to_experience                2       1
```

[28]:
```
df.columns
```

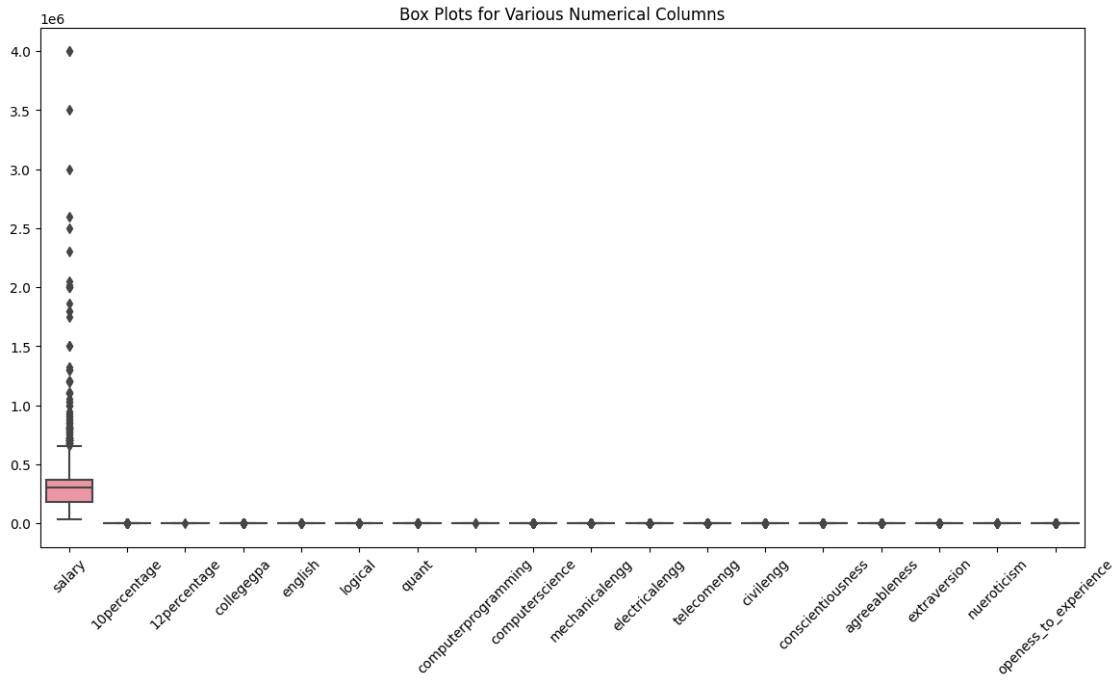
[28]:
```
Index(['id', 'salary', 'doj', 'dol', 'designation', 'jobcity', 'gender', 'dob',
       '10percentage', '10board', '12graduation', '12percentage', '12board',
       'collegeid', 'collegetier', 'degree', 'specialization', 'collegegpa',
       'collegecityid', 'collegecitytier', 'collegestate', 'graduationyear',
       'english', 'logical', 'quant', 'domain', 'computerprogramming',
       'electronicsandsemicon', 'computerscience', 'mechanicalengg',
       'electricalengg', 'telecomengg', 'civilengg', 'conscientiousness',
       'agreeableness', 'extraversion', 'nueroticism',
       'openess_to_experience'],
      dtype='object')
```

[29]:
```
# Select the columns you want to plot
columns_to_plot = ['salary', '10percentage', '12percentage', 'collegegpa',␣
 ↪'english', 'logical',
                   'quant', 'computerprogramming', 'computerscience',␣
 ↪'mechanicalengg',
                   'electricalengg', 'telecomengg', 'civilengg',␣
 ↪'conscientiousness',
                   'agreeableness', 'extraversion', 'nueroticism',␣
 ↪'openess_to_experience']

# Set up the figure and axes for subplots
fig, axes = plt.subplots(nrows=6, ncols=3, figsize=(18, 24))  # 6 rows, 3␣
 ↪columns layout
axes = axes.flatten()  # Flatten the 2D array of axes into 1D for easier␣
 ↪iteration

# Loop through each column and its respective axis
for i, column in enumerate(columns_to_plot):
    axes[i].hist(df[column].dropna(), bins=30, color='skyblue',␣
 ↪edgecolor='black')  # Plot histogram
    axes[i].set_title(f'Histogram of {column}')  # Set title for each subplot
    axes[i].set_xlabel(column)  # X-axis label
    axes[i].set_ylabel('Frequency')  # Y-axis label

# Remove any unused subplots (if there are more axes than columns)
for j in range(i+1, len(axes)):
    fig.delaxes(axes[j])

# Adjust layout to prevent overlapping
plt.tight_layout()
```

```
# Show the plot
plt.show()
```

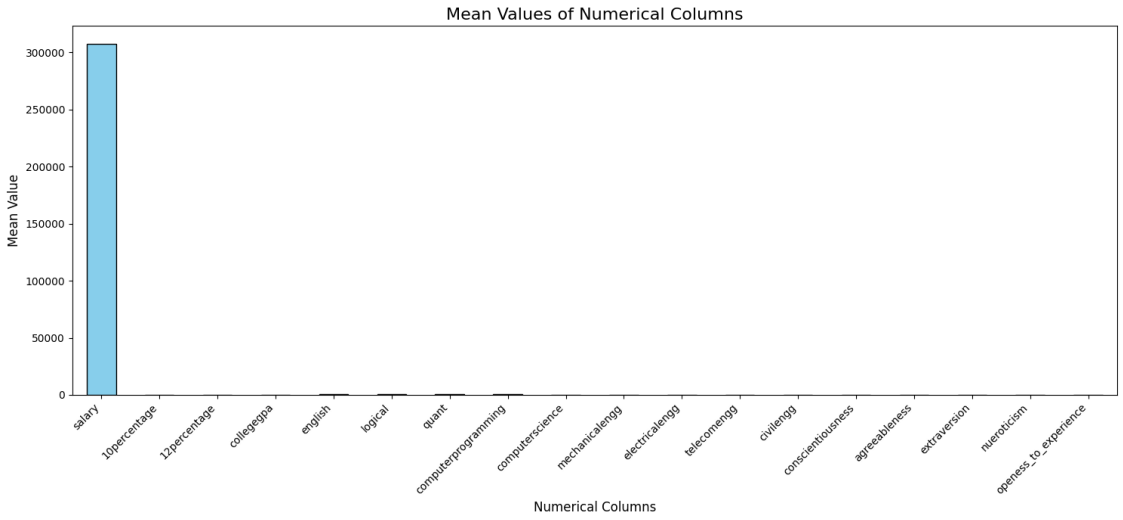


[30]:
```
# Correct list of columns to plot (only numerical columns)
columns_to_plot = ['salary', '10percentage', '12percentage', 'collegegpa',
                   'english', 'logical', 'quant', 'computerprogramming',
                   'computerscience', 'mechanicalengg', 'electricalengg',
                   'telecomengg', 'civilengg', 'conscientiousness',
                   'agreeableness', 'extraversion', 'nueroticism',
                   'openess_to_experience']

# Plot the box plot with valid columns
plt.figure(figsize=(14, 7))
sns.boxplot(data=df[columns_to_plot])
plt.title('Box Plots for Various Numerical Columns')
plt.xticks(rotation=45)
plt.show()
```



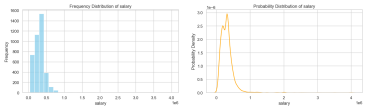
[31]:
```
import matplotlib.pyplot as plt

# Select only numerical columns
columns_to_plot = ['salary', '10percentage', '12percentage', 'collegegpa',␣
 ↪'english', 'logical',
                   'quant', 'computerprogramming', 'computerscience',␣
 ↪'mechanicalengg',
```

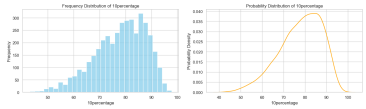
```
                  'electricalengg', 'telecomengg', 'civilengg',␣
 ↪'conscientiousness',
                  'agreeableness', 'extraversion', 'nueroticism',␣
 ↪'openess_to_experience']

# Calculate the mean of each numerical column
mean_values = df[columns_to_plot].mean()

# Create the bar plot
plt.figure(figsize=(15, 7))  # Set the figure size
mean_values.plot(kind='bar', color='skyblue', edgecolor='black')

# Customize the plot
plt.title('Mean Values of Numerical Columns', fontsize=16)
plt.xlabel('Numerical Columns', fontsize=12)
plt.ylabel('Mean Value', fontsize=12)
plt.xticks(rotation=45, ha='right')  # Rotate x labels for better visibility

# Show the plot
plt.tight_layout()
plt.show()
```

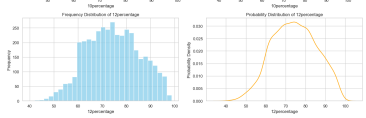


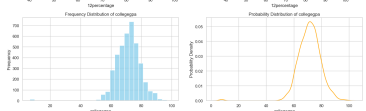
[32]:
```
# Set the style of seaborn
sns.set(style="whitegrid")

# Define the columns for plotting
columns_to_plot = ['salary', '10percentage', '12percentage', 'collegegpa',␣
 ↪'english', 'logical',
```

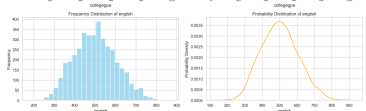
```
                    'quant', 'computerprogramming', 'computerscience',␣
 ↪'mechanicalengg',
                    'electricalengg', 'telecomengg', 'civilengg',␣
 ↪'conscientiousness',
                    'agreeableness', 'extraversion', 'nueroticism',␣
 ↪'openess_to_experience']

# Create a figure with subplots
fig, axes = plt.subplots(nrows=len(columns_to_plot), ncols=2, figsize=(14,␣
 ↪len(columns_to_plot) * 4))

# Loop through each numerical column to plot
for i, column in enumerate(columns_to_plot):
    # Frequency Distribution
    sns.histplot(df[column], ax=axes[i, 0], bins=30, kde=False, color='skyblue')
    axes[i, 0].set_title(f'Frequency Distribution of {column}', fontsize=12)
    axes[i, 0].set_xlabel(column)
    axes[i, 0].set_ylabel('Frequency')

    # Probability Distribution (KDE)
    sns.kdeplot(df[column], ax=axes[i, 1], color='orange')
    axes[i, 1].set_title(f'Probability Distribution of {column}', fontsize=12)
    axes[i, 1].set_xlabel(column)
    axes[i, 1].set_ylabel('Probability Density')

# Adjust layout
plt.tight_layout()
plt.show()
```

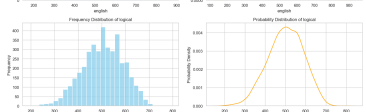

Frequency Distribution of salary
Frequency
salary
1e-6
Probability Distribution of salary
Probability Density
salary

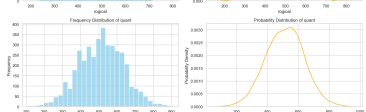

Frequency Distribution of 10percentage
Frequency
10percentage
Probability Distribution of 10percentage
Probability Density
10percentage

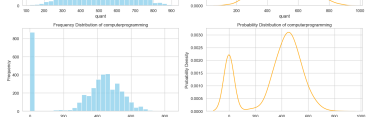

Frequency Distribution of 12percentage
Frequency
12percentage
Probability Distribution of 12percentage
Probability Density
12percentage

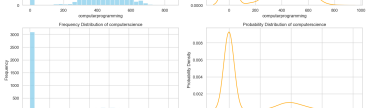

Frequency Distribution of collegegpa
Frequency
collegegpa
Probability Distribution of collegegpa
Probability Density
collegegpa

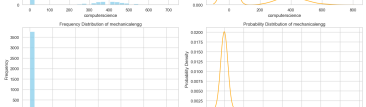

Frequency Distribution of english
Frequency
english
Probability Distribution of english
Probability Density
english

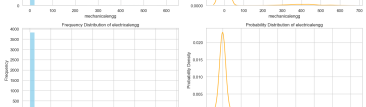

Frequency Distribution of logical
Frequency
logical
Probability Distribution of logical
Probability Density
logical

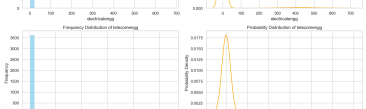

Frequency Distribution of quant
Frequency
quant
Probability Distribution of quant
Probability Density
quant

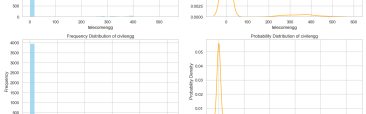

Frequency Distribution of computerprogramming
Frequency
computerprogramming
Probability Distribution of computerprogramming
Probability Density
computerprogramming

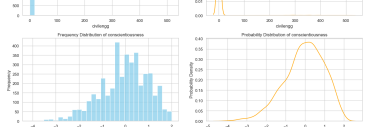

Frequency Distribution of computerscience
Frequency
computerscience
Probability Distribution of computerscience
Probability Density
computerscience

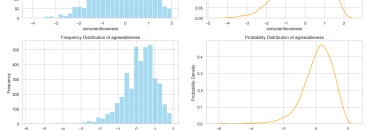

Frequency Distribution of mechanicalengg
Frequency
mechanicalengg
Probability Distribution of mechanicalengg
Probability Density
mechanicalengg

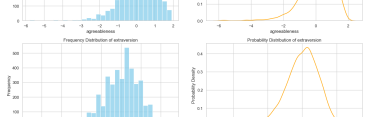

Frequency Distribution of electricalengg
Frequency
electricalengg
Probability Distribution of electricalengg
Probability Density
electricalengg

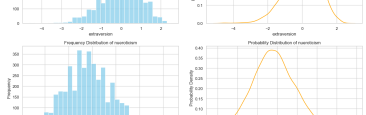

Frequency Distribution of telecomengg
Frequency
telecomengg
Probability Distribution of telecomengg
Probability Density
telecomengg

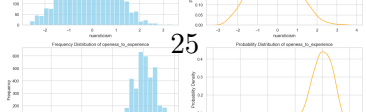

Frequency Distribution of civilengg
Frequency
civilengg
Probability Distribution of civilengg
Probability Density
civilengg


Frequency Distribution of conscientiousness
Frequency
conscientiousness
Probability Distribution of conscientiousness
Probability Density
conscientiousness


Frequency Distribution of agreeableness
Frequency
agreeableness
Probability Distribution of agreeableness
Probability Density
agreeableness

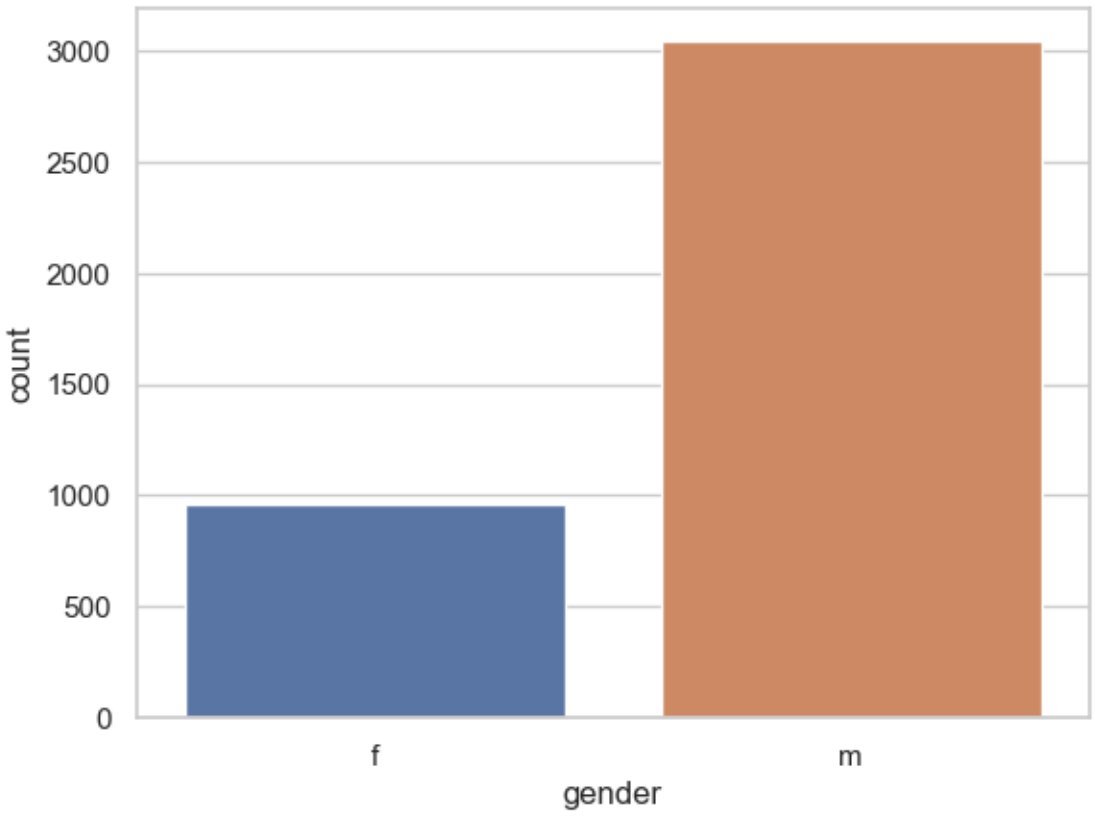

Frequency Distribution of extraversion
Frequency
extraversion
Probability Distribution of extraversion
Probability Density
extraversion


Frequency Distribution of nueroticism
Frequency
nueroticism
Probability Distribution of nueroticism
Probability Density
nueroticism


Frequency Distribution of openess_to_experience
Frequency
openess_to_experience
Probability Distribution of openess_to_experience
Probability Density
openess_to_experience

[33]:
```
sns.countplot(x=df['gender'])
```

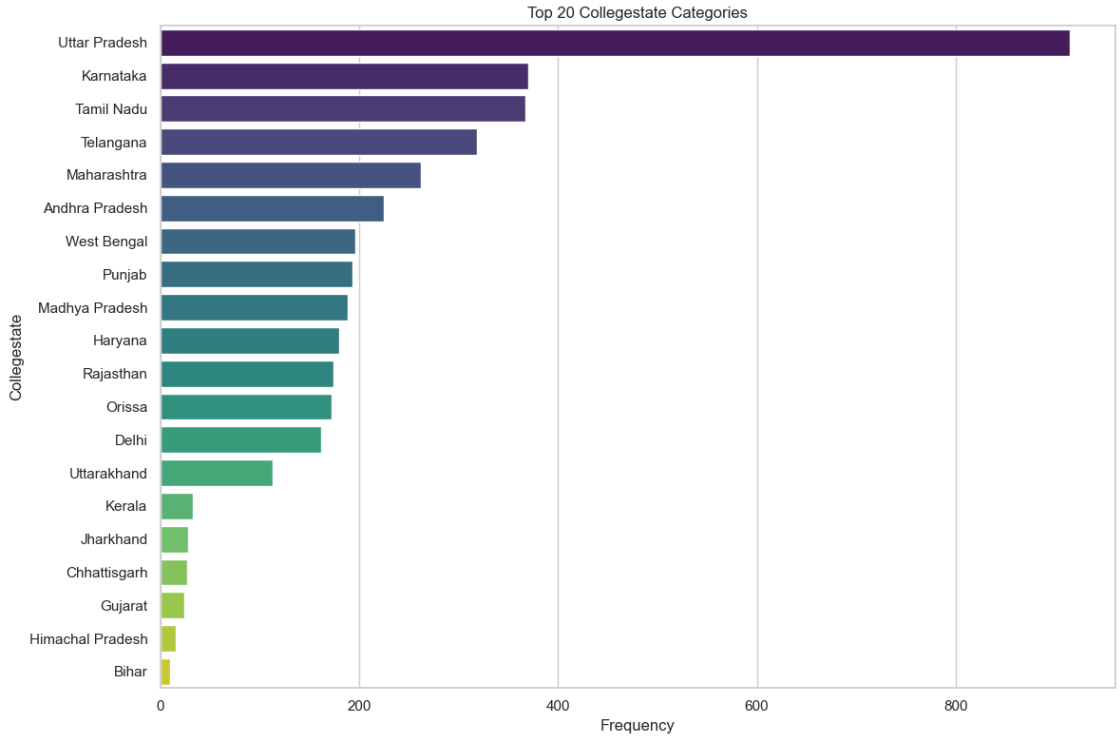
[33]:
```
<Axes: xlabel='gender', ylabel='count'>
```



[34]:
```
df.columns
```

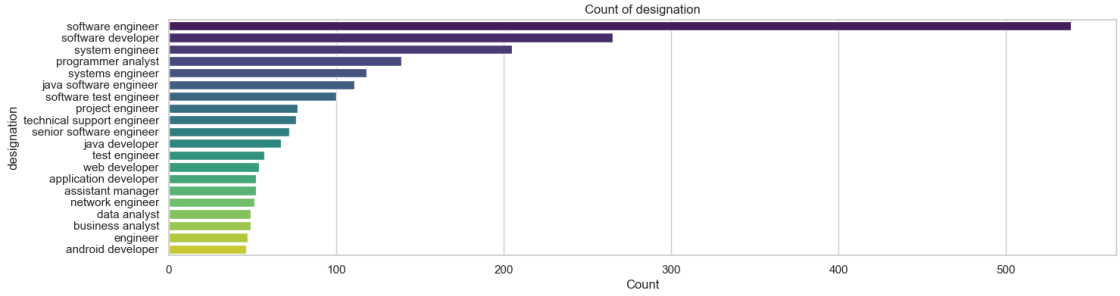
[34]:
```
Index(['id', 'salary', 'doj', 'dol', 'designation', 'jobcity', 'gender', 'dob',
       '10percentage', '10board', '12graduation', '12percentage', '12board',
       'collegeid', 'collegetier', 'degree', 'specialization', 'collegegpa',
       'collegecityid', 'collegecitytier', 'collegestate', 'graduationyear',
       'english', 'logical', 'quant', 'domain', 'computerprogramming',
       'electronicsandsemicon', 'computerscience', 'mechanicalengg',
       'electricalengg', 'telecomengg', 'civilengg', 'conscientiousness',
       'agreeableness', 'extraversion', 'nueroticism',
       'openess_to_experience'],
      dtype='object')
```

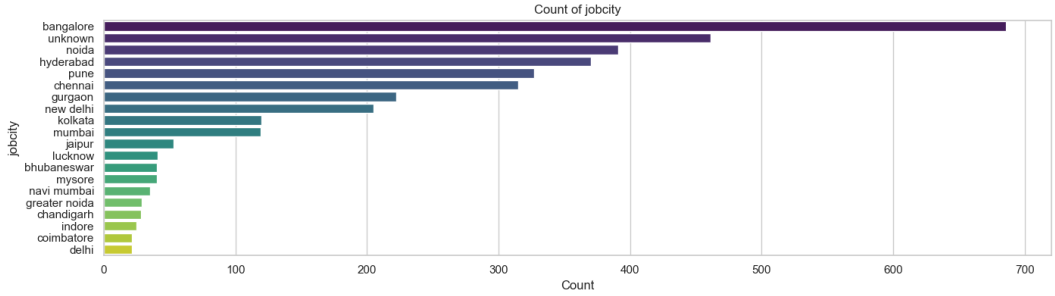
[35]:
```
top_collegestates = df['collegestate'].value_counts().nlargest(20)
plt.figure(figsize=(12, 8))
sns.countplot(y='collegestate', data=df[df['collegestate'].
 ↪isin(top_collegestates.index)],
              palette='viridis', order=top_collegestates.index)
plt.title('Top 20 Collegestate Categories')
plt.xlabel('Frequency')
plt.ylabel('Collegestate')
plt.tight_layout()
plt.show()
```

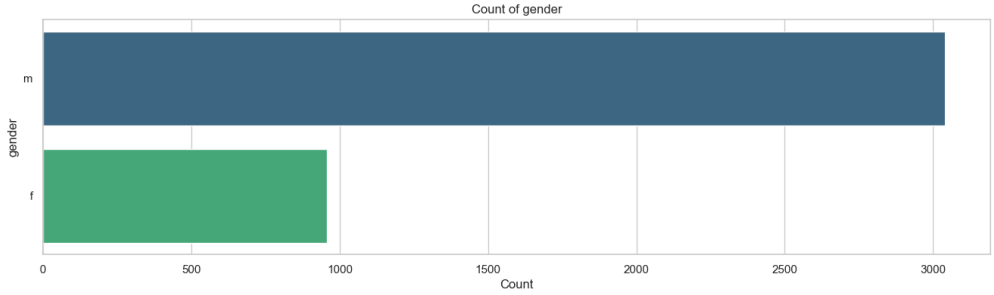


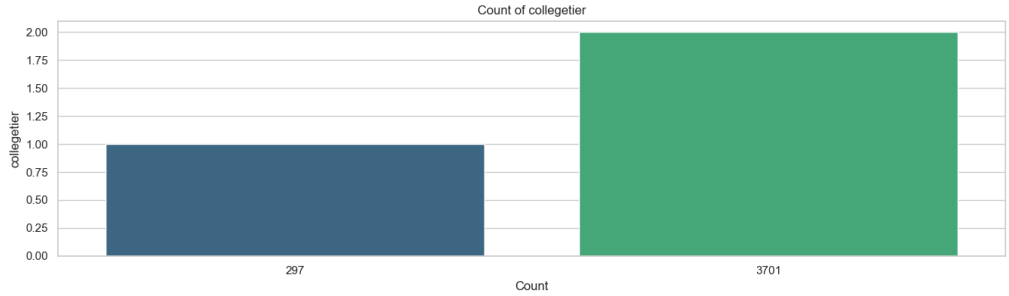
[36]:
```
import matplotlib.pyplot as plt
import seaborn as sns

# Set the aesthetics for the plots
sns.set(style="whitegrid")

# List of important categorical columns
important_categorical_columns = ['designation', 'jobcity', 'gender',␣
 ↪'collegetier', 'degree']

# Create a bar plot for each important categorical column
plt.figure(figsize=(15, 20))  # Adjust the figure size as needed
```

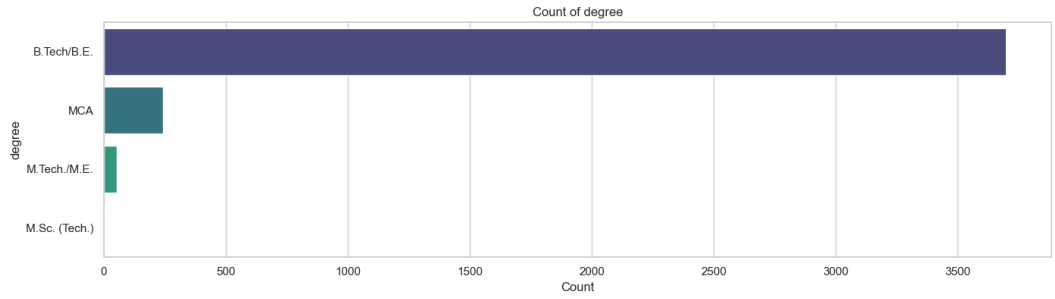
```
for i, column in enumerate(important_categorical_columns):
    plt.subplot(len(important_categorical_columns), 1, i + 1)  # Create a␣
 ↪subplot for each column
    top_values = df[column].value_counts().nlargest(20)  # Get top 20 values
    sns.barplot(x=top_values.values, y=top_values.index, palette='viridis')  #␣
 ↪Horizontal bar plot
    plt.title(f'Count of {column}')  # Set the title
    plt.xlabel('Count')  # Label for x-axis
    plt.ylabel(column)  # Label for y-axis

plt.tight_layout()  # Adjust layout to prevent clipping of tick-labels
plt.show()
```


Count of designation
software engineer
software developer
system engineer
programmer analyst
systems engineer
java software engineer
software test engineer
project engineer
technical support engineer
senior software engineer
java developer
test engineer
web developer
application developer
assistant manager
network engineer
data analyst
business analyst
engineer
android developer
designation
0
100
200
300
400
500
Count


Count of jobcity
bangalore
unknown
noida
hyderabad
pune
chennai
gurgaon
new delhi
kolkata
mumbai
jaipur
lucknow
bhubaneswar
mysore
navi mumbai
greater noida
chandigarh
indore
coimbatore
delhi
jobcity
0
100
200
300
400
500
600
700
Count

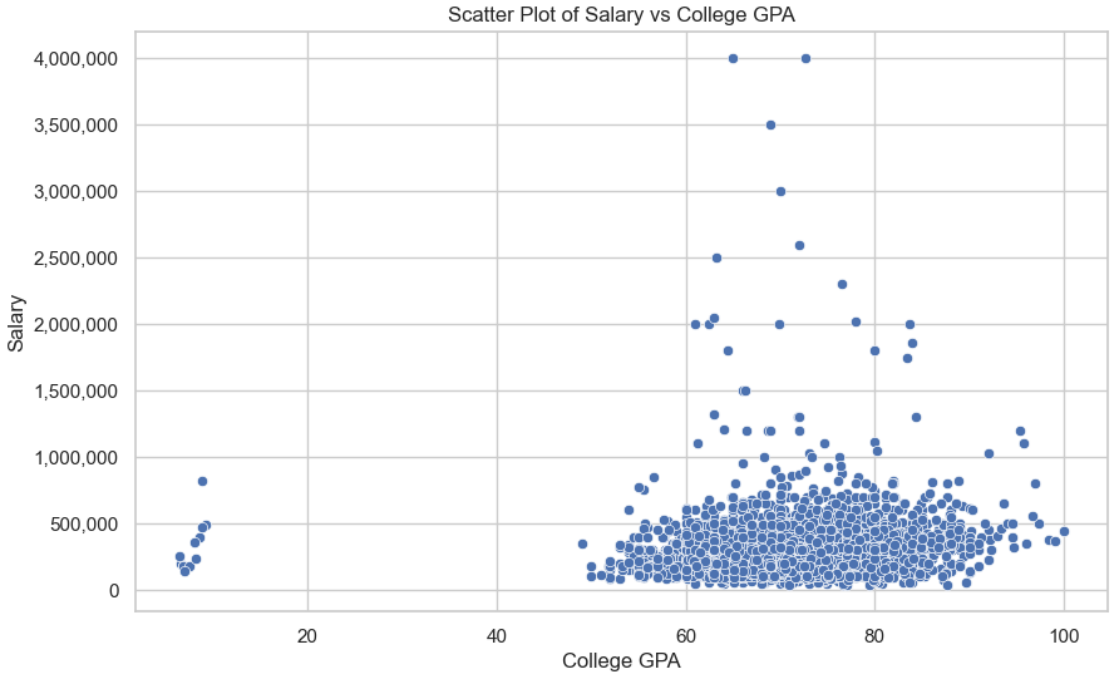

Count of gender
m
f
gender
0
500
1000
1500
2000
2500
3000
Count


Count of collegetier
2.00
1.75
1.50
1.25
1.00
0.75
0.50
0.25
0.00
collegetier
297
3701
Count


Count of degree
B.Tech/B.E.
MCA
M.Tech./M.E.
M.Sc. (Tech.)
degree
0
500
1000
1500
2000
2500
3000
3500
Count

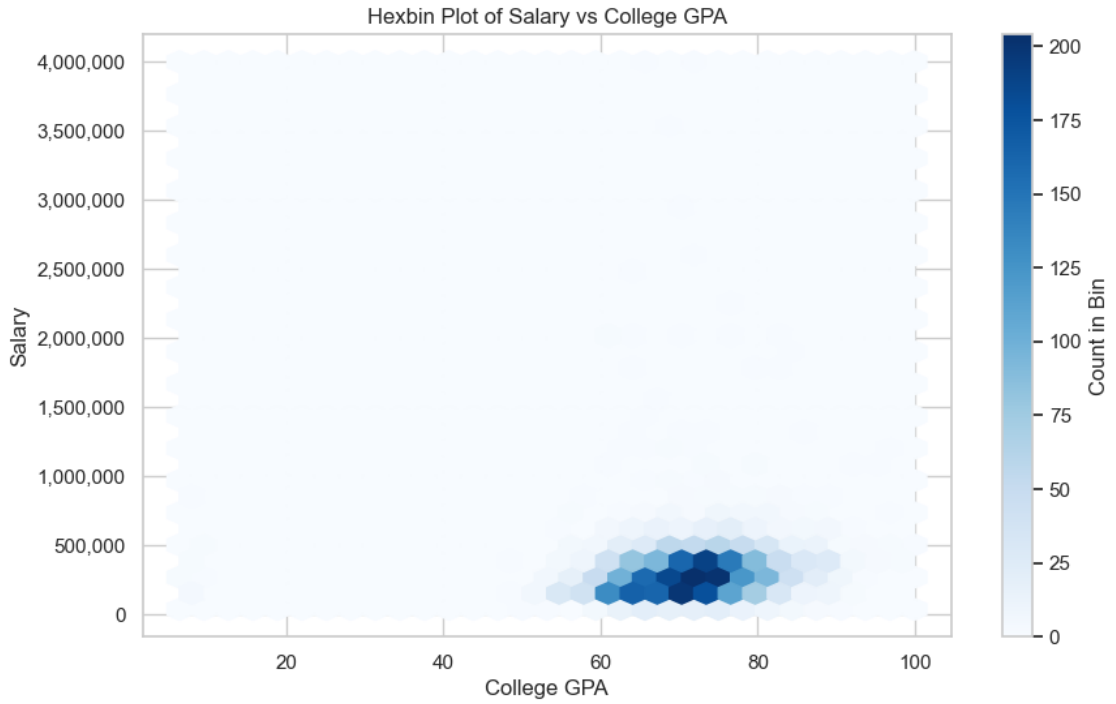
2 Bivariate Analysis

[37]:
```
from matplotlib.ticker import FuncFormatter

# Function to format y-axis labels
def currency(x, _):
    return f'{int(x):,}'  # Format as integer with commas

plt.figure(figsize=(10, 6))
sns.scatterplot(data=df, x='collegegpa', y='salary')
plt.title('Scatter Plot of Salary vs College GPA')
plt.xlabel('College GPA')
plt.ylabel('Salary')
plt.grid(True)

# Apply the formatter to the y-axis
plt.gca().yaxis.set_major_formatter(FuncFormatter(currency))

plt.show()
```

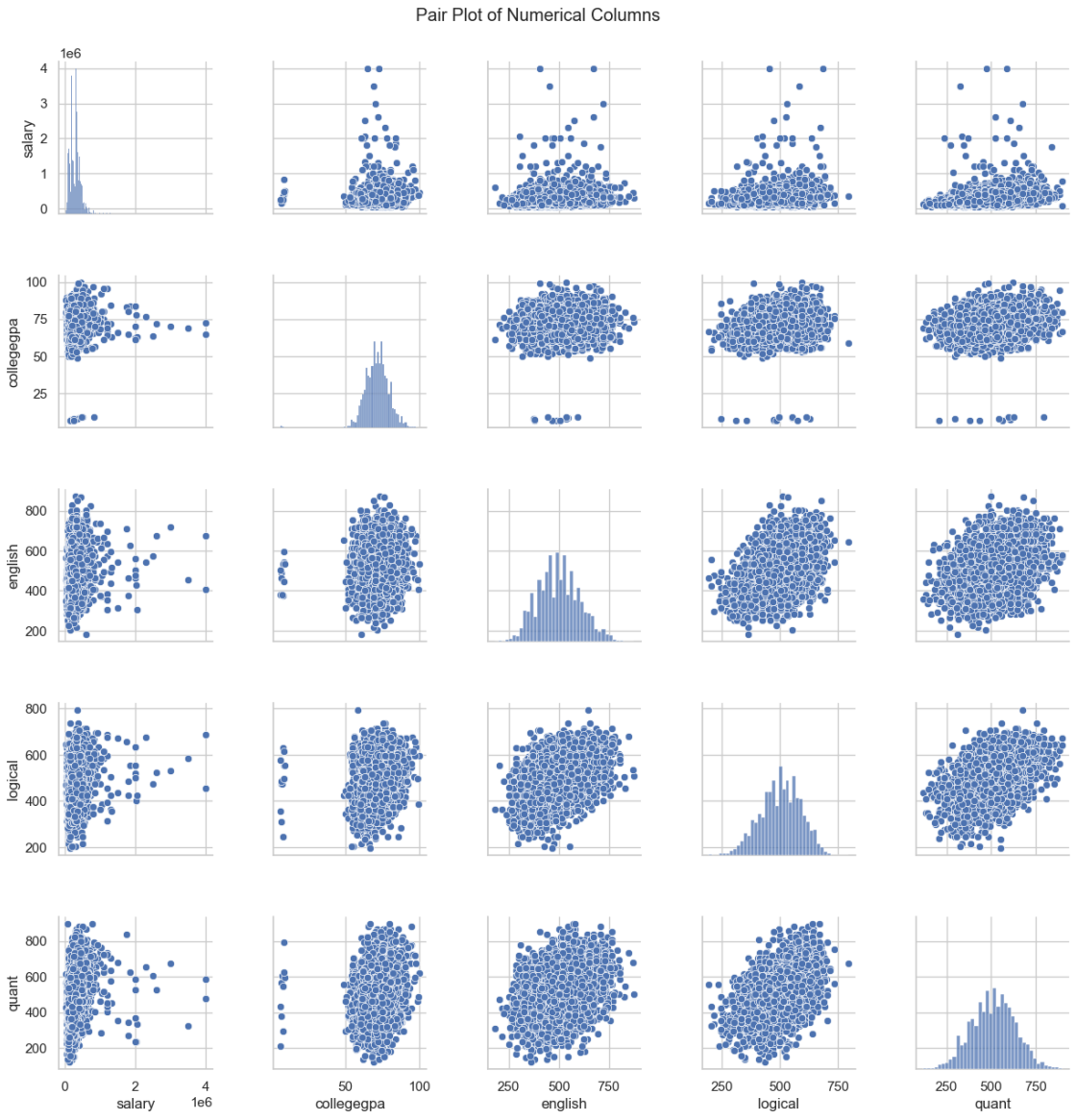


[38]:
```
plt.figure(figsize=(10, 6))
plt.hexbin(df['collegegpa'], df['salary'], gridsize=30, cmap='Blues')
plt.colorbar(label='Count in Bin')
plt.title('Hexbin Plot of Salary vs College GPA')
plt.xlabel('College GPA')
```

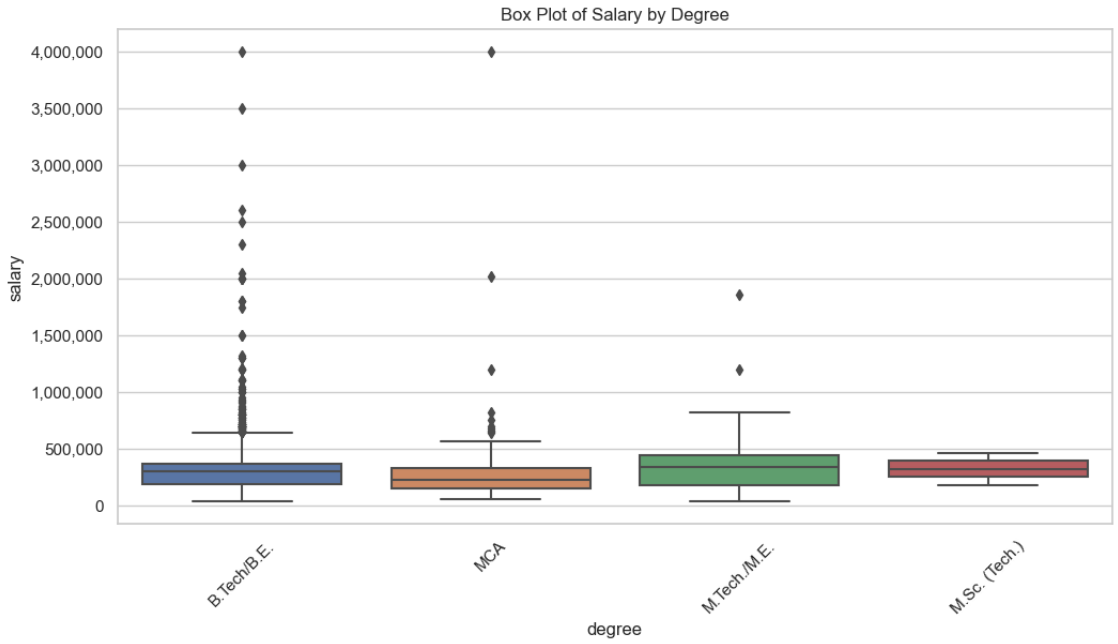
```
plt.ylabel('Salary')
plt.gca().yaxis.set_major_formatter(FuncFormatter(currency))
plt.show()
```



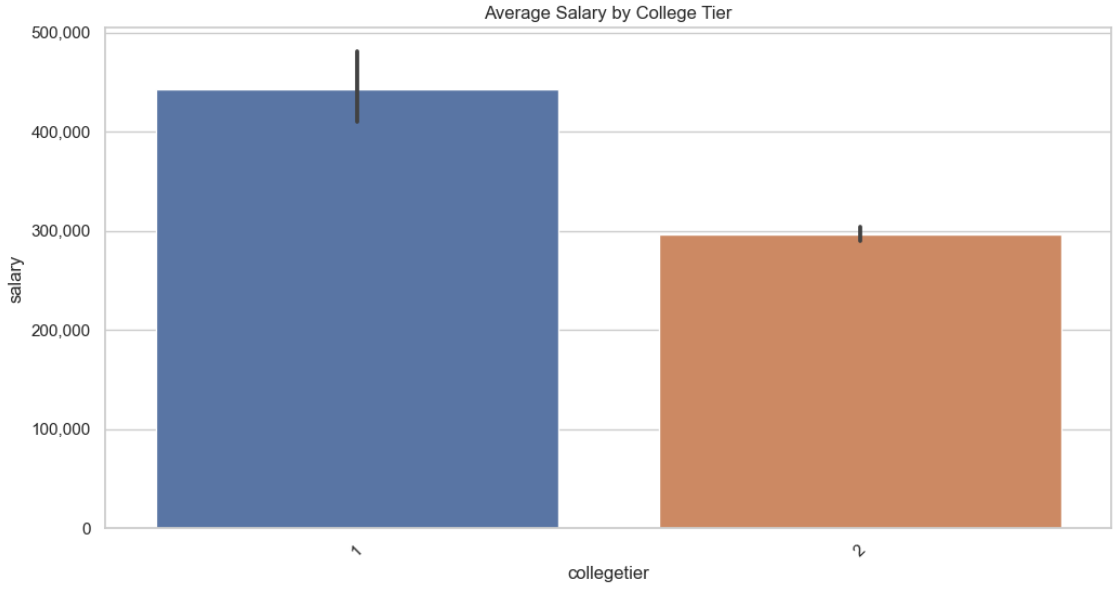
[39]:
```
numerical_columns = ['salary', 'collegegpa', 'english', 'logical', 'quant']
sns.set(style="whitegrid")
pair_plot = sns.pairplot(df[numerical_columns])
plt.suptitle('Pair Plot of Numerical Columns', y=1.02)
plt.subplots_adjust(hspace=0.4, wspace=0.4)
plt.gca().yaxis.set_major_formatter(FuncFormatter(currency))

plt.show()
```



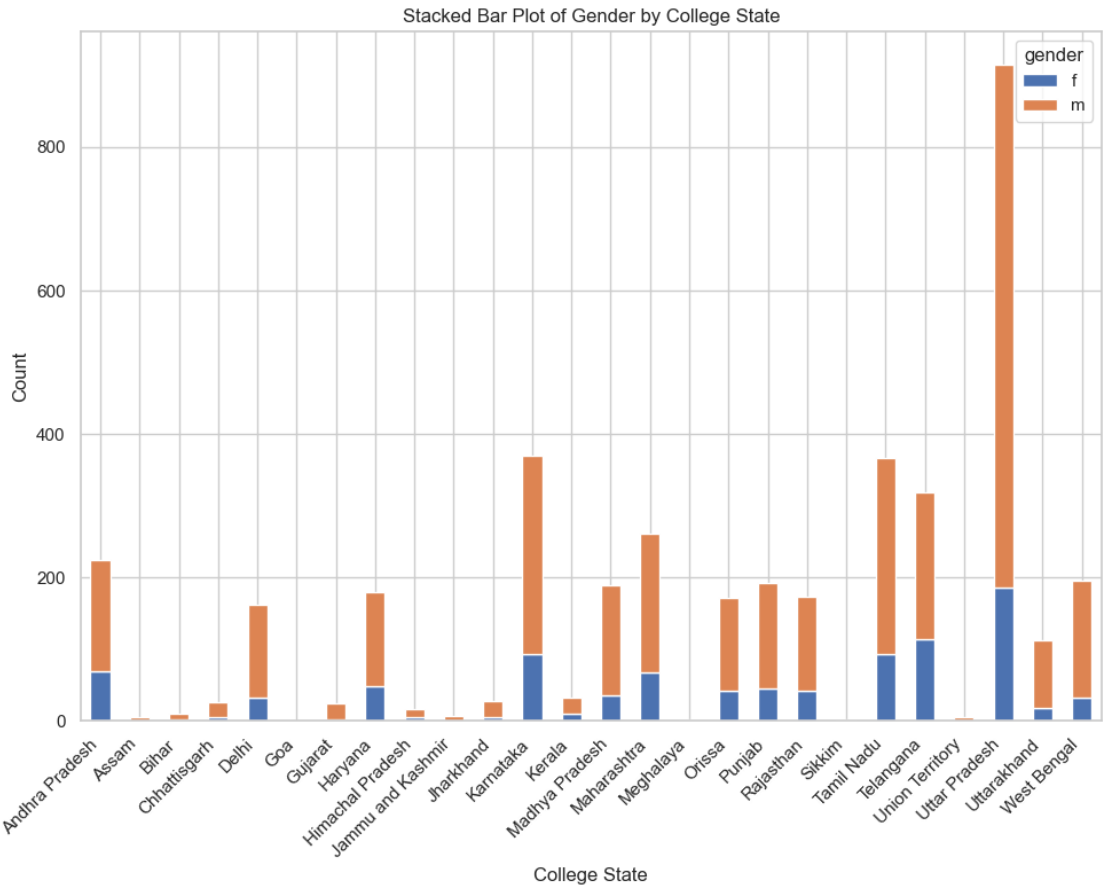
[40]:
```
plt.figure(figsize=(12, 6))
sns.boxplot(data=df, x='degree', y='salary')
plt.title('Box Plot of Salary by Degree')
plt.xticks(rotation=45)
plt.gca().yaxis.set_major_formatter(FuncFormatter(currency))
plt.show()
```



[41]:
```
plt.figure(figsize=(12, 6))
sns.barplot(data=df, x='collegetier', y='salary', estimator=np.mean)
plt.title('Average Salary by College Tier')
plt.xticks(rotation=45)
plt.gca().yaxis.set_major_formatter(FuncFormatter(currency))
plt.show()
```



[42]:
```
pivot_table = df.pivot_table(index='collegestate', columns='gender',␣
↪values='salary', aggfunc='count').fillna(0)
pivot_table.plot(kind='bar', stacked=True, figsize=(10, 8))
plt.title('Stacked Bar Plot of Gender by College State')
plt.xlabel('College State')
plt.ylabel('Count')
plt.xticks(rotation=45, ha='right')  # Adjusted alignment to 'right'
plt.tight_layout()  # Adjust layout to prevent clipping
plt.show()
```



3 Step - 5 - Research Questions

[43]:
```
df.columns
```

[43]:
```
Index(['id', 'salary', 'doj', 'dol', 'designation', 'jobcity', 'gender', 'dob',
       '10percentage', '10board', '12graduation', '12percentage', '12board',
       'collegeid', 'collegetier', 'degree', 'specialization', 'collegegpa',
       'collegecityid', 'collegecitytier', 'collegestate', 'graduationyear',
```

```
       'english', 'logical', 'quant', 'domain', 'computerprogramming',
       'electronicsandsemicon', 'computerscience', 'mechanicalengg',
       'electricalengg', 'telecomengg', 'civilengg', 'conscientiousness',
       'agreeableness', 'extraversion', 'nueroticism',
       'openess_to_experience'],
      dtype='object')
```

[44]:
```
from scipy import stats

# Specify the claimed salary range
lower_bound = 2.5 * 100000  # converting lakhs to actual number
upper_bound = 3 * 100000

# Filter data for specified job titles
job_titles = ['Programming Analyst', 'Software Engineer', 'Hardware Engineer',␣
 ↪'Associate Engineer']
filtered_data = df[df['designation'].isin(job_titles)]

# Perform one-sample t-test on salary
if not filtered_data.empty:
    t_statistic, p_value = stats.ttest_1samp(filtered_data['salary'],␣
 ↪lower_bound)

    # Display the results
    print(f"T-statistic: {t_statistic}, P-value: {p_value}")

    # Interpret the p-value
    alpha = 0.05
    if p_value < alpha:
        print("Reject the null hypothesis: Average salary significantly differs␣
 ↪from the claimed range.")
    else:
        print("Fail to reject the null hypothesis: Average salary does not␣
 ↪significantly differ from the claimed range.")
else:
    print("No data found for the specified job titles.")
```

```
No data found for the specified job titles.
```

[45]:
```
# Assuming df is your DataFrame containing the data
job_titles = ['Programming Analyst', 'Software Engineer', 'Hardware Engineer',␣
 ↪'Associate Engineer']
salary_data = df[df['designation'].isin(job_titles)]

# Calculate the average salary for each job title
average_salaries = salary_data.groupby('designation')['salary'].mean().
 ↪reset_index()
```

```
# Check if average salaries are within the claimed range of 2.5 to 3 Lakhs
average_salaries['within_claimed_range'] = average_salaries['salary'].
 ↪apply(lambda x: 2.5 <= x <= 3)

print("Average Salaries for Specified Job Titles:")
print(average_salaries)

print("\nAverage Salaries within Claimed Range:")
print(average_salaries[average_salaries['within_claimed_range']])
```

```
Average Salaries for Specified Job Titles:
Empty DataFrame
Columns: [designation, salary, within_claimed_range]
Index: []

Average Salaries within Claimed Range:
Empty DataFrame
Columns: []
Index: []
```

[46]:
```
# Create a contingency table
contingency_table = pd.crosstab(df['gender'], df['specialization'])

# Display the contingency table
print("Contingency Table:")
print(contingency_table)

# Perform Chi-Square test
chi2_stat, p_value, dof, expected = stats.chi2_contingency(contingency_table)

# Create a results DataFrame with reset index
results = pd.DataFrame({
    'Metric': ['Chi-Squared Statistic', 'P-value', 'Degrees of Freedom',␣
 ↪'Conclusion'],
    'Value': [
        chi2_stat,
        p_value,
        dof,
        "Reject the null hypothesis" if p_value < 0.05 else "Fail to reject the␣
 ↪null hypothesis"
    ]
})

# Reset the index of the results DataFrame
results.reset_index(drop=True, inplace=True)
```

```r
# Display the results
print("\nChi-Square Test Results:")
print(results)
```

```
Contingency Table:
specialization  aeronautical engineering  \
gender
f                                       1
m                                       2

specialization  applied electronics and instrumentation  \
gender
f                                                     2
m                                                     7

specialization  automobile/automotive engineering  biomedical engineering  \
gender
f                                               0                       2
m                                               5                       0

specialization  biotechnology  ceramic engineering  chemical engineering  \
gender
f                           9                    0                     1
m                           6                    1                     8

specialization  civil engineering  computer and communication engineering  \
gender
f                               6                                        0
m                              23                                        1

specialization  computer application  …  internal combustion engine  \
gender                                 …
f                                 59  …                           0
m                                185  …                           1

specialization  mechanical & production engineering  \
gender
f                                                 0
m                                                 1

specialization  mechanical and automation  mechanical engineering  \
gender
f                                       0                      10
m                                       5                     191

specialization  mechatronics  metallurgical engineering  other  \
gender
```

```
f                          1                          0      0
m                          3                          2     13

specialization  polymer technology  power systems and automation  \
gender
f                                0                            0
m                                1                            1

specialization  telecommunication engineering
gender
f                                           1
m                                           5

[2 rows x 46 columns]

Chi-Square Test Results:
                  Metric                       Value
0  Chi-Squared Statistic                         104
1                P-value                           0
2     Degrees of Freedom                          45
3             Conclusion  Reject the null hypothesis
```

[ ]: