In [ ]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

In [ ]:
```
df = pd.read_csv("NIRF_Overall_2024.csv")
```

In [ ]:
```
plt.style.use('seaborn-v0_8-dark-palette')
```

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

Out[ ]:

	Unnamed: 0	Institute ID	Name	City	State	Score	Rank
0	0	IR-O-U-0456	Indian Institute of Technology Madras	Chennai	Tamil Nadu	86.42	1
1	1	IR-O-U-0220	Indian Institute of Science, Bengaluru	Bengaluru	Karnataka	83.28	2
2	2	IR-O-U-0306	Indian Institute of Technology Bombay	Mumbai	Maharashtra	81.37	3
3	3	IR-O-I-1074	Indian Institute of Technology Delhi	New Delhi	Delhi	80.31	4
4	4	IR-O-I-1075	Indian Institute of Technology Kanpur	Kanpur	Uttar Pradesh	77.56	5

In [ ]:
```
zones = {
 'Northern Zone': ['Chandigarh', 'Delhi', 'Haryana', 'Himachal Pradesh', 'Jammu and Kash
 'North Eastern Zone': ['Assam', 'Arunachal Pradesh', 'Manipur','Meghalaya', 'Mizoram',
 'Central Zone': ['Chhattisgarh', 'Madhya Pradesh', 'Uttarakhand', 'Uttar Pradesh'],
 'Eastern Zone': ['Bihar', 'Jharkhand', 'Odisha', 'West Bengal'],
 'Western Zone': ['Dadra and Nagar Haveli and Daman and Diu', 'Goa','Gujarat', 'Maharash
 'Southern Zone': ['Andhra Pradesh', 'Karnataka', 'Kerala', 'Puducherry','Tamil Nadu', '
 }
```

In [ ]:
```
def categorize_zone(state):
  for zone, states in zones.items():
    if state in states:
      return zone
  return 'Unknown'
```

In [ ]:
```
df['Zone / Zonal Region'] = df['State'].apply(categorize_zone)
```

In [ ]:
```
df
```

Out[ ]:

	Unnamed: 0	Institute ID	Name	City	State	Score	Rank	Zone / Zonal Region
0	0	IR-O-U-0456	Indian Institute of Technology Madras	Chennai	Tamil Nadu	86.42	1	Southern Zone
1	1	IR-O-U-0220	Indian Institute of Science, Bengaluru	Bengaluru	Karnataka	83.28	2	Southern Zone
2	2	IR-O-U-0306	Indian Institute of Technology Bombay	Mumbai	Maharashtra	81.37	3	Western Zone
3	3	IR-O-I-1074	Indian Institute of Technology Delhi	New Delhi	Delhi	80.31	4	Northern Zone
4	4	IR-O-I-1075	Indian Institute of Technology Kanpur	Kanpur	Uttar Pradesh	77.56	5	Central Zone
...	...	...	...	...	...	...	...	...
95	95	IR-O-I-1486	Sri Ramachandra Institute of Higher Education ...	Chennai	Tamil Nadu	48.10	96	Southern Zone

96	96	IR-O-U-0003	Acharya Nagarjuna University	Guntur	Andhra Pradesh	47.73	97	Southern Zone
97	97	IR-O-U-0331	Tata Institute of Social Sciences	Mumbai	Maharashtra	47.56	98	Western Zone
98	98	IR-O-U-0686	All India Institute of Medical Sciences Patna	Patna	Bihar	47.55	99	Eastern Zone
99	99	IR-O-U-0470	Periyar University	Salem	Tamil Nadu	47.43	100	Southern Zone

100 rows × 8 columns

Q1 Among the top 5 states, which state has the highest number of ranked institutions in the NIRF rankings?

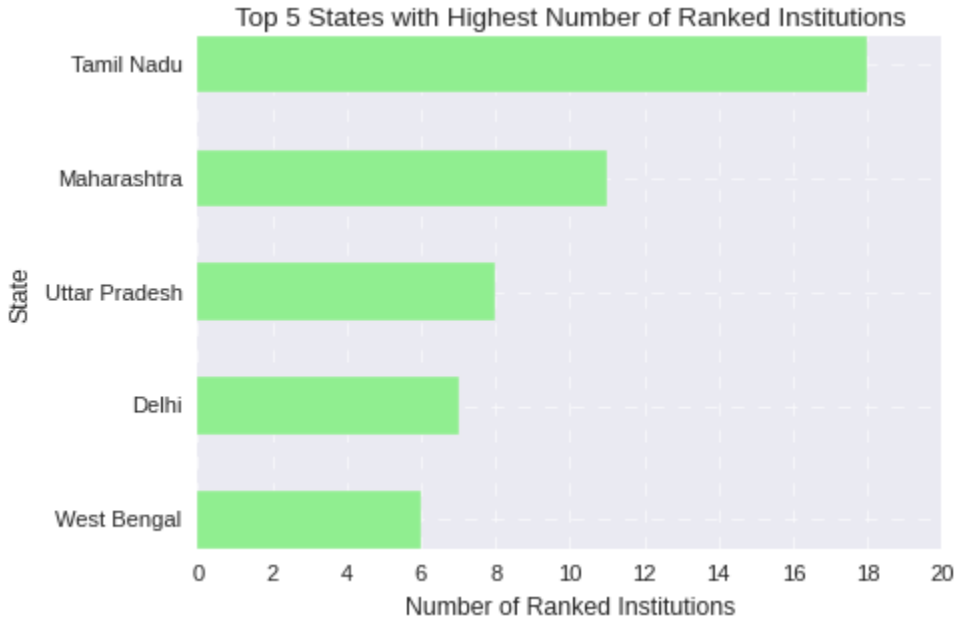
In [ ]:
```
top_states = df["State"].value_counts().nlargest(5).sort_values()
top_states
```

Out[ ]:

State	count
West Bengal	6
Delhi	7
Uttar Pradesh	8
Maharashtra	11
Tamil Nadu	18

dtype: int64

In [ ]:
```
plt.figure(figsize=(6, 4))
plt.barh(top_states.index ,top_states.values, color='lightgreen',height = 0.5)
plt.xlabel('Number of Ranked Institutions')
plt.ylabel('State')
plt.title('Top 5 States with Highest Number of Ranked Institutions')
plt.xticks(np.arange(0,22,step = 2))
plt.grid(axis='both', color='white', linestyle='--', linewidth=0.5)
plt.show()
```



Q2 Which states should the government focus on to improve their presence in the top 100 NIRF rankings? Identify the states that could benefit from increased investment in higher education.

In [ ]:
```
all_state = df["State"].value_counts()
```

In [ ]:
```
Mapping = {'Chandigarh', 'Delhi', 'Haryana', 'Himachal Pradesh', 'Jammu and Kashmir', 'L
 'Meghalaya', 'Mizoram', 'Nagaland', 'Sikkim','Tripura','Chhattisgarh', 'Madhya Pradesh'
 'Dadra and Nagar Haveli and Daman and Diu', 'Goa', 'Gujarat','Maharashtra','Andhra Prad
 }
```

In [ ]:
```
present_in_nirf = set(df["State"])
all_states = set(Mapping)
not_in_nirf = sorted(all_states - present_in_nirf)
print("States where the government should focus:")
print(", ".join(not_in_nirf))
```

```
States where the government should focus:
Andaman and Nicobar, Arunachal Pradesh, Chhattisgarh, Dadra and Nagar Haveli and Daman a
nd Diu, Goa, Haryana, Ladakh, Manipur, Meghalaya, Mizoram, Nagaland, Puducherry, Sikkim,
Tripura
```

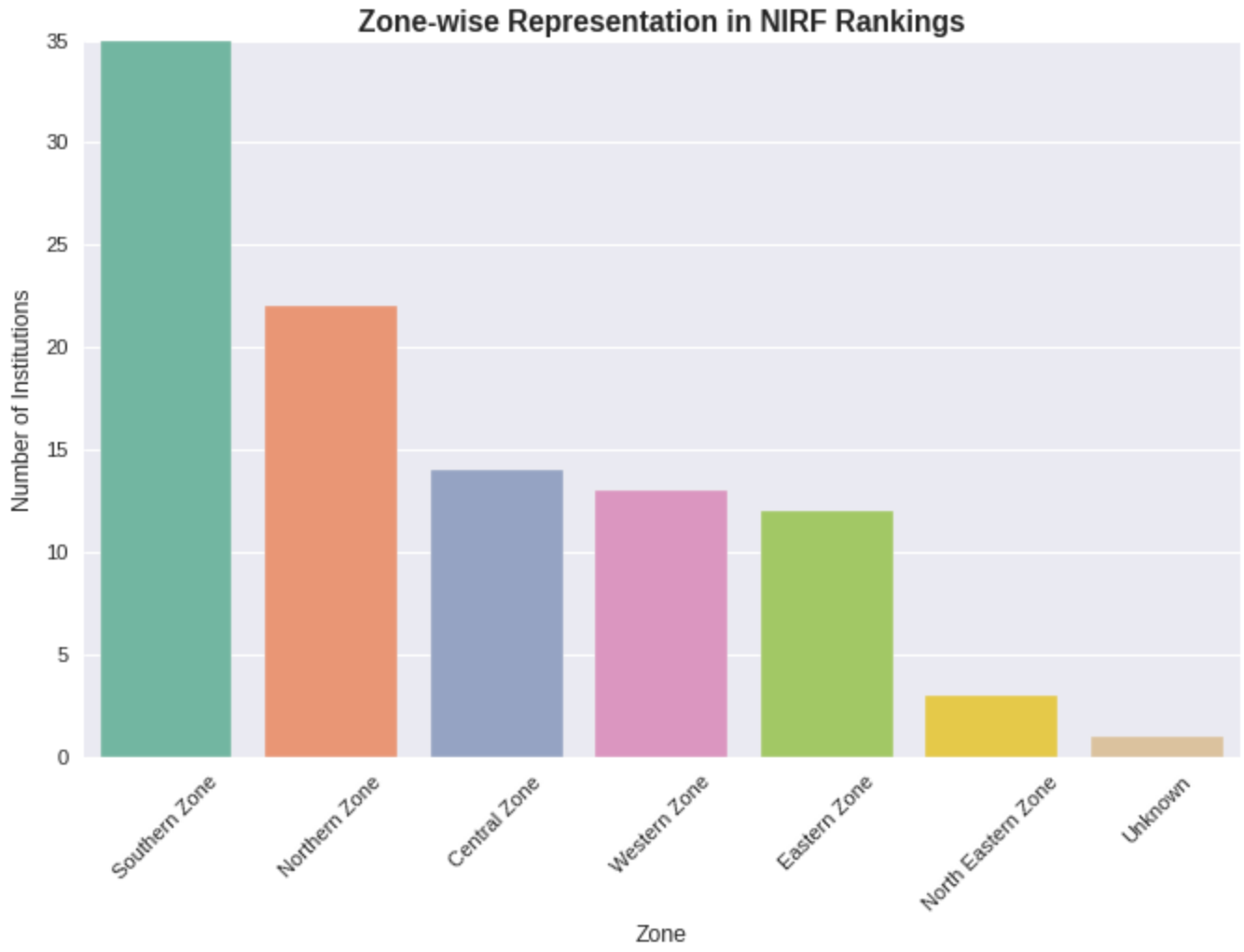
Q3 Which zone has the highest representation in the NIRF rankings?

In [ ]:
```
zone_representation = df['Zone / Zonal Region'].value_counts()
print(zone_representation)
```

```
Zone / Zonal Region
Southern Zone         35
Northern Zone         22
Central Zone          14
Western Zone          13
Eastern Zone          12
North Eastern Zone     3
Unknown                1
Name: count, dtype: int64
```

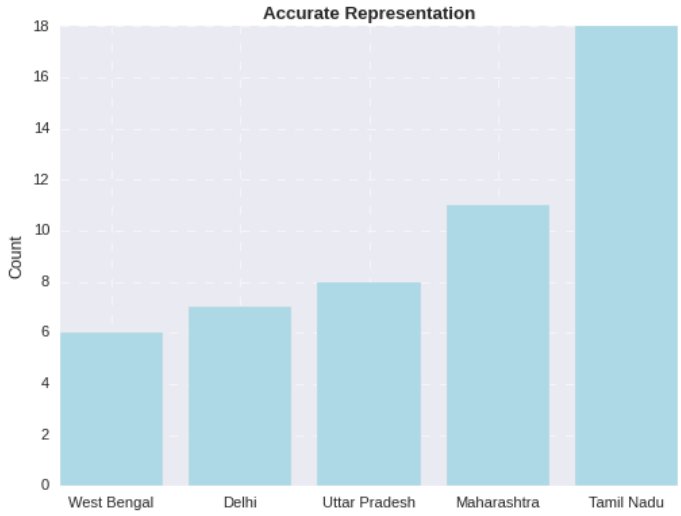
In [ ]:
```
plt.figure(figsize=(10, 6))
sns.barplot(x=zone_representation.index, y=zone_representation.values, hue=zone_represen
plt.title('Zone-wise Representation in NIRF Rankings', fontsize=14, fontweight='bold')
plt.xlabel('Zone')
```

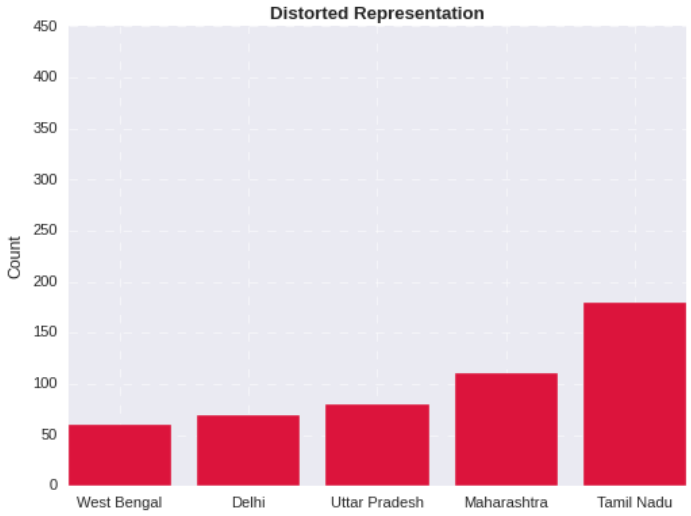
```
plt.ylabel('Number of Institutions')
plt.xticks(rotation=45)
plt.show()
```



Q4 Create two visualizations of the same data to discuss the “Lie Factor” in this context and explain how the visualization could mislead viewers.

In [ ]:
```
fig, (ax1, ax2) = plt.subplots(1, 2, figsize=(13, 5))
ax1.bar(top_states.index, top_states.values, color='lightblue', )
ax1.set_title('Accurate Representation', fontweight='bold')
ax1.set_ylabel('Count')
ax1.grid(axis='both', color='white', linestyle='--', linewidth=0.5)
# Distorted representation (Lie Factor)
distorted_values = top_states.values * 10 # Arbitrary distortion factor
ax2.bar(top_states.index, distorted_values,color='crimson')
ax2.set_title('Distorted Representation', fontweight='bold')
ax2.set_ylabel('Count')
ax2.set_ylim(0, max(distorted_values) * 2.5) # Adjust y-axis to exaggerate the differenc
ax2.grid(axis='both', color='white', linestyle='--', linewidth=0.5)
plt.tight_layout()
plt.show()
```





Q5 Visualize the distribution of scores among all institutions.

In [ ]:
```
sorted_scores = df['Score'].sort_values()
sns.displot(sorted_scores, bins=20, kde=True,color='purple',stat="density",height=7, asp
sns.kdeplot(sorted_scores, color='crimson')
plt.title('Distribution of Scores Among All Institutions', fontweight='bold')
plt.grid(axis='both', color='white', linestyle='--', linewidth=0.5)
plt.xlabel('Score')
plt.ylabel('Density')
plt.show()
```