In [2]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import plotly.express as px
sns.set_theme(color_codes=True)
pd.set_option('display.max_columns', None)
```

Limpieza de datos

In [3]:

```
df = pd.read_excel('Top_1000_companies_DataSet.xlsx')
```

In [4]:

```
df.drop_duplicates() #no hay dupliciados

df.dtypes # los formatos/tipos de datos
```

Out[4]:

```
company_name           object
url                    object
city                   object
state                  object
country                object
employees              object
linkedin_url           object
founded                object
Industry               object
GrowjoRanking          object
Previous Ranking       object
estimated_revenues     object
job_openings           object
keywords               object
LeadInvestors          object
Accelerator            object
btype                  object
valuation             float64
total_funding          object
product_url            object
indeed_url             object
growth_percentage     float64
contact_info           object
dtype: object
```

Eliminar duplicados

In [5]:

```
df.drop_duplicates()
```

Out[5]:

	company_name	url	city	state	country	employees	linkedin_url	
0	OpenAI	openai.com	San Francisco	CA	United States	655	http://www.linkedin.com/company/openai	
1	Alchemy	alchemy.com	San Francisco	CA	United States	201	http://www.linkedin.com/company/alchemyinc	
2	dbt Labs	getdbt.com	Philadelphia	PA	United States	511	http://www.linkedin.com/company/dbtlabs	
3	Wasabi Technologies	wasabi.com	Boston	MA	United States	355	http://www.linkedin.com/company/wasabitechnolo...	
4	Whatnot	whatnot.com	Los Angeles	CA	United States	551	http://www.linkedin.com/company/whatnot-inc	
...	...	...	...	...	...	...	...	
976	Forte	forte.io	San Francisco	CA	United States	145	http://www.linkedin.com/company/forte-labs-inc	
977	Collective Health	collectivehealth.com	San Francisco	CA	United States	615	http://www.linkedin.com/company/collectivehealth	
978	NaN	Google Ventures	NaN	NaN	1500000000	$719M	https://www.growjo.com/company/Collective_Health	https://www q=co
979	Fathom (YC W21)	fathom.video	San Francisco	CA	USA	96	http://www.linkedin.com/company/fathom-video	
980	Hone	honehq.com	San Francisco	CA	United States	179	http://www.linkedin.com/company/honehq	

981 rows × 23 columns

Deshacerse ede las fials que contengan datos nan y reamplzar en blanco

In [6]:

```
df = df.fillna('')
```

Eliminar las filas que no contengan datos de la tabla principal

In [7]:

```
for x in df.index:
    if df.loc[x, "company_name"] == '':
        df.drop(x, inplace=True)
```

Eliminar todos los datos diferentes que no esten en el abecedario o en los numeros del 1 al 9

In [8]:

```
df["company_name"] = df["company_name"].str.replace('[^a-zA-Z0-9]',' ')
df["city"] = df["city"].str.replace('[^a-zA-Z0-9]',' ')
```

```
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\1779931556.py:1: FutureWarning: The default value of regex wil
l change from True to False in a future version.
  df["company_name"] = df["company_name"].str.replace('[^a-zA-Z0-9]',' ')
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\1779931556.py:2: FutureWarning: The default value of regex wil
l change from True to False in a future version.
  df["city"] = df["city"].str.replace('[^a-zA-Z0-9]',' ')
```

Revisar la informacion de los datos

In [9]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 965 entries, 0 to 980
Data columns (total 23 columns):
 #   Column              Non-Null Count  Dtype 
---  ------              --------------  ----- 
 0   company_name        965 non-null    object
 1   url                 965 non-null    object
 2   city                965 non-null    object
 3   state               965 non-null    object
 4   country             965 non-null    object
 5   employees           965 non-null    object
 6   linkedin_url        965 non-null    object
 7   founded             965 non-null    object
 8   Industry            965 non-null    object
 9   GrowjoRanking       965 non-null    object
 10  Previous Ranking    965 non-null    object
 11  estimated_revenues  965 non-null    object
 12  job_openings        965 non-null    object
 13  keywords            965 non-null    object
 14  LeadInvestors       965 non-null    object
 15  Accelerator         965 non-null    object
 16  btype               965 non-null    object
 17  valuation           965 non-null    object
 18  total_funding       965 non-null    object
 19  product_url         965 non-null    object
 20  indeed_url          965 non-null    object
 21  growth_percentage   965 non-null    object
 22  contact_info        965 non-null    object
dtypes: object(23)
memory usage: 213.2+ KB
```

Eliminar las columnas que no necesitamos

In [10]:

```python
columnas_a_eliminar = ["contact_info","product_url","indeed_url","Accelerator","btype","keywords","linkedin_url
df = df.drop(columns = columnas_a_eliminar)
df = df.drop(680)
df = df.drop(688)
df = df.drop(738)
df = df.drop(740)
```

Resetear los index porque se acabana de eliminar el index 680

In [11]:

```python
df = df.reset_index(drop=True)
```

convertir el formato de algunas columnas

Principalmente convertirlas en type str excepto GrowjoRanking que ya es de type int →↓

para poder manipularlas y aplicarles filtros en s

In [12]:

```python
df["employees"] = df["employees"].apply(lambda x: str(x))
df["founded"] = df["founded"].apply(lambda x: str(x))
df["estimated_revenues"] = df["estimated_revenues"].apply(lambda x: str(x))
df["job_openings"] = df["job_openings"].apply(lambda x: str(x))
df["growth_percentage"] = df["growth_percentage"].apply(lambda x: str(x))
```

Reemplazar valores desconocidos por los valores 0 para int y desconocido para str

In [13]:

```python
df["founded"] = df["founded"].replace('','0')
df["state"] = df["state"].replace('','desconocido')
df["city"] = df["city"].replace('','desconocido')
df["country"] = df["country"].replace('','desconocido')
df["Industry"] = df["Industry"].replace('','desconocido')
df["estimated_revenues"] = df["estimated_revenues"].replace('','0')
df["job_openings"] = df["job_openings"].replace('','0')
df["LeadInvestors"] = df["LeadInvestors"].replace('','desconocido')
df["valuation"] = df["valuation"].replace('','0')
df["total_funding"] = df["total_funding"].replace('','0')
df["growth_percentage"] = df["growth_percentage"].replace('','0')
```

Convertir las columnas de numeros a enteros

In [14]:

```python
df["employees"] = df["employees"].apply(lambda x: int(x))
df["GrowjoRanking"] = df["GrowjoRanking"].apply(lambda x: int(x))
df["founded"] = df["founded"].apply(lambda x: int(x))
df["valuation"] = df["valuation"].apply(lambda x: int(x))
df["estimated_revenues"] = df["estimated_revenues"].apply(lambda x: float(x))
df["growth_percentage"] = df["growth_percentage"].apply(lambda x: float(x))
df["job_openings"] = df["job_openings"].apply(lambda x: int(x))
```

Eliminar los caracteres extraños en la columna de tota_funding

In [15]:

```python
df['total_funding'] = df['total_funding'].str.replace(r'[^0-9MmBb.]', '', regex=True)
```

Necesitamos convertir la columna total_funding en una columna que solo contenga numeros

In [16]:
```
df['total_funding'] = df['total_funding'].replace({'M': 'e6', 'B': 'e9'}, regex=True)
df['total_funding'] = pd.to_numeric(df['total_funding'], errors='coerce')
df["total_funding"] = df["total_funding"].apply(lambda x: int(x))
```

Este codigo es preferencial para convertir los datos limpios en xlsx

In [17]:
```
output_file = "top_companies_cleaning.xlsx"
df.to_excel(output_file, index=False)
```

In [18]:
```
df.select_dtypes(include='object').nunique()
```

Out[18]:
```
company_name     942
city             327
state             54
country           61
Industry         120
LeadInvestors    356
dtype: int64
```

Neceitamos convertir los paises a regiones y para eso debemos reemplazar los nomnbres de algunos paises

In [19]:
```
df["country"] = df["country"].replace('AUS','Australia')
df["country"] = df["country"].replace('Aus','Australia')
df["country"] = df["country"].replace('CAN','Canada')
df["country"] = df["country"].replace('GEN','Germany')
df["country"] = df["country"].replace('Ger','Germany')
df["country"] = df["country"].replace('IE','Irelanda')
df["country"] = df["country"].replace('Ind','India')
df["country"] = df["country"].replace('Netharlands','Netherlands')
df["country"] = df["country"].replace('NO','Norway')
df["country"] = df["country"].replace('NOR','Norway')
df["country"] = df["country"].replace('POL','Polonia')
df["country"] = df["country"].replace('SGP','Singapore')
df["country"] = df["country"].replace('SWE','Sweden')
df["country"] = df["country"].replace('USA','United States')
df["country"] = df["country"].replace('United State','United States')
```

Convertir los paises en regiones

In [20]:
```
def segment_country(country):
    if country in ["China", "Hong Kong", "India", "Indonesia", "Israel", "Japan", "Kuwait", "Pakistan", "Singap
        return 'Asia'
    elif country in ["Austria", "Belgium", "Cyprus", "Estonia", "Finland", "France", "Germany", "Ireland", "Ire
        return 'Europe'
    elif country in ["Canada", "Mexico", "Panama", "United States"]:
        return 'North America'
    elif country in ["Brazil", "Colombia", "Ecuador"]:
        return 'South America'
    elif country in ["Egypt", "Kenya", "Namibia", "Seychelles", "South Africa"]:
        return 'Africa'
    elif country in ["Australia", "New Zealand"]:
        return 'Oceania'
    else:
        return 'Others'
```

Aplicar la función de segmentación para crear la nueva columna

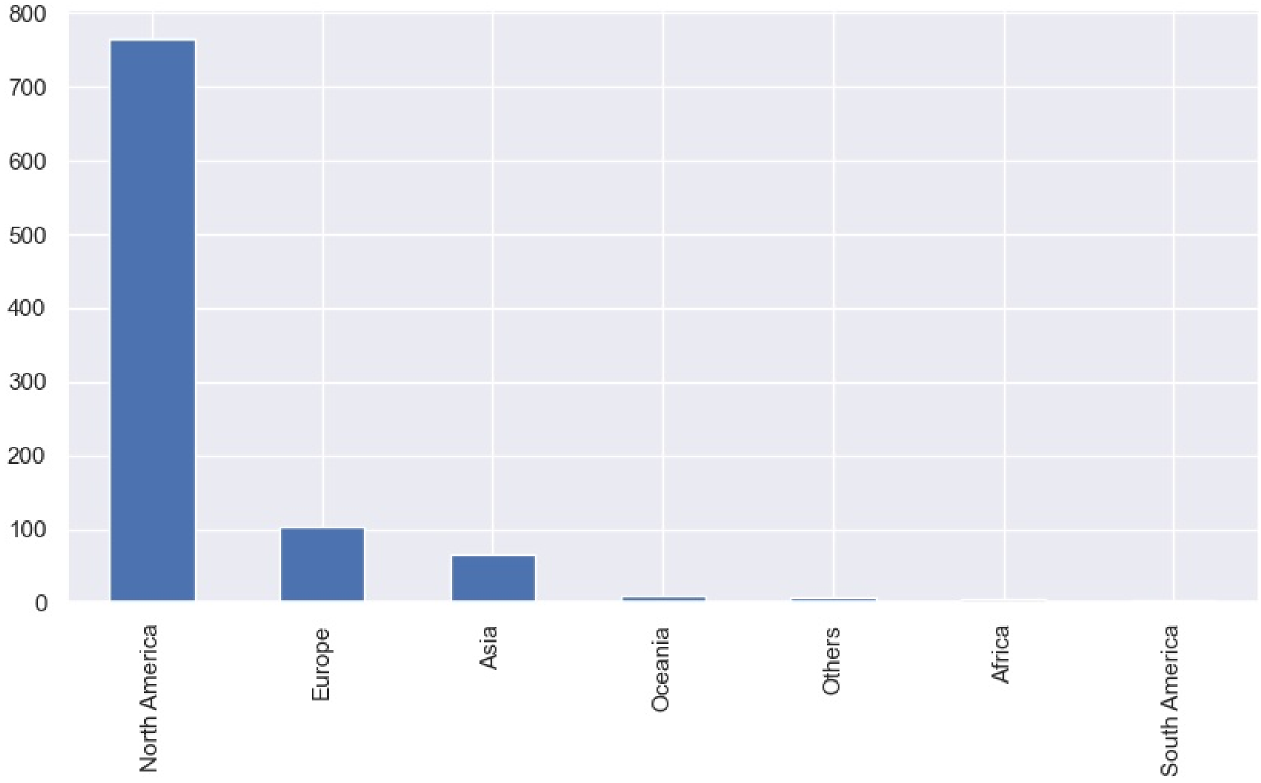
In [21]:
```
df['region'] = df['country'].apply(segment_country)
```

In [22]:
```
# Agregar una columna de años para hacer graficos de barras por fechas
df['año'] = range(1800, 1800 + len(df))
```

Graficar Regiones

In [23]:
```
plt.figure(figsize=(10,5))
df['region'].value_counts().plot(kind='bar')
```

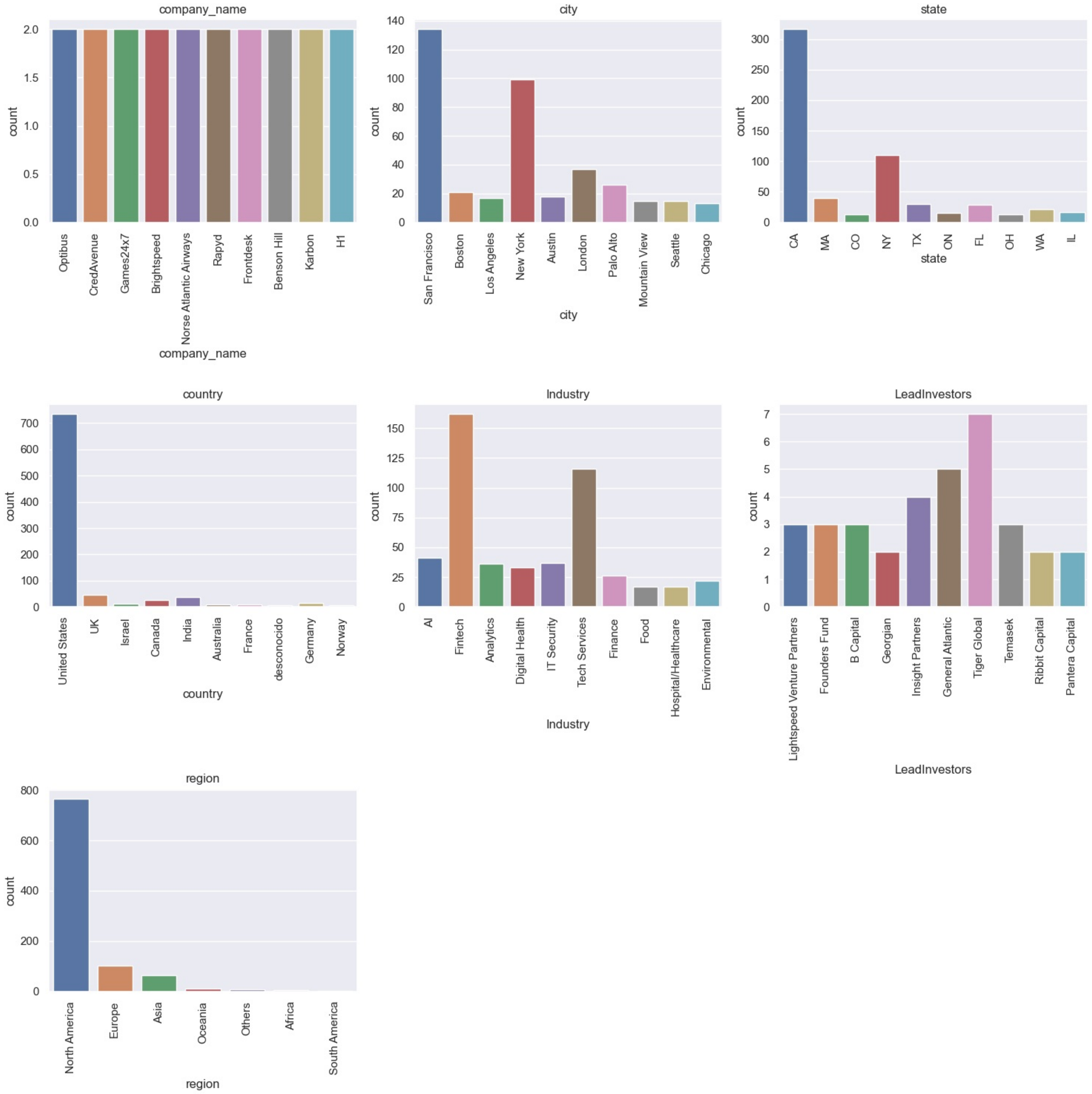
Out[23]:
```
<Axes: >
```



EDA EXPLORATORY DATA ANALYSIS

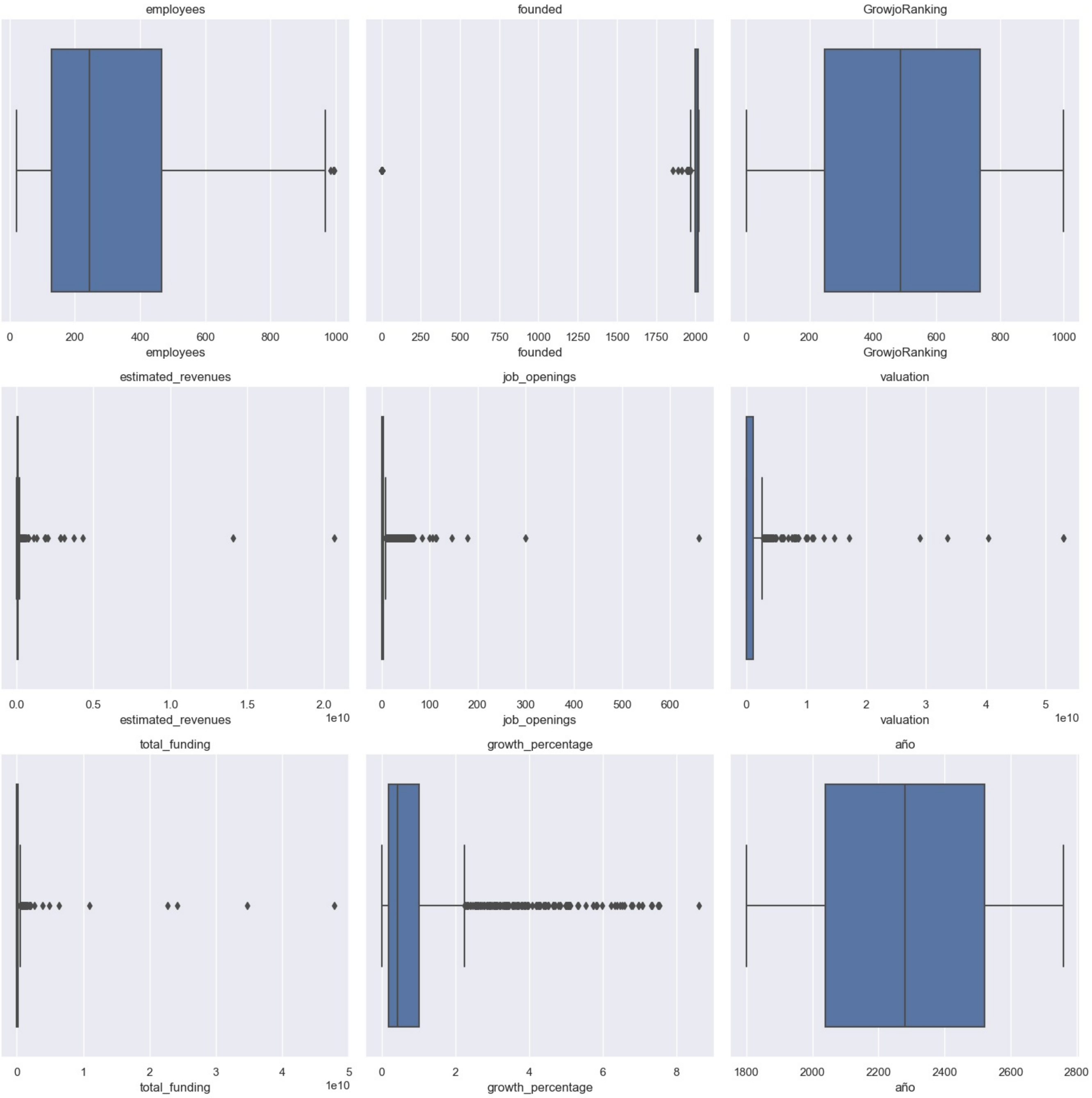
In [24]:

```
#Obtener los nombres de todas las columnas con el tipo de dato objetos (catagorical num)
cat_vars = df.select_dtypes(include='object').columns.tolist()

# Crear los espacios para las gráficas
num_cols = len(cat_vars)
num_rows = (num_cols + 2) // 3
fig, axs = plt.subplots(nrows=num_rows, ncols=3, figsize=(15, 5*num_rows))
axs = axs.flatten()

# Crear un contador de gráficas para los 5 primeros valores de cada variable categórica usando seaborn
for i, var in enumerate(cat_vars):
    # Excluir 'desconocido' de las columnas leadinvestors y state
    if var in ['LeadInvestors', 'state']:
        top_values = df[df[var] != 'desconocido'][var].value_counts().nlargest(10).index
        filtered_df = df[df[var].isin(top_values)]
    else:
        top_values = df[var].value_counts().nlargest(10).index
        filtered_df = df[df[var].isin(top_values)]

    sns.countplot(x=var, data=filtered_df, ax=axs[i])
    axs[i].set_title(var)
    axs[i].tick_params(axis='x', rotation=90)

# Eliminar cada espacio extra en los gráficos
if num_cols < len(axs):
    for i in range(num_cols, len(axs)):
        fig.delaxes(axs[i])

# Ajustar los espacios entre las gráficas
fig.tight_layout()

plt.show()
#conteo_valores = df['LeadInvestors'].value_counts()
```



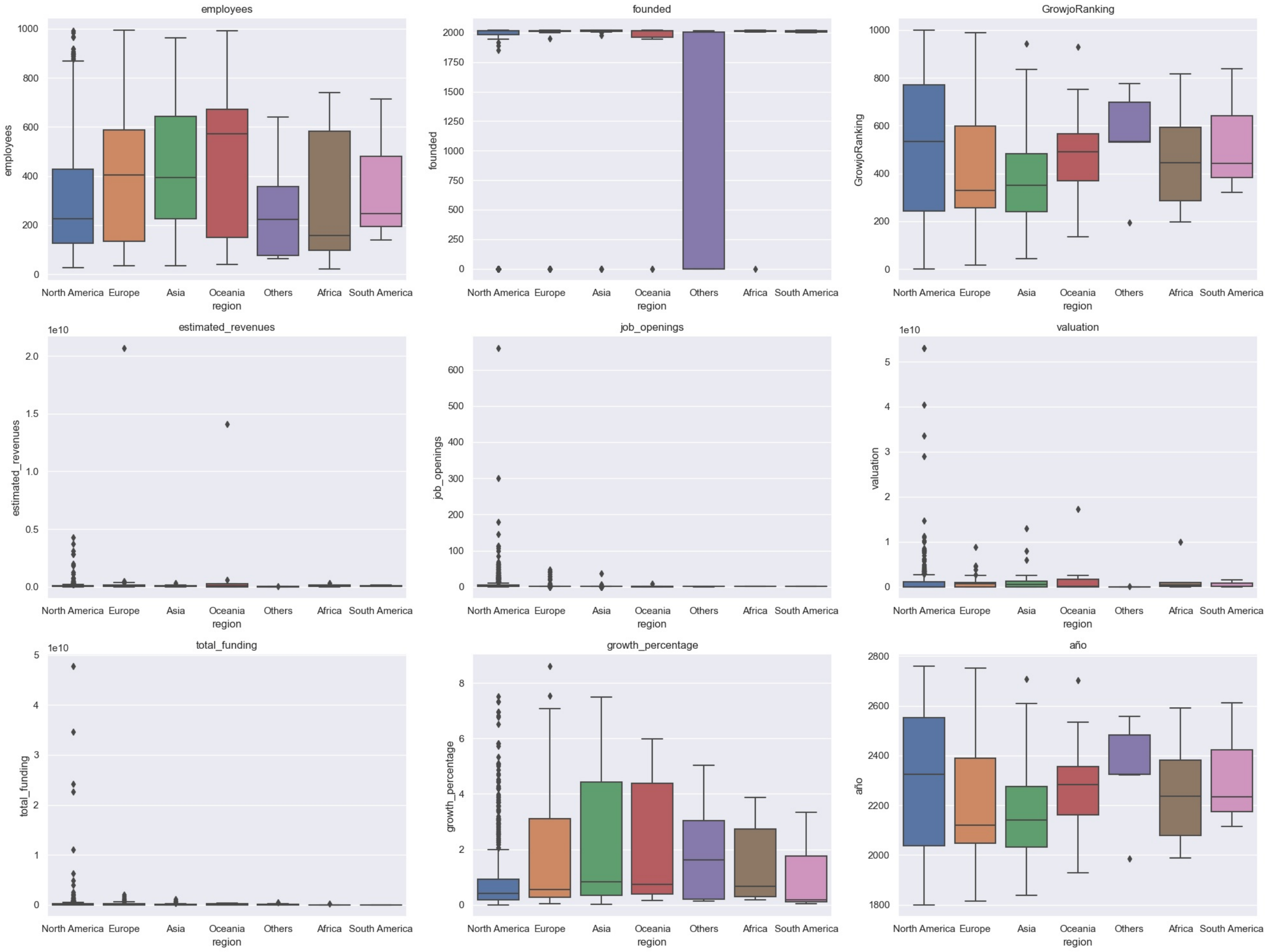
In [25]:

```
#Escoger los nombres de las columnas con los datos tipo 'int' o 'float'
num_vars = df.select_dtypes(include=['int', 'float']).columns.tolist()

#Crear un espacio para cada grafica
num_cols = len(num_vars)
num_rows = (num_cols + 2) //3
fig, axs = plt.subplots(nrows=num_rows, ncols=3, figsize=(15, 5*num_rows))
axs = axs.flatten()

#Crear un boxplot para cada variable númerica usando Seaborn
for i, var in enumerate(num_vars):
    sns.boxplot(x=df[var], ax=axs[i])
    axs[i].set_title(var)

#Eliminar los expacios extras que no se graficaron
if num_cols < len(axs):
    for i in range(num_cols, len(axs)):
        fig.delaxes(axs[i])

#Ajustar los espacios entre las graficas
fig.tight_layout()
plt.show()
```



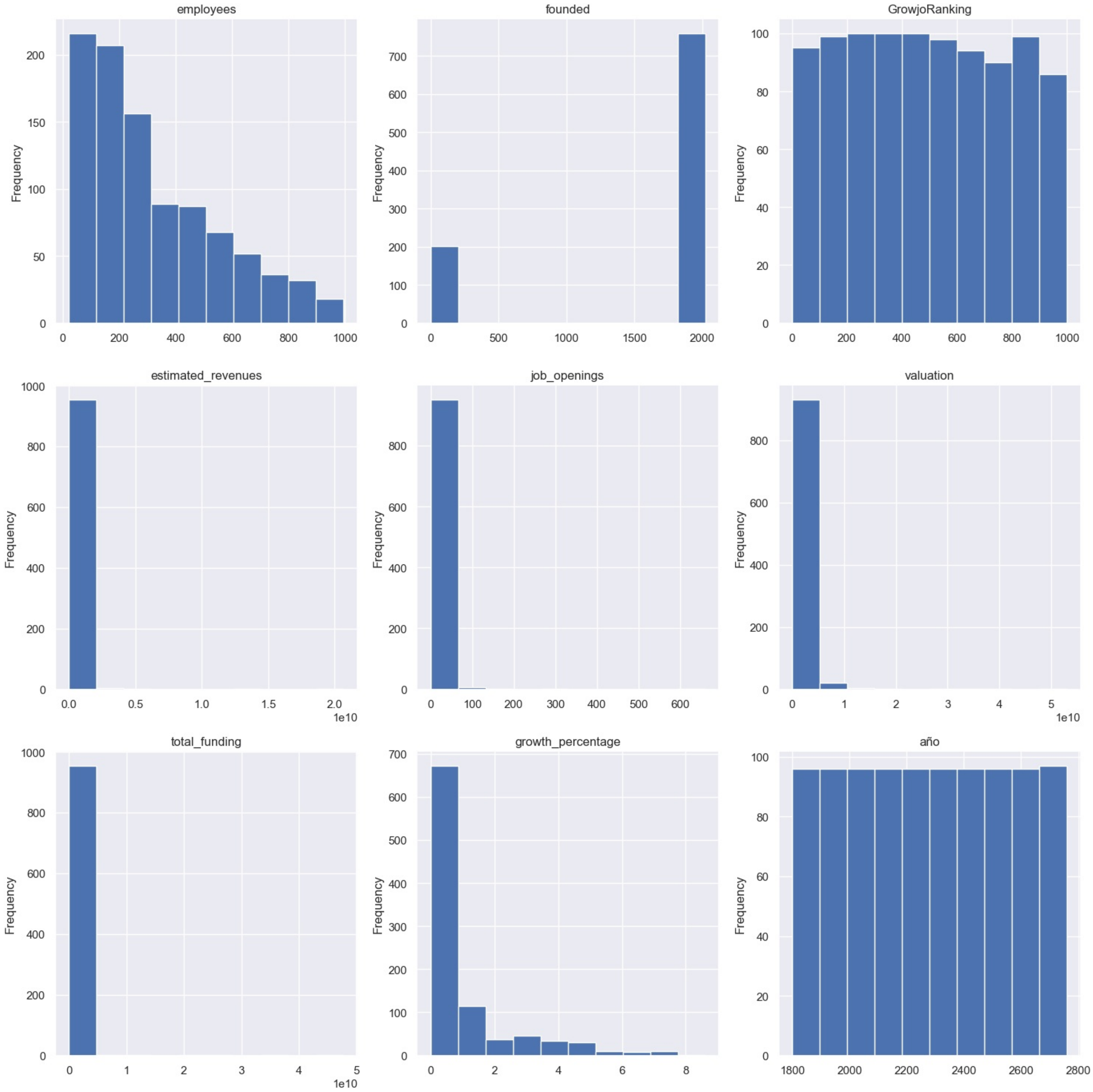
In [26]:

```
# Escogemos los nombre de todas las columnas con los datos 'int' "Numeros enteros"
int_vars = df.select_dtypes(include=['int', 'float']).columns.tolist()

#Crear las figuras/espacios para los graficos
num_cols = len(int_vars)
num_rows = (num_cols + 2)// 3 # Asegurate que son los espacios suficientes para todas las graficas
fig, axs = plt.subplots(nrows=num_rows, ncols=3, figsize=(20, 5*num_rows))
axs = axs.flatten()

#crear un box-plot para cada varibles usando seaborn con hue='attritio'

for i, var in enumerate(int_vars):
    sns.boxplot(y=var, x='region', data=df , ax=axs[i])
    axs[i].set_title(var)

# Eliminar cada espacio extra que o hayan llenado los graficos
if num_cols < len(axs):
    for i in range(num_cols, len(axs)):
       fig.delaxes(axs[i])

# Ajustar los espacios de os graficos y los titulos
fig.tight_layout()

plt.show()
```



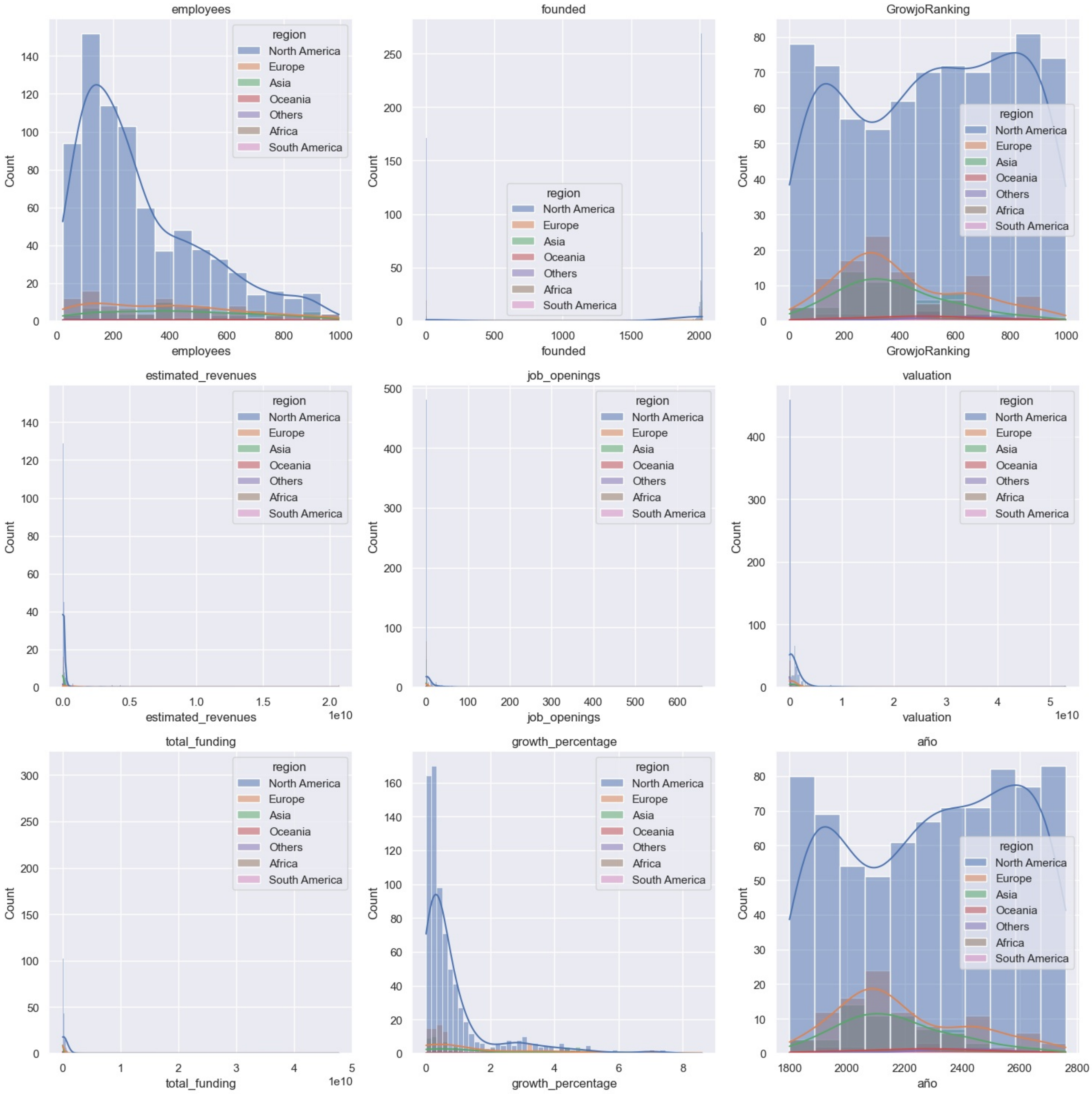
In [27]:

```
#Escoger los nombres de todas las columnas que contengan datos 'int' y 'float'
int_vars = df.select_dtypes(include=['int','float']).columns.tolist()

#Crear los esopacios para las graficas
num_cols = len (int_vars)
num_rows = (num_cols + 2) //3
fig, axs = plt.subplots(nrows=num_rows, ncols=3, figsize=(15, 5*num_rows))
axs = axs.flatten()

# Crear un histograma por cada variable entero}
for i, var in enumerate(int_vars):
    df[var].plot.hist(ax=axs[i])
    axs[i].set_title(var)

# Elimnar los espacios extras y dejar solo los que necesitamos
if num_cols < len(axs):
    for i in range(num_cols, len(axs)):
        fig.delaxes(axs[i])

# Ajustar los espacios entre las graficas
fig.tight_layout()

plt.show()
```



In [28]:

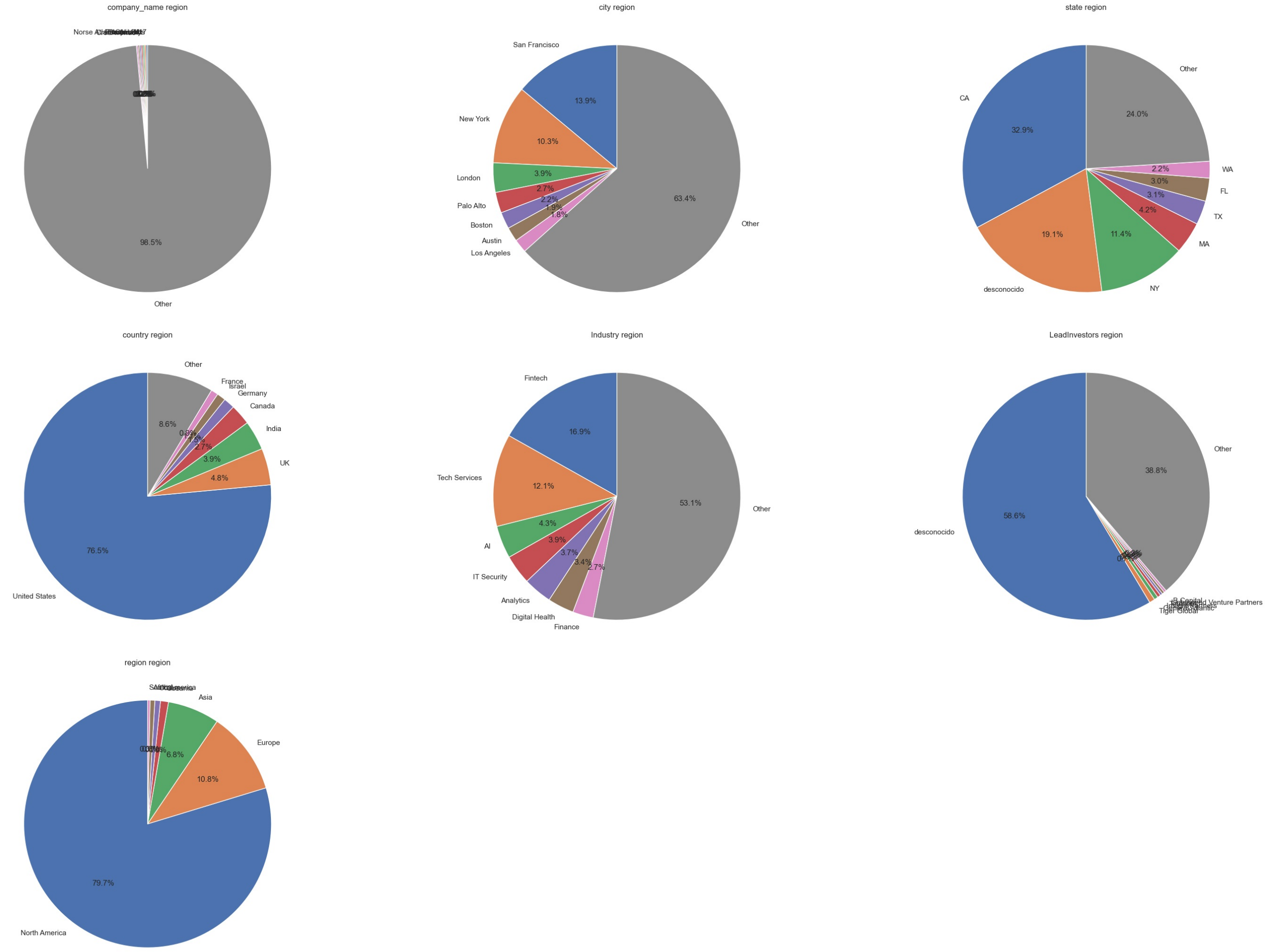
```
#Obtener los nombres de toidas las comlumnas de tipo 'int' (Entero)

int_vars = df.select_dtypes(include=['int', 'float']).columns.tolist()

#Crear una fuigura con los espacios de las graficas
num_cols = len(int_vars)
num_rows = (num_cols + 2) // 3 # To make sure there are enough rows for the subplots
fig, axs = plt.subplots(nrows=num_rows, ncols=3, figsize=(15, 5*num_rows))
axs = axs.flatten()

#Crear un histograma para cada variable con hue='Attrition'
for i, var in enumerate(int_vars):
    sns.histplot(data=df, x=var, hue='region', kde=True, ax=axs[i])
    axs[i].set_title(var)

# Eliminar los espacios de graficos que no se necesitan
if num_cols < len(axs):
    for i in range(num_cols, len(axs)):
        fig.delaxes(axs[i])

# Ajustar los espacios entre las graficas
fig.tight_layout()

plt.show()
```



In [29]:

```
#Especificar el número maximo de de categorías a mostrar individualmente
max_categories = 7

# Filtrar las columnas categoricas con tip 'objeto'
cat_cols = [col for col in df.columns if df[col].dtype == 'object']

# Crear los espacios de los graficos
num_cols = len(cat_cols)
num_rows = (num_cols + 2) // 3
fig, axs = plt.subplots(nrows=num_rows, ncols=3, figsize=(30, 7*num_rows))

# Aplana la matriz axs para facilitar la indexación
axs = axs.flatten()

# Crear la torta para cada columna categorica
for i, col in enumerate(cat_cols):
    if i < len(axs): # Ensure we don't exceed the number of subplots
        #Count the number of occurrences for each category
        cat_counts = df[col].value_counts()

        # Categorías de grupo más allá de max_categories superiores como 'Otros'
        if len(cat_counts) > max_categories:
            cat_counts_top = cat_counts[:max_categories]
            cat_counts_other = pd.Series(cat_counts[max_categories:].sum(), index=["Other"])
            cat_counts = cat_counts_top.append(cat_counts_other)


        # Crear una torta
        axs[i].pie(cat_counts, labels=cat_counts.index, autopct='%1.1f%%', startangle=90)
        axs[i].set_title(f'{col} region')

 #eliminar cada espacio extra
if num_cols < len(axs):
    for i in range(num_cols, len(axs)):
        fig.delaxes(axs[i])

# Ajusta el espacio entre las graficas
fig.tight_layout()

plt.show()
```

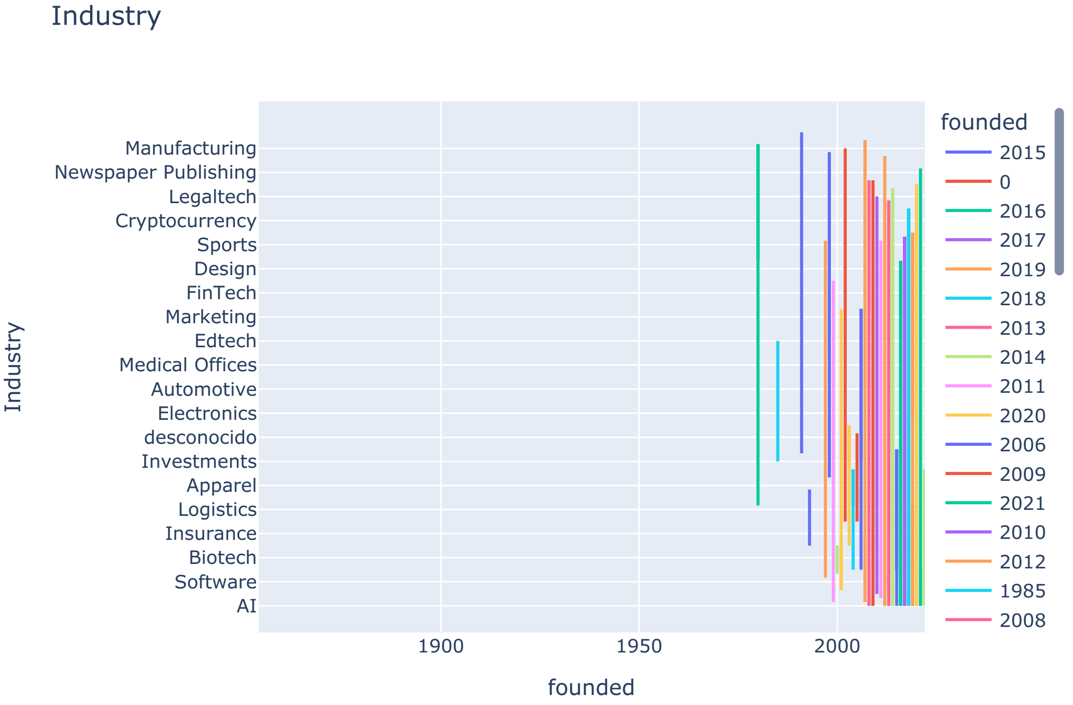
```
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\13778241.py:25: FutureWarning: The series.append method is dep
recated and will be removed from pandas in a future version. Use pandas.concat instead.
  cat_counts = cat_counts_top.append(cat_counts_other)
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\13778241.py:25: FutureWarning: The series.append method is dep
recated and will be removed from pandas in a future version. Use pandas.concat instead.
  cat_counts = cat_counts_top.append(cat_counts_other)
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\13778241.py:25: FutureWarning: The series.append method is dep
recated and will be removed from pandas in a future version. Use pandas.concat instead.
  cat_counts = cat_counts_top.append(cat_counts_other)
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\13778241.py:25: FutureWarning: The series.append method is dep
recated and will be removed from pandas in a future version. Use pandas.concat instead.
  cat_counts = cat_counts_top.append(cat_counts_other)
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\13778241.py:25: FutureWarning: The series.append method is dep
recated and will be removed from pandas in a future version. Use pandas.concat instead.
  cat_counts = cat_counts_top.append(cat_counts_other)
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\13778241.py:25: FutureWarning: The series.append method is dep
recated and will be removed from pandas in a future version. Use pandas.concat instead.
  cat_counts = cat_counts_top.append(cat_counts_other)
```



In [30]:

```
df[{'founded','Industry','company_name'}]
graph=px.line(df,x='founded',y='Industry',color='founded',title='Industry',range_x=[1854,2022])
graph.show()

df[{'founded','region','company_name'}]
graph=px.line(df,x='founded',y='region',color='founded',title='region',range_x=[1854,2022])

graph.show()
```

```
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\2205364330.py:1: FutureWarning: Passing a set as an indexer is
deprecated and will raise in a future version. Use a list instead.
  df[{'founded','Industry','company_name'}]
```



```
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\2205364330.py:5: FutureWarning:

Passing a set as an indexer is deprecated and will raise in a future version. Use a list instead.
```

Grafico de torta por industria

In [31]:

```
df_torta = df[{'region','estimated_revenues'}]

fig=px.pie(df_torta,values='estimated_revenues',color='region',names='region',labels='region',width=800,height=
fig.show()
```

```
C:\Users\ASUS\AppData\Local\Temp\ipykernel_21616\2421618612.py:1: FutureWarning:

Passing a set as an indexer is deprecated and will raise in a future version. Use a list instead.
```

DATA PROCESING PART 2

In [32]:

```
# Revisar la cantidad de los valores perdidos
revisar_datosperdidos = df.isnull().sum()* 100 / df.shape[0] #Este codigo muestra el porcentaje de los datos pe
revisar_datosperdidos[revisar_datosperdidos > 0].sort_values(ascending=False)
```

Out[32]:

```
Series([], dtype: float64)
```

In [33]:

```
# Como en este dataset todos los datos están completos se dejan quietos

# En el caso coontrario donde hubiesen datos nulos mayores al 30% se eliminan df.drop(columns:"")
# cuando dos columnas se encuentren con la misma cantidad de datos null y sean >30% se procede a rellenar con e
# df["columna_x"].fillna(df["columna_x"].mean(, inplace=True))
# df["columna_y"].fillna(df["columna_y"].mean(, inplace=True))
```

Codificación de etiquetas para tipos de datos de objetos

Label Encoding for object datatypes

In [ ]:

```
for col in df.select_dtypes(include=['object']).columns:

    #Imprimir el nombre de las columnas y los valores unicos
    print(f"{col}: {df[col].unique()}")
```

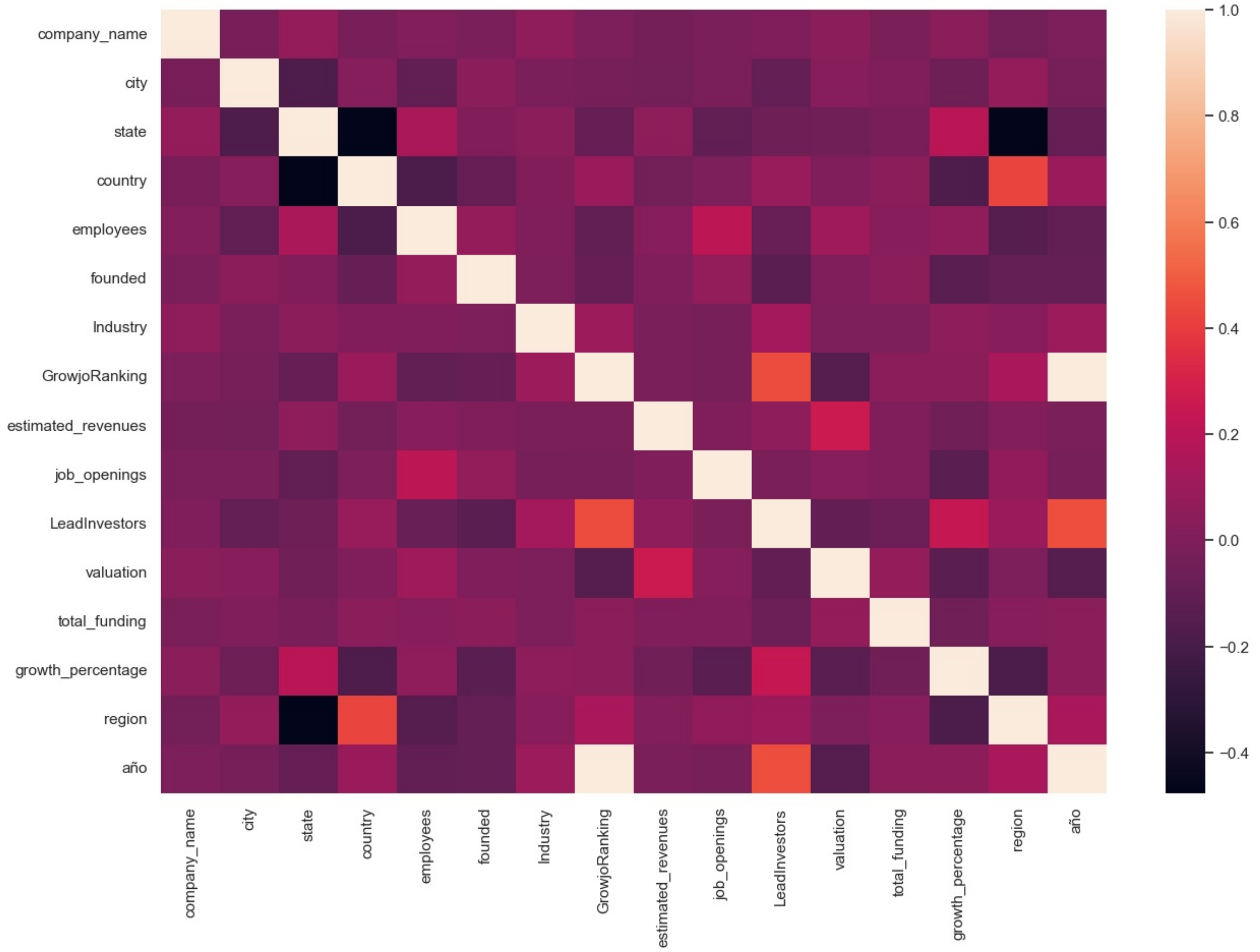
In [ ]:

```
from sklearn import preprocessing

# recorra cada columna en el marco de datos donde dtype es 'objeto'
for col in df.select_dtypes(include=['object']).columns:

    #inicializar un objeto codificador de etiquetas
    label_encoder = preprocessing.LabelEncoder()

    #ajustar el codificador a los valores únicos en la columna
    label_encoder.fit(df[col].unique())

    #Transforma la columna usando el codificador
    df[col] = label_encoder.transform(df[col])

    #imprimir el nombre de la columna y los valores codificados únicos
    print(f"{col}: {df[col].unique()}")
```

In [44]:

```
# Correlation heatmap
plt.figure(figsize=(15, 10))
sns.heatmap(df.corr(), fmt='.2g', annot=False)
```

```
Out[44]: <Axes: >
```


company_name
city
state
country
employees
founded
Industry
GrowjoRanking
estimated_revenues
job_openings
LeadInvestors
valuation
total_funding
growth_percentage
region
año
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4

```
In [ ]:
```