Decoding Startup Success: An Analytical Study on Growth, Funding, and Profitability Trends

Insights from Data-Driven Explorations Across Multi-Industry Startups

Goal of the Project

- **Understand the Key Drivers** of startup success through comprehensive exploratory data analysis.

- **Identify Patterns & Trends** in funding, profitability, and market presence across industries and regions.

- **Enable Stakeholders** (investors, entrepreneurs, analysts) to make data-driven decisions using empirical evidence.

- **Benchmark Startups** by comparing financial and operational indicators to uncover high-performing profiles.

- **Analyze Exit Strategies** (IPO, acquisition) to assess success rates across sectors and funding levels.

- **Reveal Industry-Specific Challenges**, such as unprofitability or valuation disparities, for strategic planning.

- **Assess Resource Efficiency** by examining revenue-per-employee ratios and funding utilization.

Project Overview

1 **Objective:**

To analyze key metrics influencing startup growth, funding, and profitability using a diverse, multi-industry dataset.

2 **Scope:**

Exploratory Data Analysis (EDA) across financial, operational, and market metrics to uncover drivers of startup success.

3 **Use Cases:**

Useful for investors, data scientists, and startup founders to inform decision-making and strategic investments.

4 **Tools:**

Jupyter Notebook for analysis and visualization.

Data Cleaning & Preprocessing

Missing Value Treatment:

Imputed or removed rows with nulls in key features like funding amount or valuation.

Outlier Management:

Log scaling and quantile capping used on revenue, valuation, and employee distributions.

Visualizations:

Preparing the data for statistical visualizations and correlation analysis
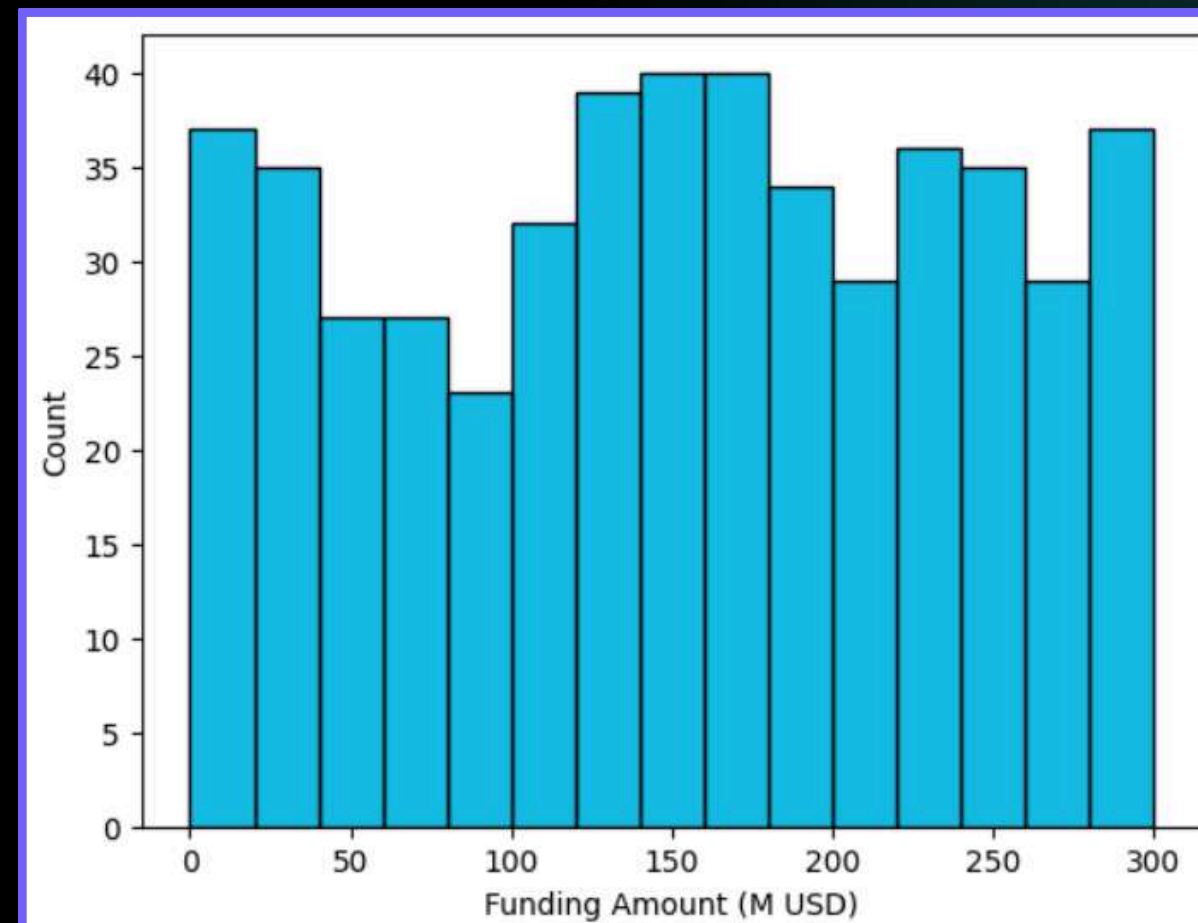
Feature Engineering:

Derived features like "Success Rate" and grouped data by region and industry for comparative analysis.

EXPLORATORY DATA ANALYSIS (EDA) Highlights

1. **Funding Amount (M USD):**

```
sns.histplot(data=df,x='Funding Amount (M USD)',bins=[0,20,40,60,80,100,120,140,160,180,200,220,240,260,280,300])
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

2. Market Share Distribution by Industry:

```python
plt.figure(figsize=(10, 5))
sns.boxplot(x=df['Industry'], y=df['Market Share (%)'], palette='muted')
plt.xticks(rotation=45, ha='right')
plt.title('Market Share Distribution by Industry')
plt.xlabel('Industry')
plt.ylabel('Market Share (%)')
plt.show()
```


Market Share Distribution by Industry
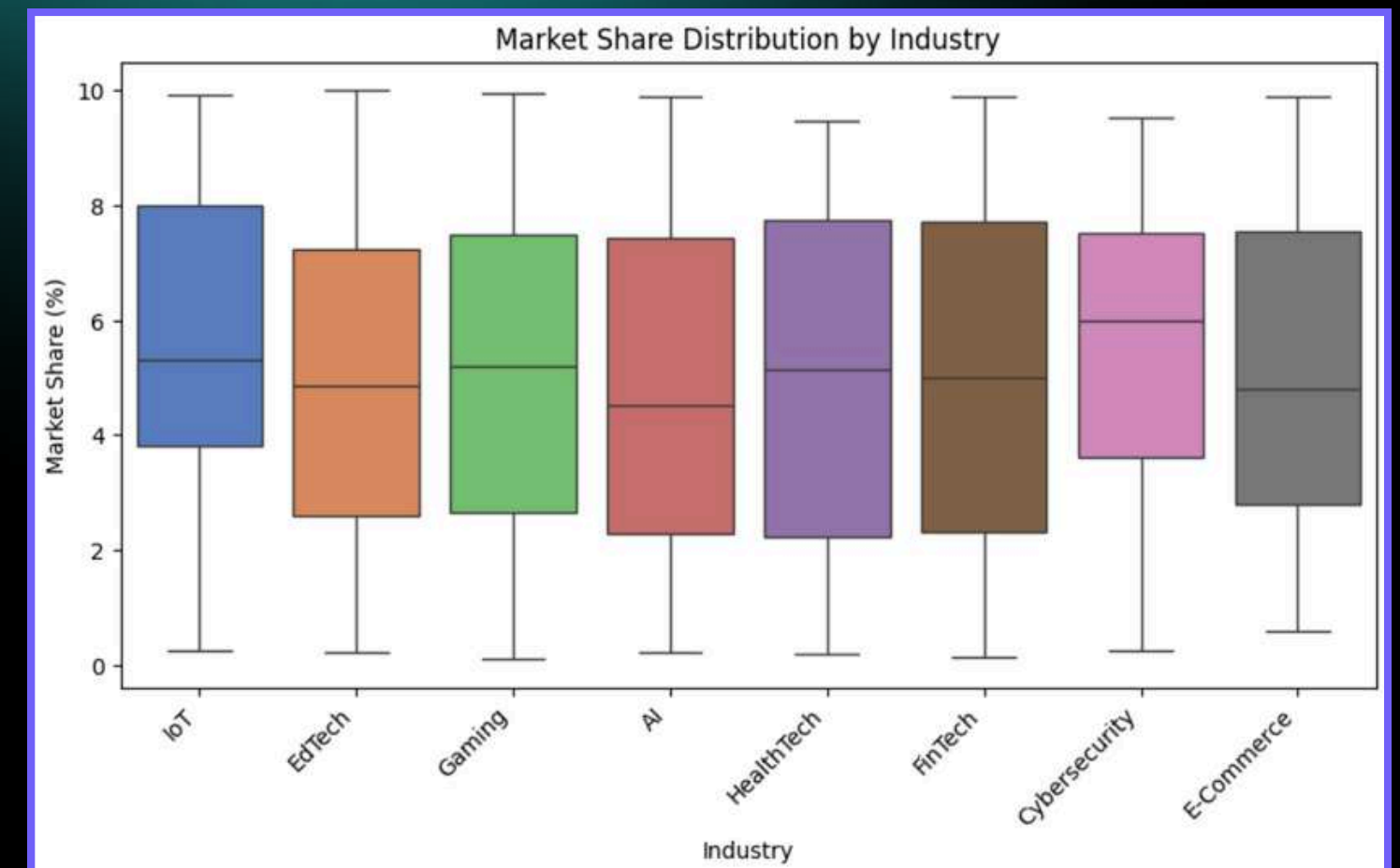
EXPLORATORY DATA ANALYSIS (EDA) Highlights

3. Average Revenue by Region:

```python
avg_revenue = df.groupby('Region')['Revenue (M USD)'].mean().sort_values()
plt.figure(figsize=(6, 4))
sns.barplot(x=avg_revenue.index, y=avg_revenue.values, palette='Blues_d')
plt.title('Average Revenue by Region')
plt.xlabel('Region')
plt.ylabel('Revenue (M USD)')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```
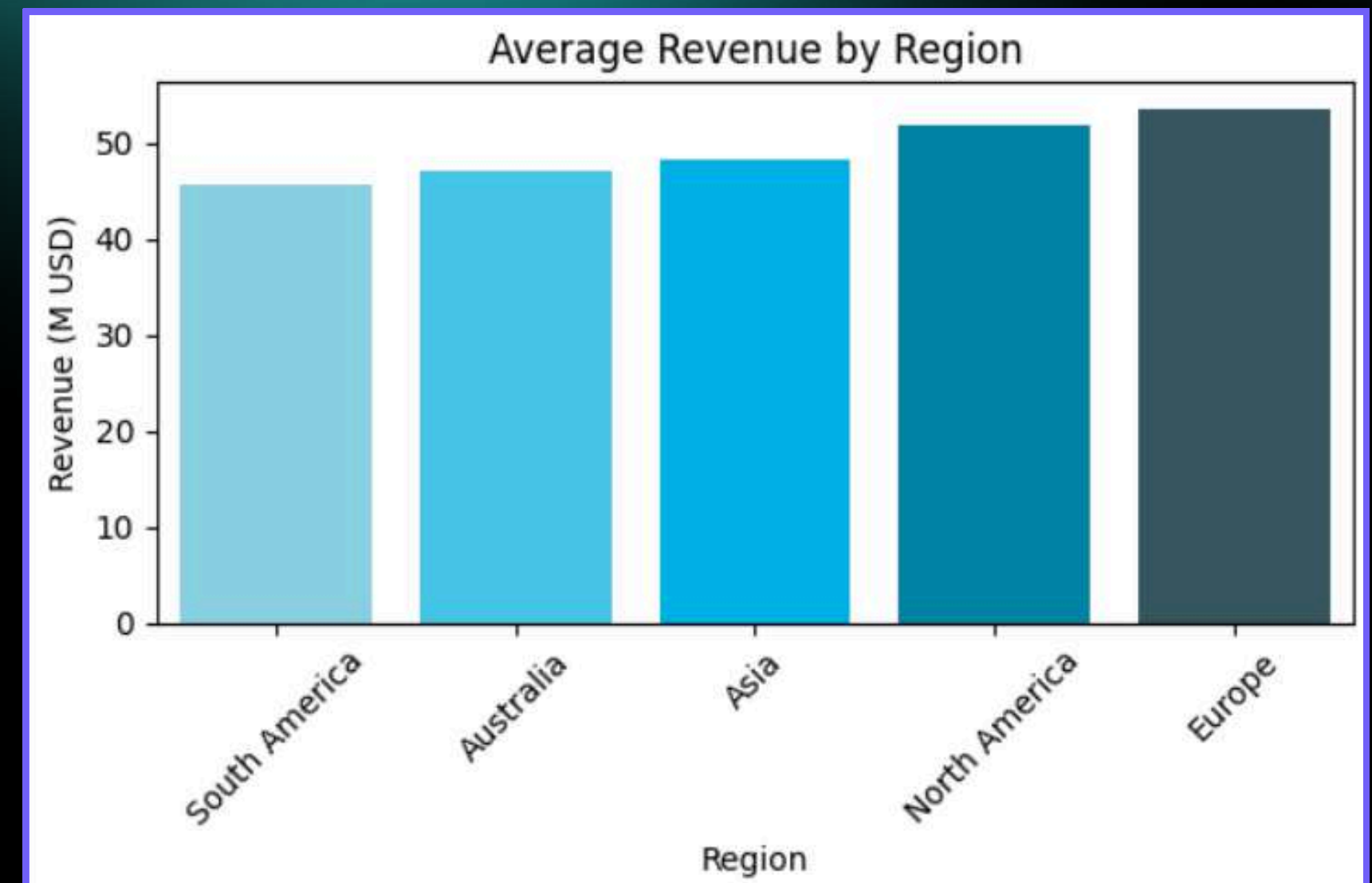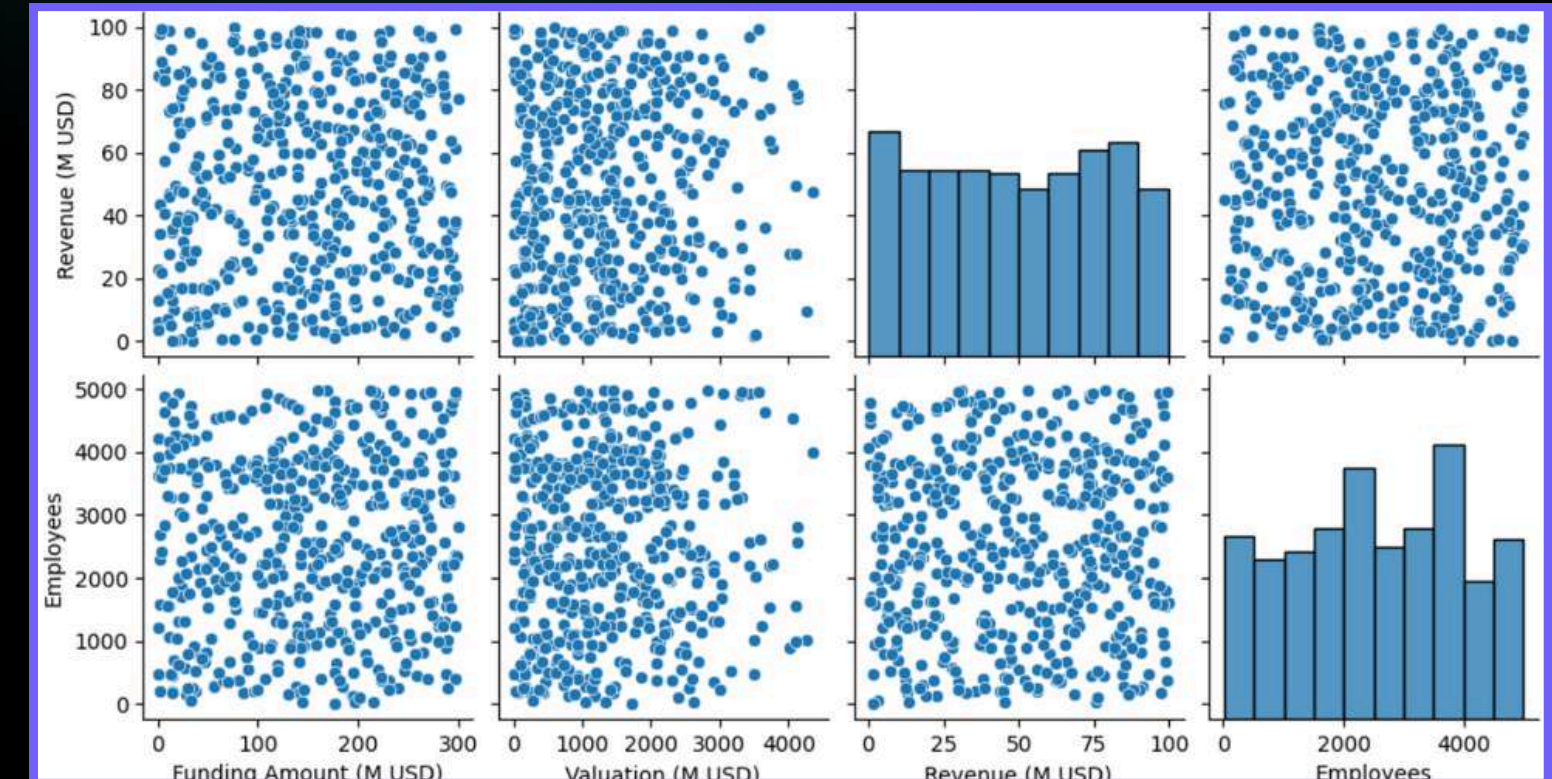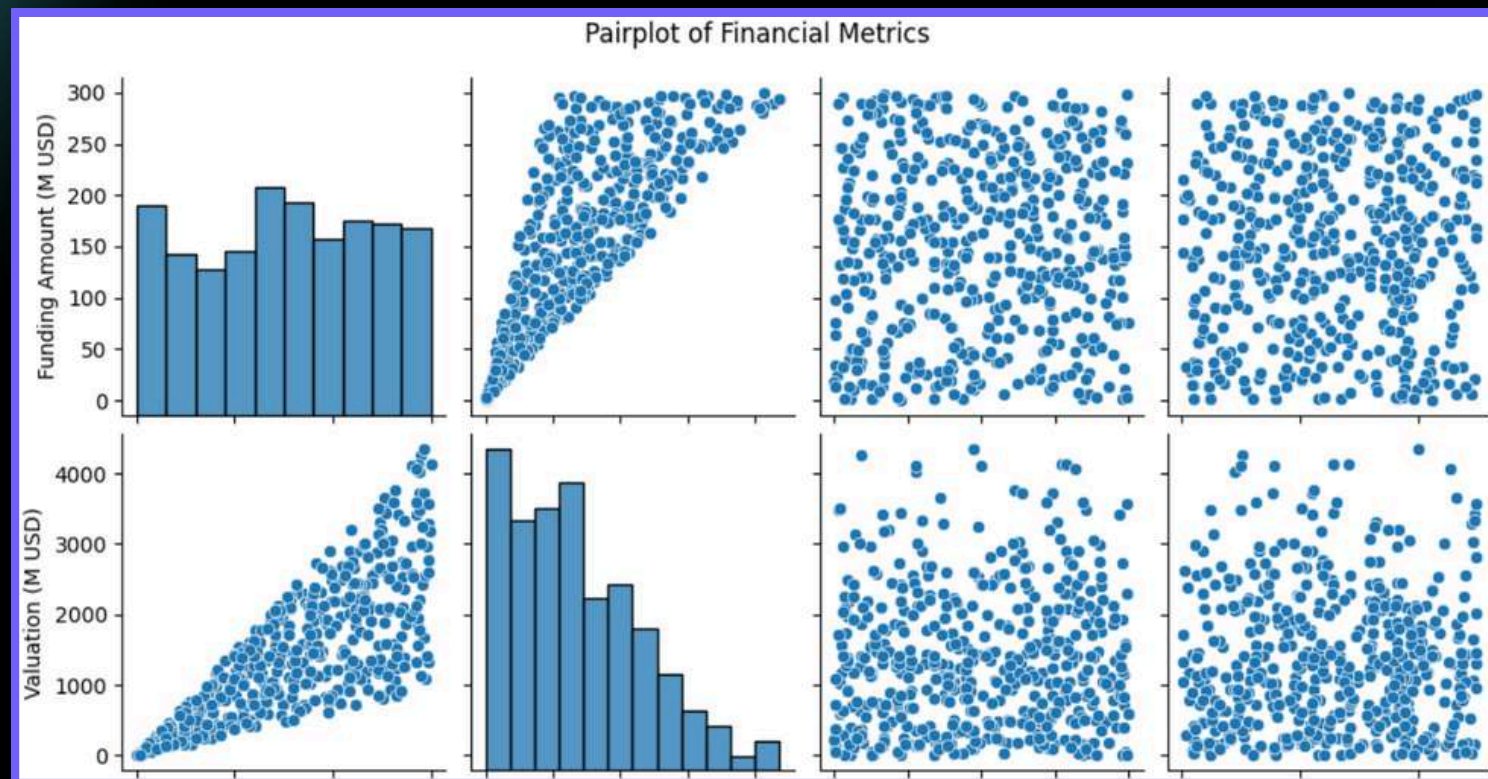
EXPLORATORY DATA ANALYSIS (EDA) Highlights

4. Pairplot of Core Financial Features:

```python
core_features = ['Funding Amount (M USD)', 'Valuation (M USD)', 'Revenue (M USD)', 'Employees']
sns.pairplot(df[core_features])
plt.suptitle('Pairplot of Financial Metrics', y=1.02)
plt.show()
```
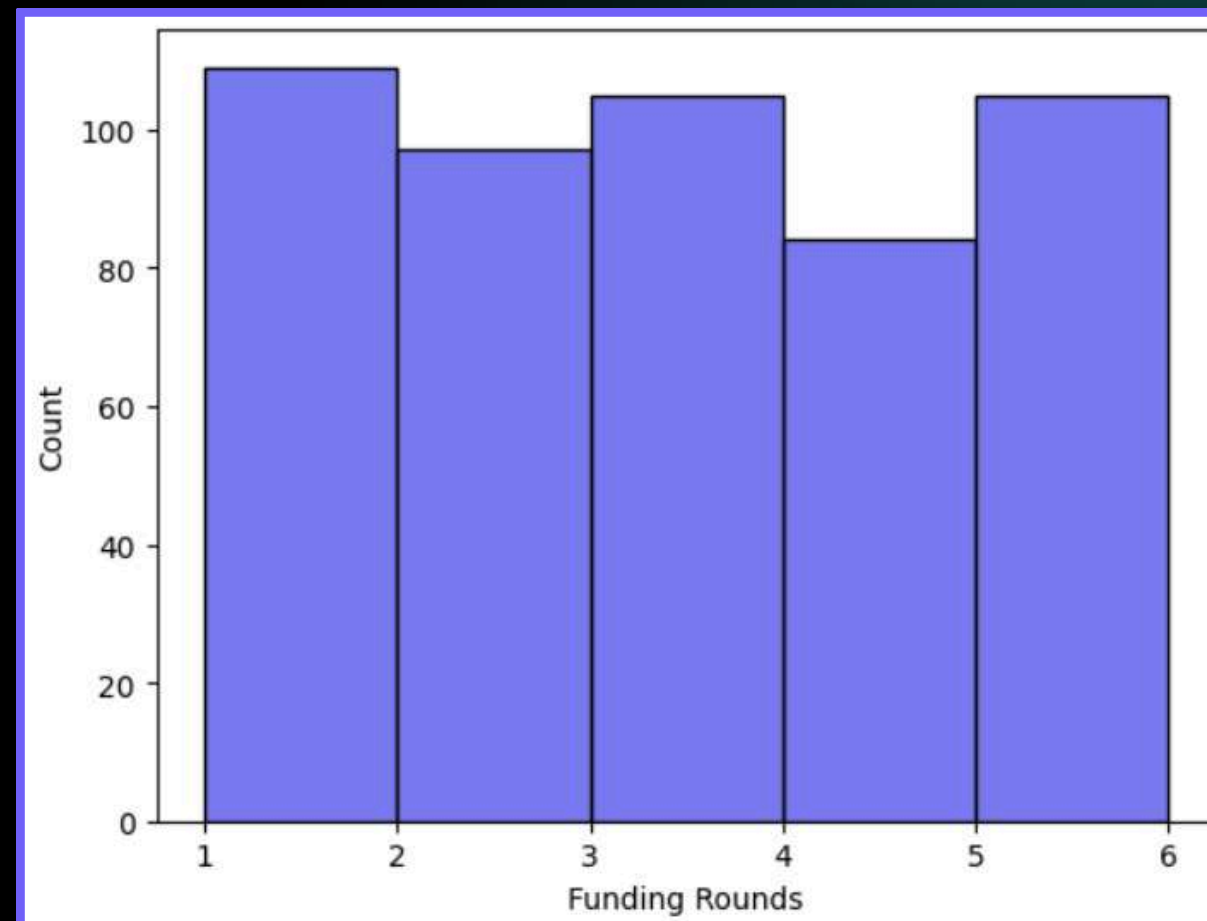

Pairplot of Financial Metrics

EXPLORATORY DATA ANALYSIS (EDA) Highlights

5. Funding Rounds:

```python
sns.histplot(data=df,x='Funding Rounds',bins=[1,2,3,4,5,6])
```
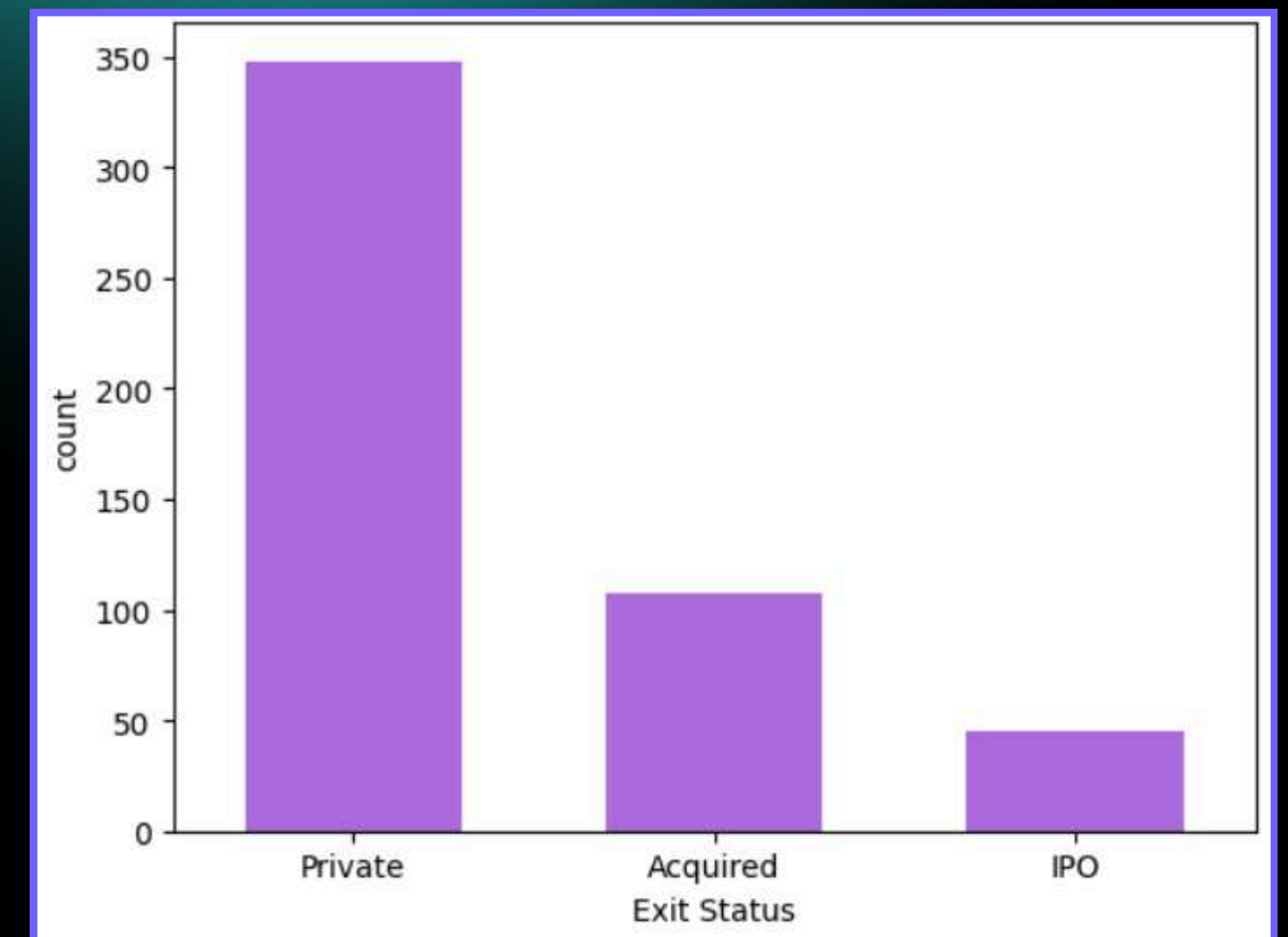
EXPLORATORY DATA ANALYSIS (EDA) Highlights

7. Exit Status Analysis Countplot:

```python
sns.countplot(data=df,x=df['Exit Status'],width=0.6)
plt.show()
```
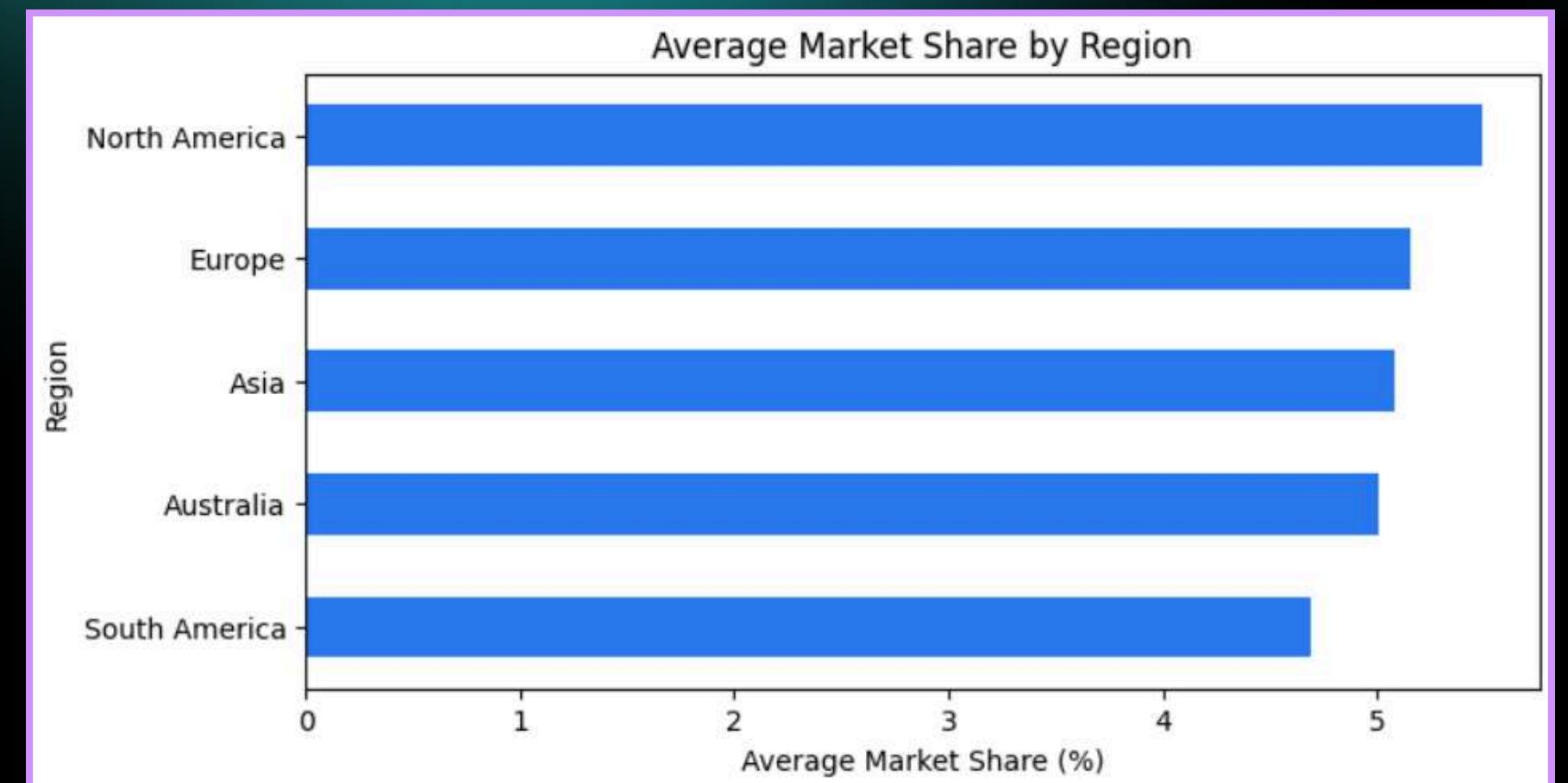
EXPLORATORY DATA ANALYSIS (EDA) Highlights

8. Regional Market Share:

```python
plt.figure(figsize=(8, 4))
df.groupby('Region')['Market Share (%)'].mean().sort_values().plot(kind='barh')
plt.title('Average Market Share by Region')
plt.xlabel('Average Market Share (%)')
plt.show()
```


Average Market Share by Region

EXPLORATORY DATA ANALYSIS (EDA) Highlights

9. Funding Trend Over Time:

```python
funding_trend = df.groupby('Year Founded')['Funding Amount (M USD)'].sum().sort_index()
plt.figure(figsize=(10, 5))
sns.lineplot(x=funding_trend.index, y=funding_trend.values, marker='o', color='darkred')
plt.title('Total Funding Raised per Year')
plt.xlabel('Year Founded')
plt.ylabel('Total Funding (M USD)')
plt.tight_layout()
plt.show()
```
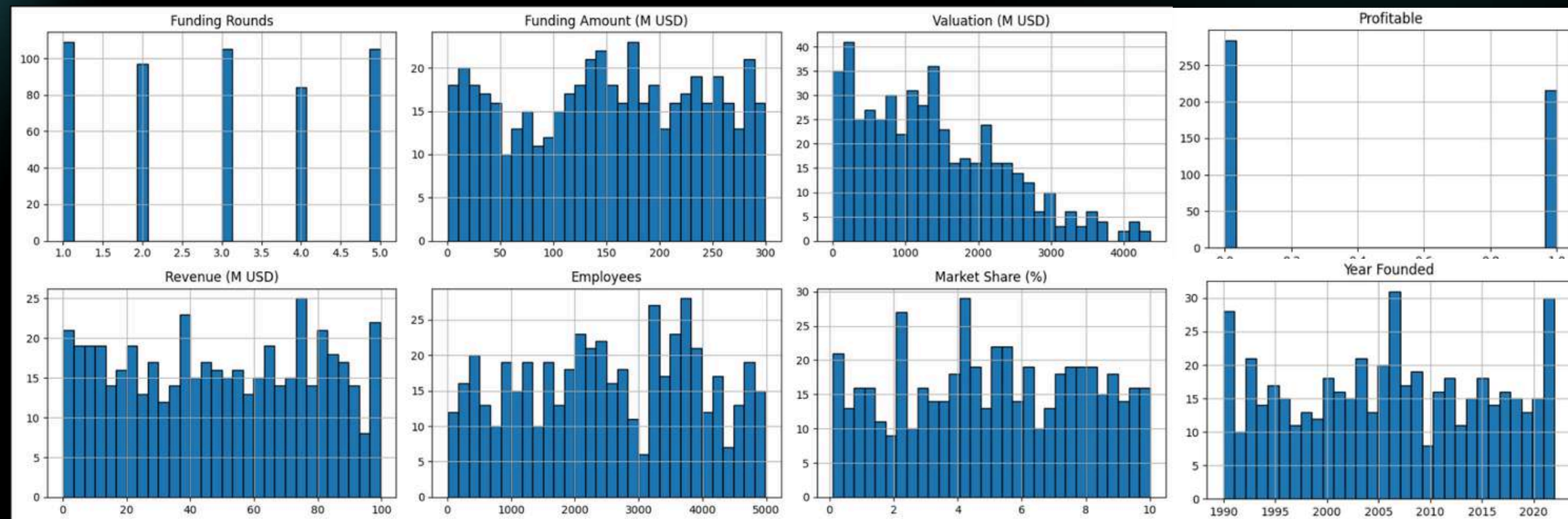

Total Funding Raised per Year
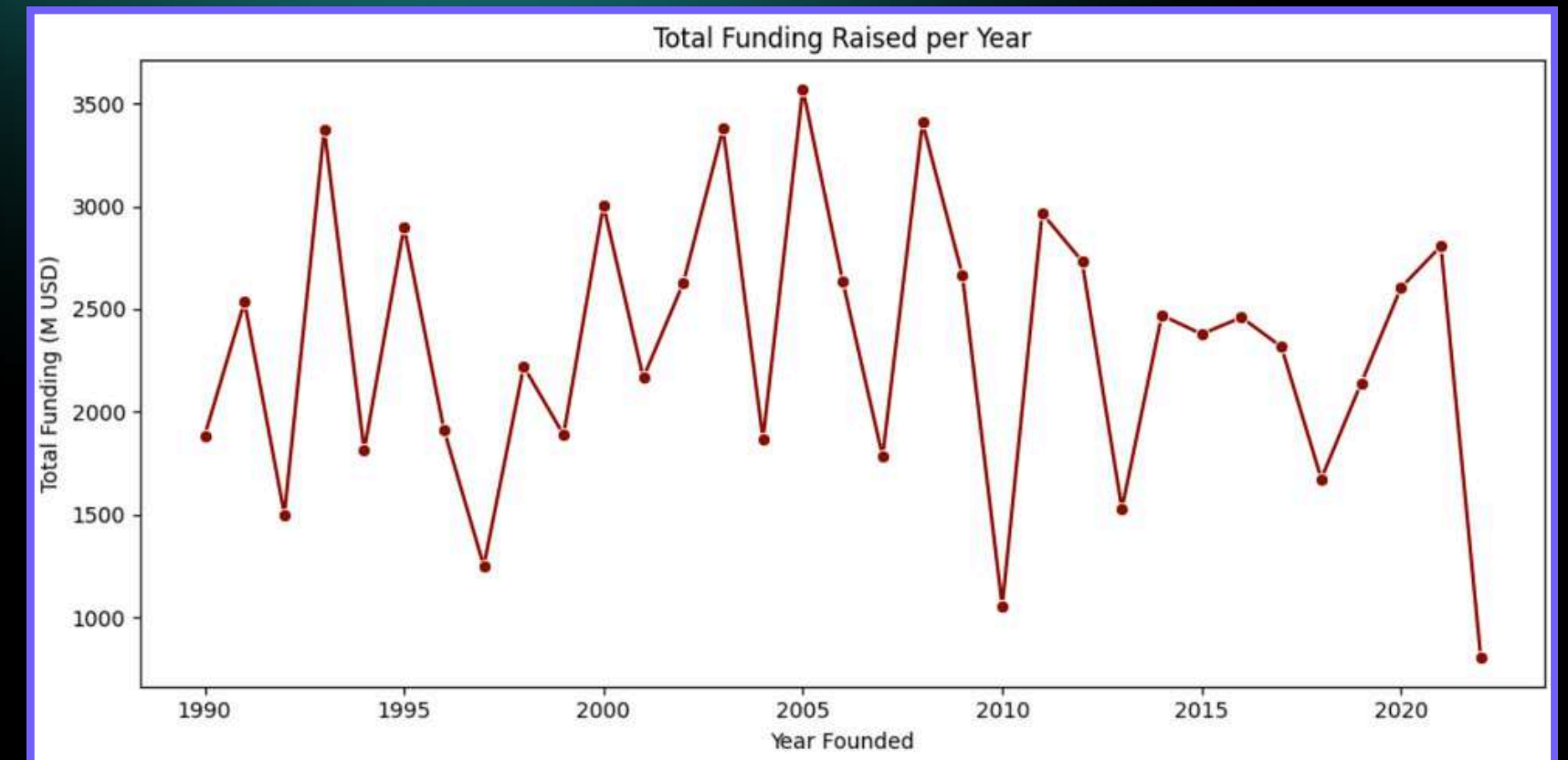
EXPLORATORY DATA ANALYSIS (EDA) Highlights

10. Distribution of Numerical Features:

```python
df.select_dtypes(include='number').hist(bins=30, figsize=(15, 10), edgecolor='black')

plt.tight_layout()
plt.show()
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

11. Employees per Startup by Industry:

```python
plt.figure(figsize=(8, 6))
sns.boxplot(data=df, x='Industry', y='Employees')
plt.title('Number of Employees per Industry')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```
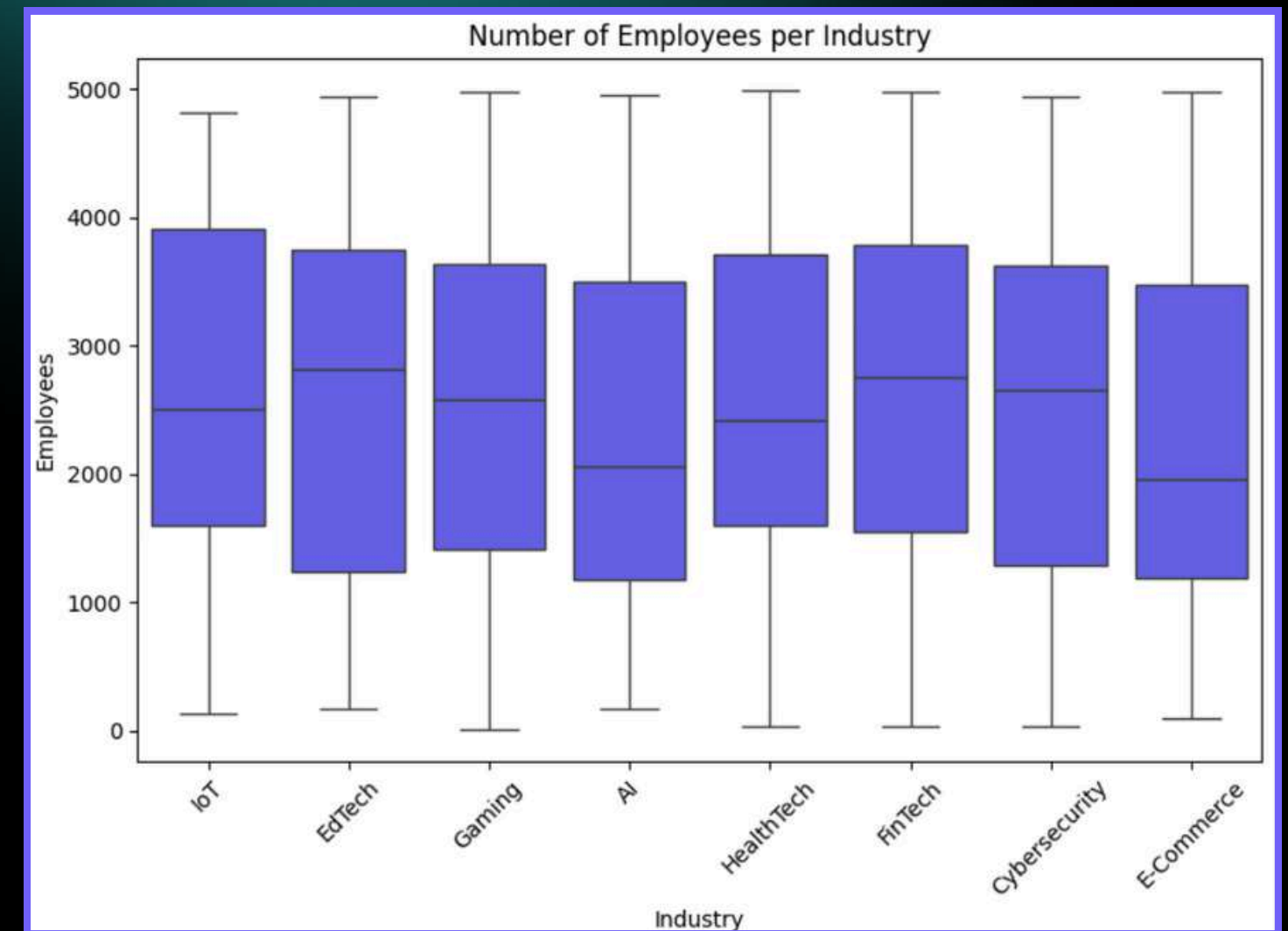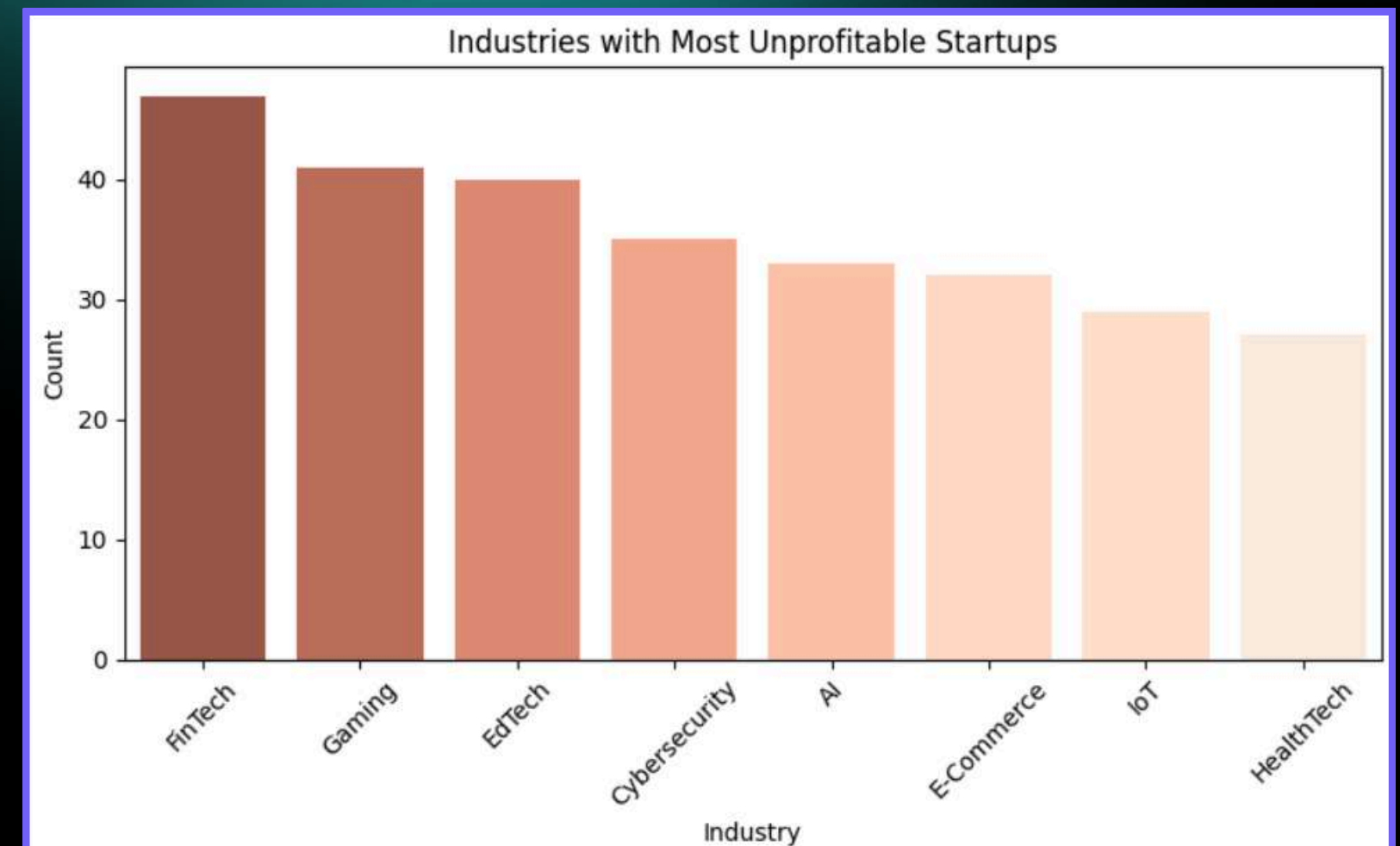
EXPLORATORY DATA ANALYSIS (EDA) Highlights

## 12. Industries with Most Unprofitable Startups:

```python
unprofitable_counts = df[df['Profitable'] == 0]['Industry'].value_counts()
plt.figure(figsize=(8, 5))
sns.barplot(x=unprofitable_counts.index, y=unprofitable_counts.values, palette='Reds_r')
plt.title('Industries with Most Unprofitable Startups')
plt.xticks(rotation=45)
plt.ylabel('Count')
plt.tight_layout()
plt.show()
```


Industries with Most Unprofitable Startups

EXPLORATORY DATA ANALYSIS (EDA) Highlights

13. Funding Amount vs. Valuation:

```python
plt.figure(figsize=(8, 6))
sns.regplot(x='Funding Rounds', y='Valuation (M USD)', data=df, scatter_kws={'alpha':0.5})
plt.title('Funding Rounds vs Valuation')
plt.show()
```
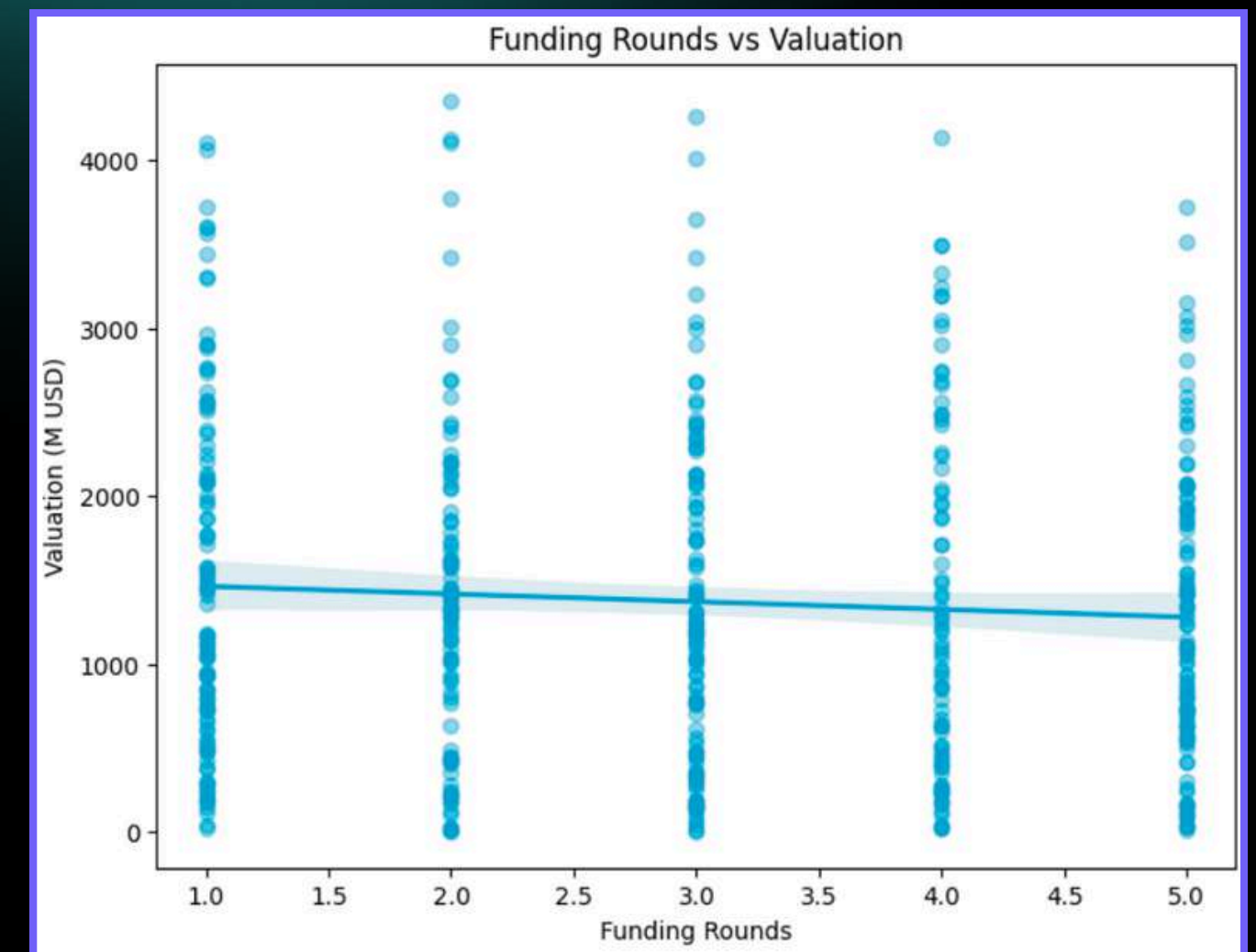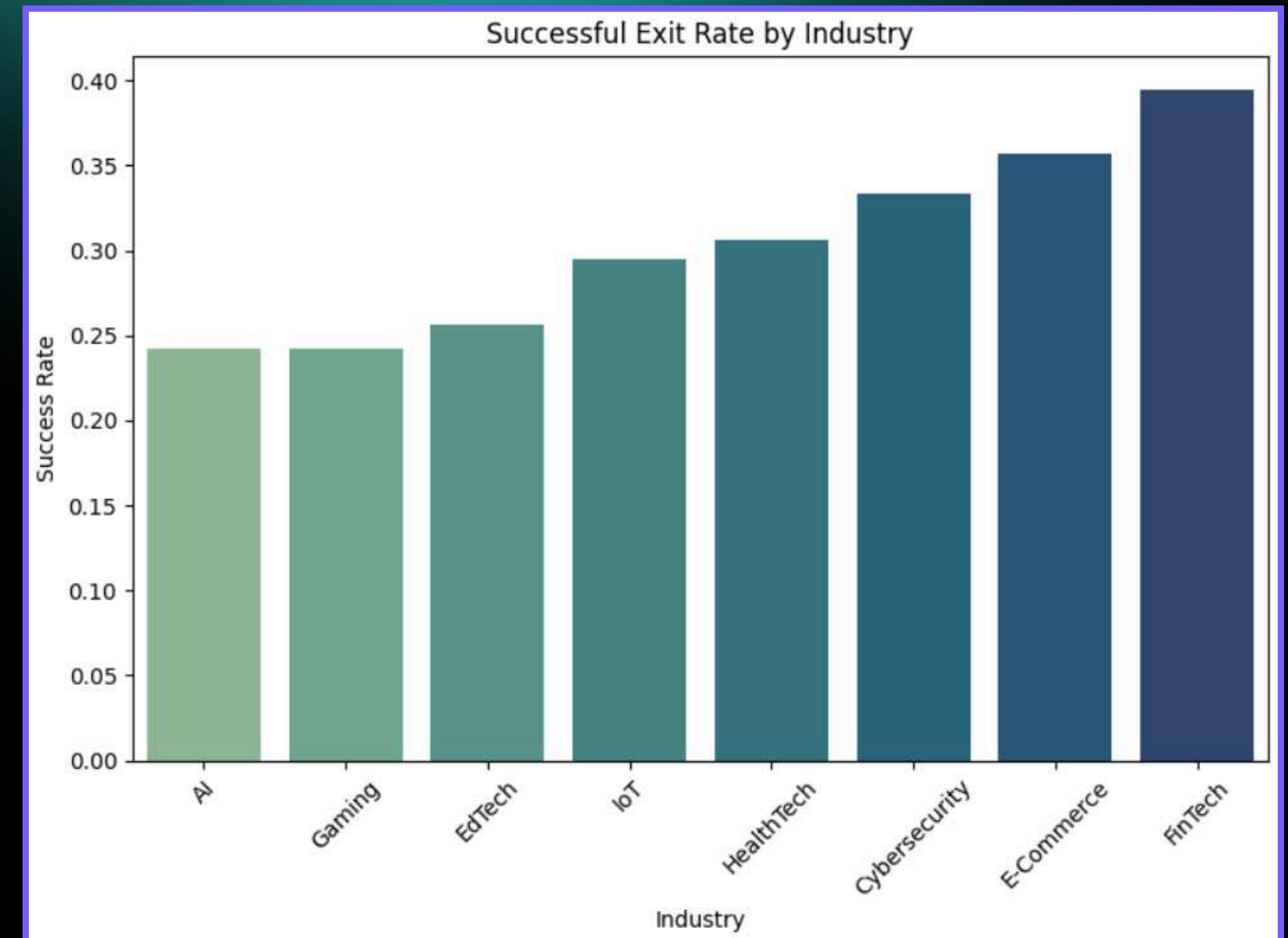
EXPLORATORY DATA ANALYSIS (EDA) Highlights

## 14. Success Rate (Exit = Acquired or IPO) by Industry:

```python
df['Successful Exit'] = df['Exit Status'].isin(['Acquired', 'IPO']).astype(int)
success_rate = df.groupby('Industry')['Successful Exit'].mean().sort_values()
plt.figure(figsize=(8, 6))
sns.barplot(x=success_rate.index, y=success_rate.values, palette='crest')
plt.title('Successful Exit Rate by Industry')
plt.ylabel('Success Rate')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

15. Time Trend Analysis (Year Founded):

```python
plt.figure(figsize=(11, 6))
sns.countplot(x='Year Founded', data=df, palette='viridis')
plt.title('Startups Founded by Year')
plt.xticks(rotation=45)
plt.show()
```
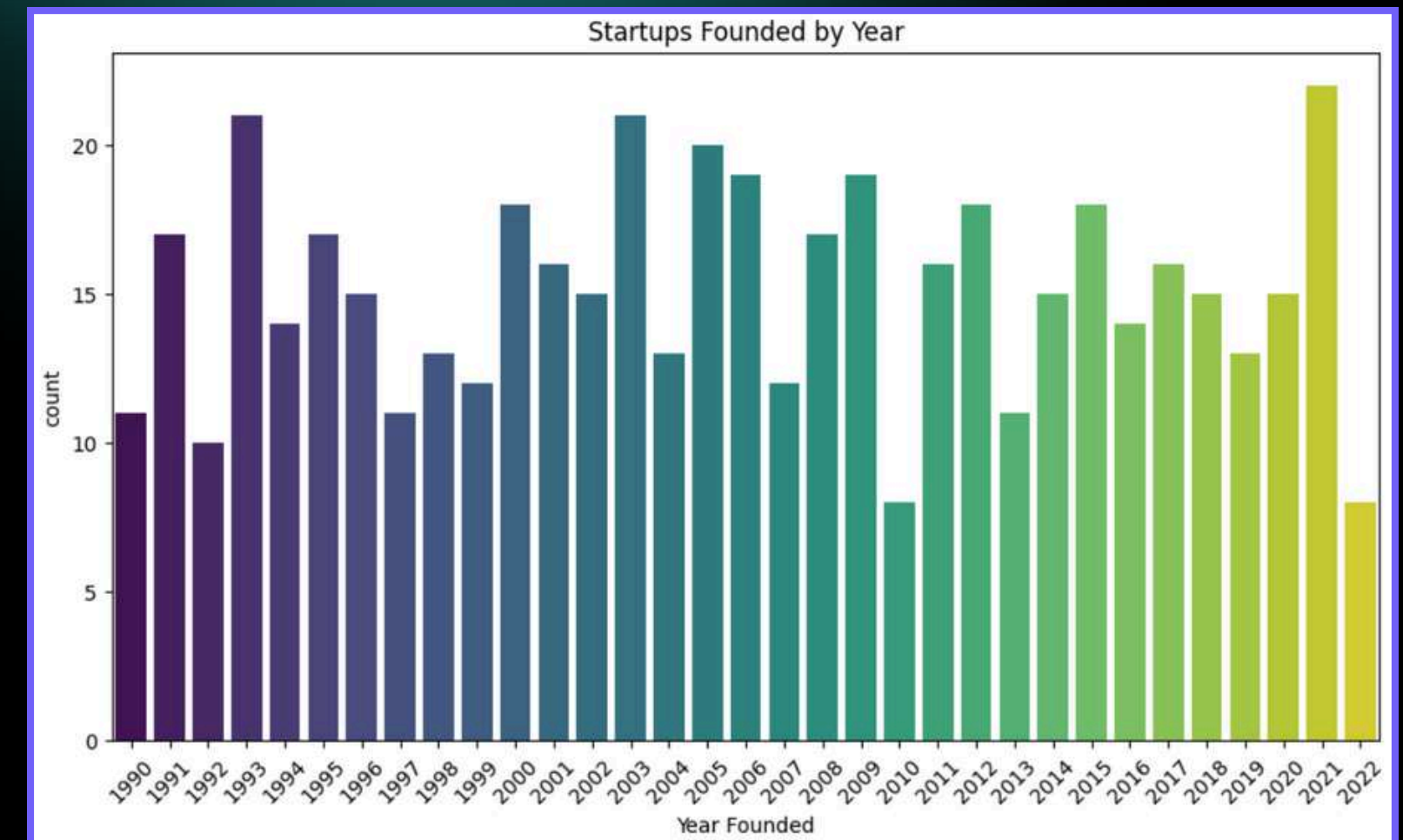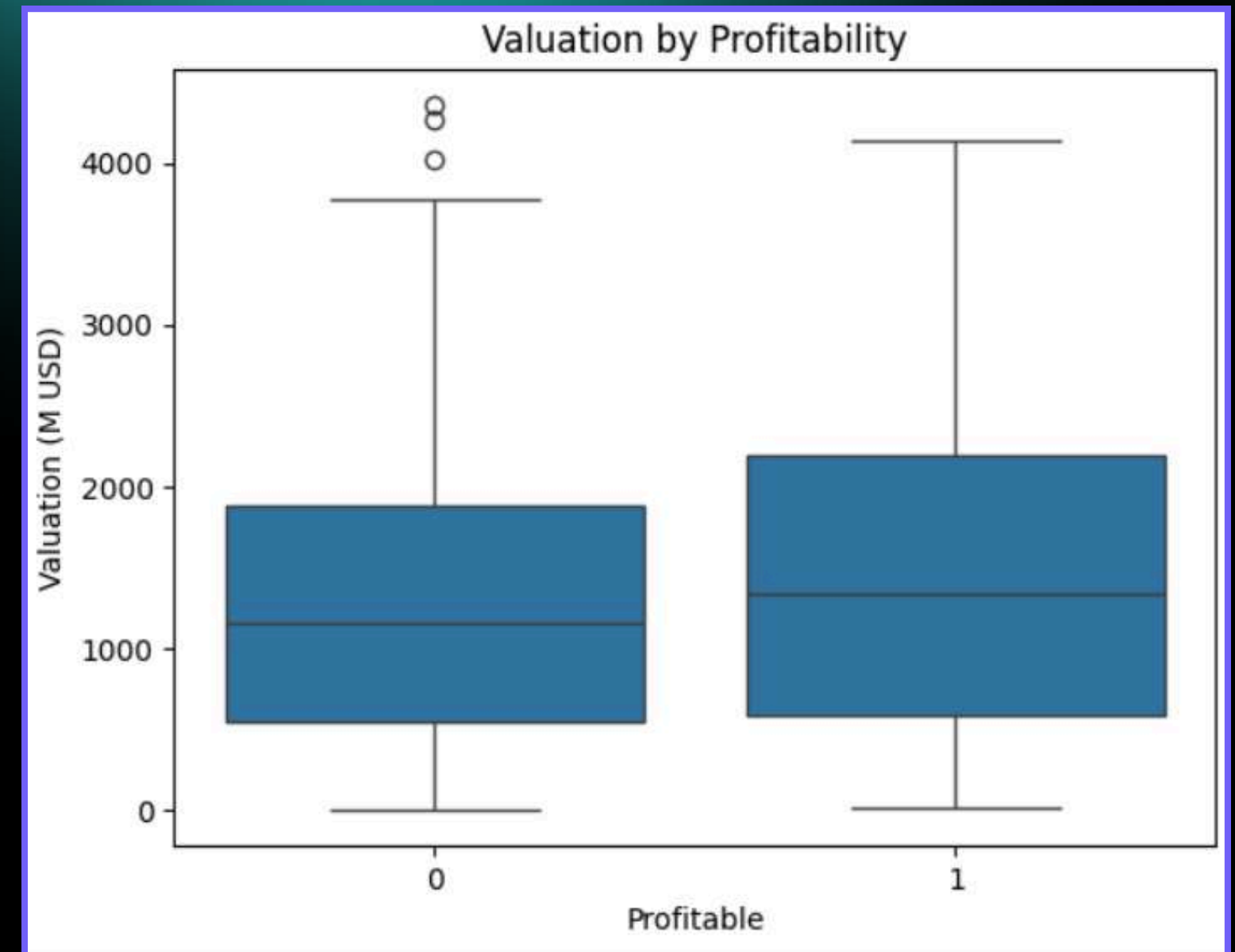
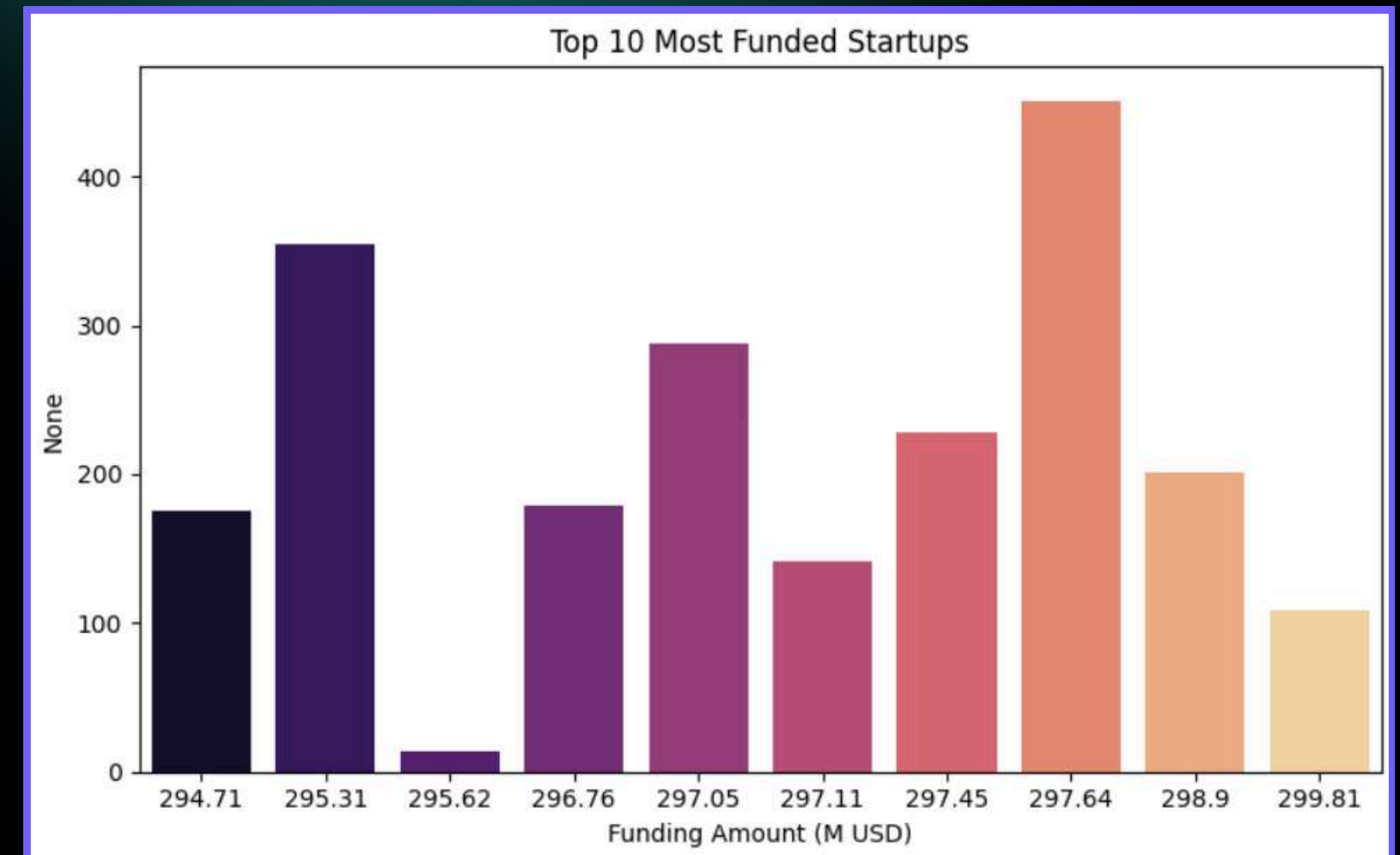# EXPLORATORY DATA ANALYSIS (EDA) Highlights

16. Valuation by Profitability:

```python
sns.boxplot(x='Profitable', y='Valuation (M USD)', data=df)
plt.title('Valuation by Profitability')
plt.show()
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

17. Top 10 Most Funded Startups:

```python
top_funded = df.sort_values(by='Funding Amount (M USD)', ascending=False).head(10)
plt.figure(figsize=(8, 5))
sns.barplot(data=top_funded, x='Funding Amount (M USD)', y=top_funded.index, palette='magma')
plt.title('Top 10 Most Funded Startups')
plt.xlabel('Funding Amount (M USD)')
plt.tight_layout()
plt.show()
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

18. Exit Status Analysis Pie chart:

```python
plt.figure(figsize=(6, 4))
plt.pie(df['Exit Status'].value_counts().values, labels=df['Exit Status'].value_counts().index, autopct='%1.1f%%', startangle=140)

plt.title("Exit Status Analysis")

plt.show()
```
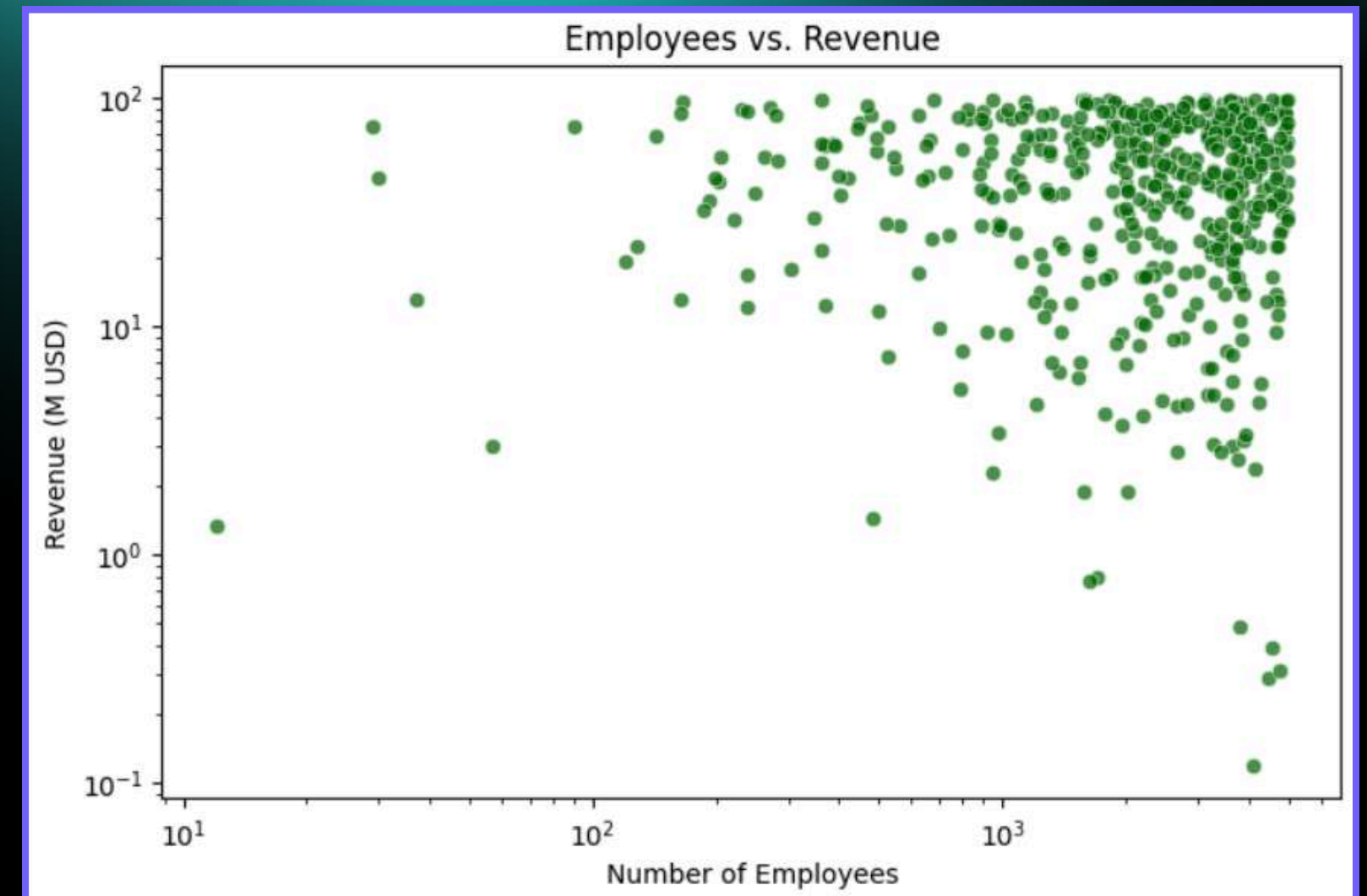
EXPLORATORY DATA ANALYSIS (EDA) Highlights

19. Employees vs. Revenue:

```python
plt.figure(figsize=(8, 5))
sns.scatterplot(x=df['Employees'], y=df['Revenue (M USD)'], alpha=0.7, color='darkgreen')
plt.title('Employees vs. Revenue')
plt.xlabel('Number of Employees')
plt.ylabel('Revenue (M USD)')
plt.xscale('log')
plt.yscale('log')
plt.show()
```
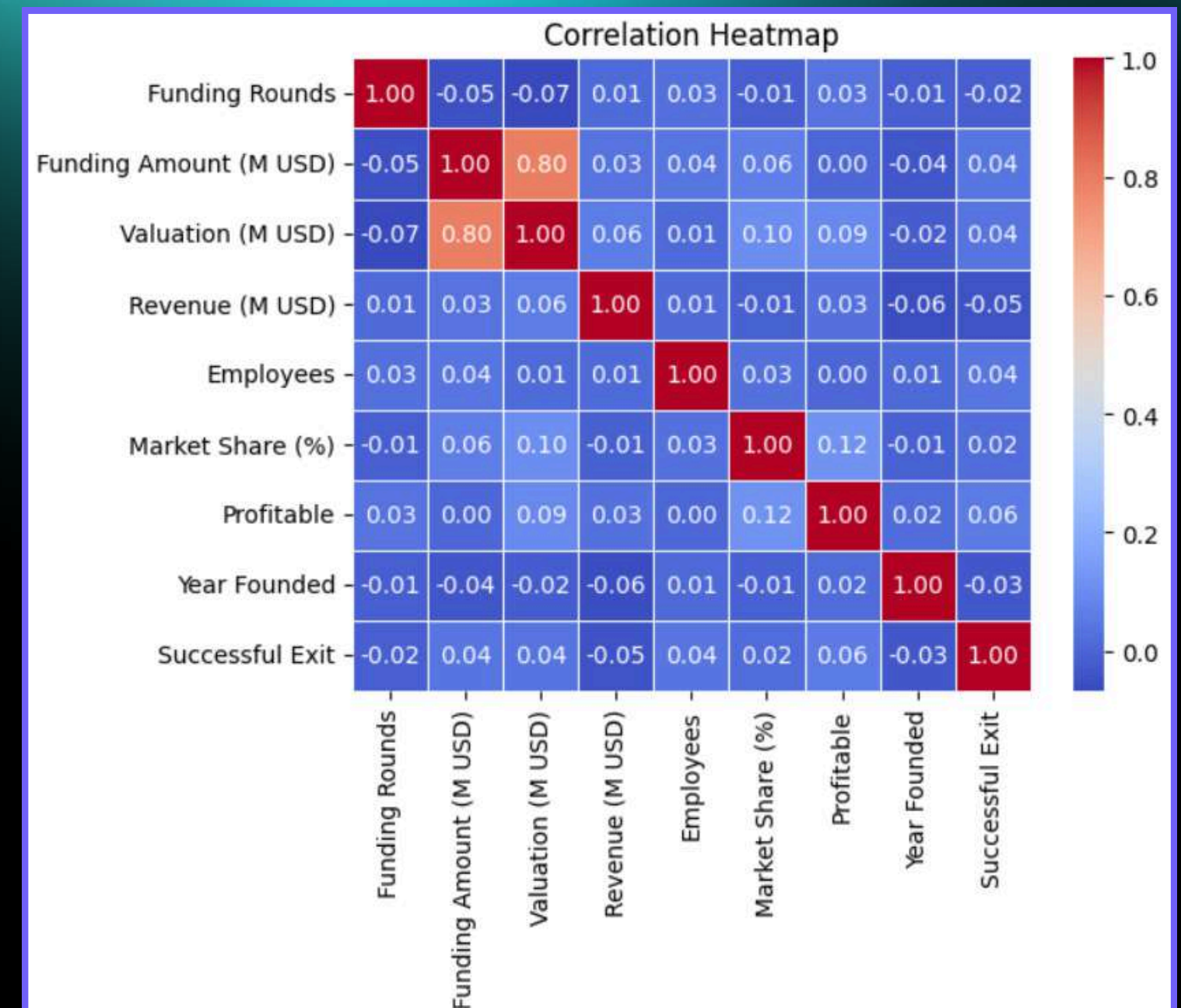
EXPLORATORY DATA ANALYSIS (EDA) Highlights

20. Correlation Heatmap:

```python
sns.heatmap(corr,annot=True,cmap='coolwarm',fmt='.2f', linewidths=0.5)
plt.title('Correlation Heatmap')
plt.show()
```


Correlation Heatmap

EXPLORATORY DATA ANALYSIS (EDA) Highlights

21. Numerical Variables Distribution:

```python
fig, axes = plt.subplots(1, 3, figsize=(18, 5))
sns.histplot(df['Funding Amount (M USD)'], ax=axes[0], kde=True, color='darkblue')
axes[0].set_title('Funding Amount Distribution')

sns.histplot(df['Valuation (M USD)'], ax=axes[1], kde=True, color='purple')
axes[1].set_title('Valuation Distribution')

sns.histplot(df['Revenue (M USD)'], ax=axes[2], kde=True, color='darkorange')
axes[2].set_title('Revenue Distribution')
plt.show()
```
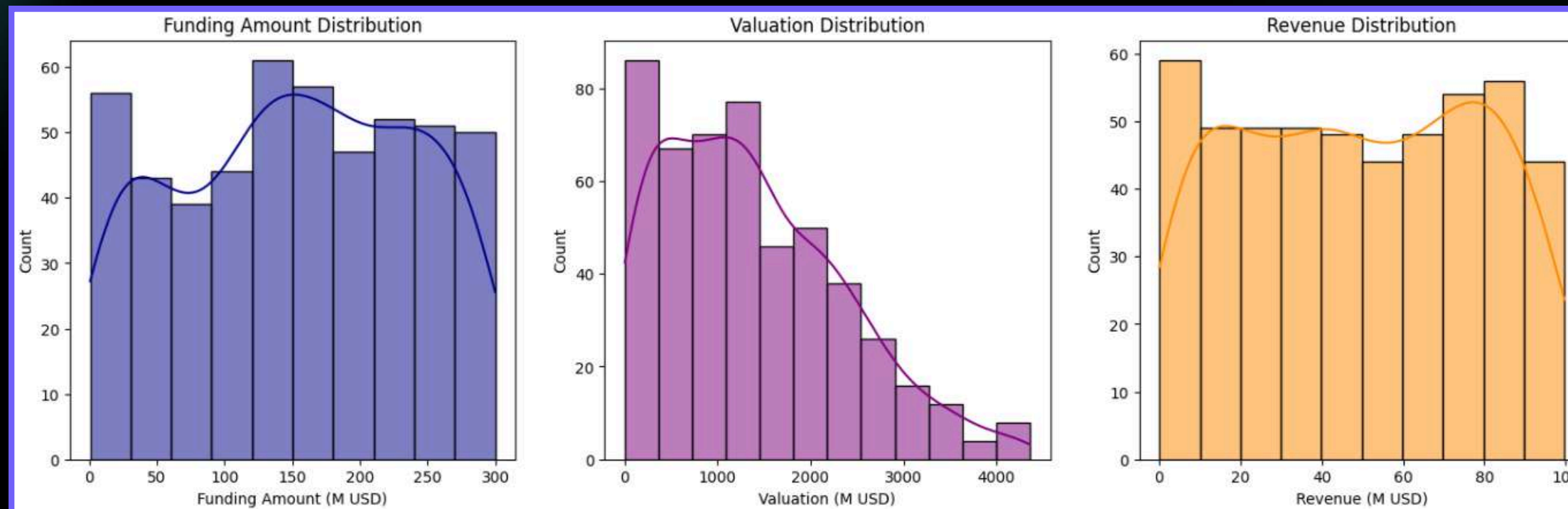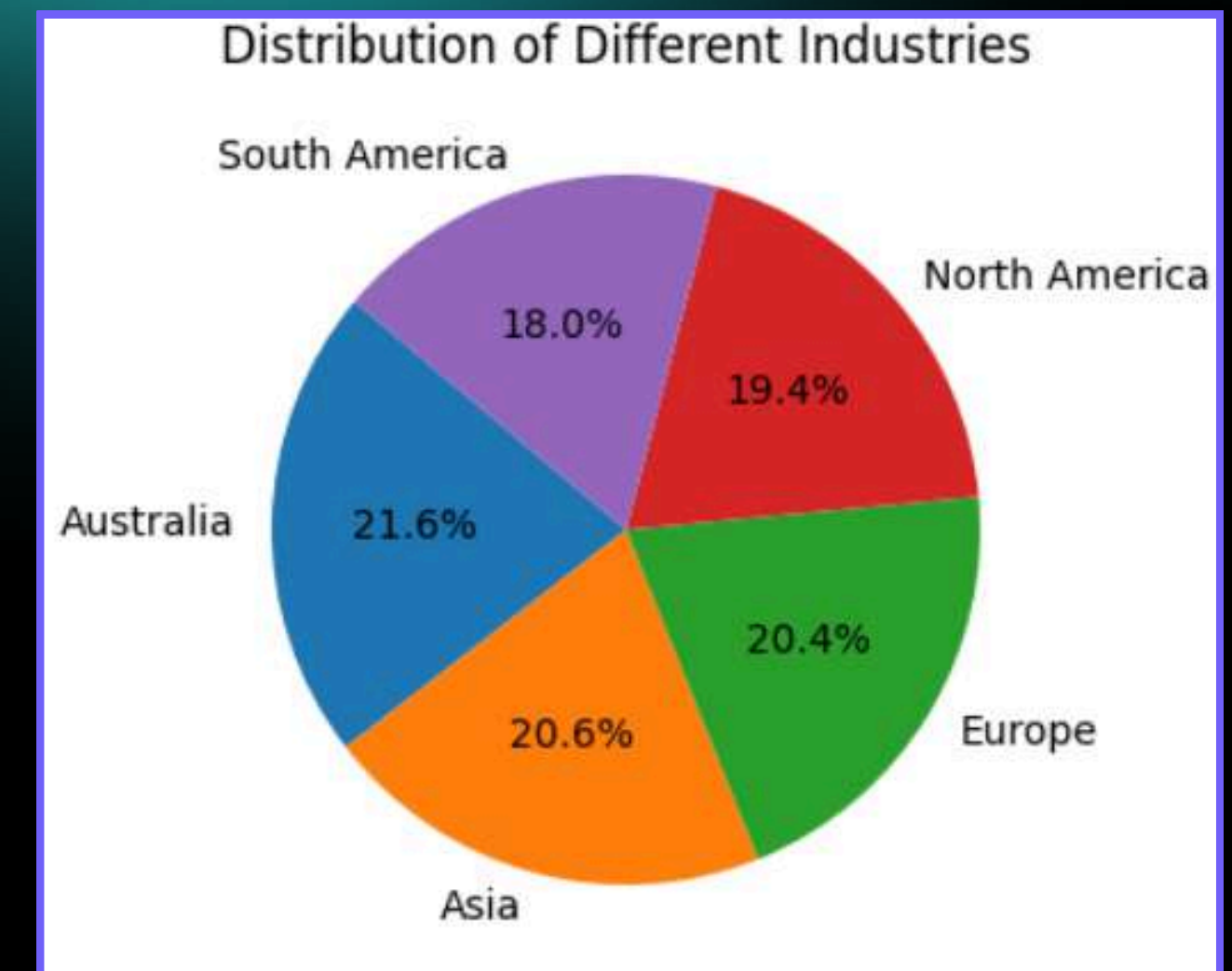
EXPLORATORY DATA ANALYSIS (EDA) Highlights

22. Distribution of Different Industries:

```python
industry_counts = df['Industry'].value_counts()

plt.figure(figsize=(4, 6))
plt.pie(df['Region'].value_counts().values, labels=df['Region'].value_counts().index, autopct='%1.1f%%', startangle=140)

plt.title("Distribution of Different Industries")

plt.show()
```


Distribution of Different Industries

EDA Highlights

23. Average Startup Valuation by Region:

```python
plt.figure(figsize=(6, 4))
region_valuation = df.groupby('Region')['Valuation (M USD)'].mean().sort_values()
sns.barplot(x=region_valuation.index, y=region_valuation.values, palette='viridis')
plt.title('Average Startup Valuation by Region')
plt.xlabel('Region')
plt.ylabel('Avg. Valuation (M USD)')
plt.xticks(rotation=45)
plt.tight_layout()
plt.show()
```
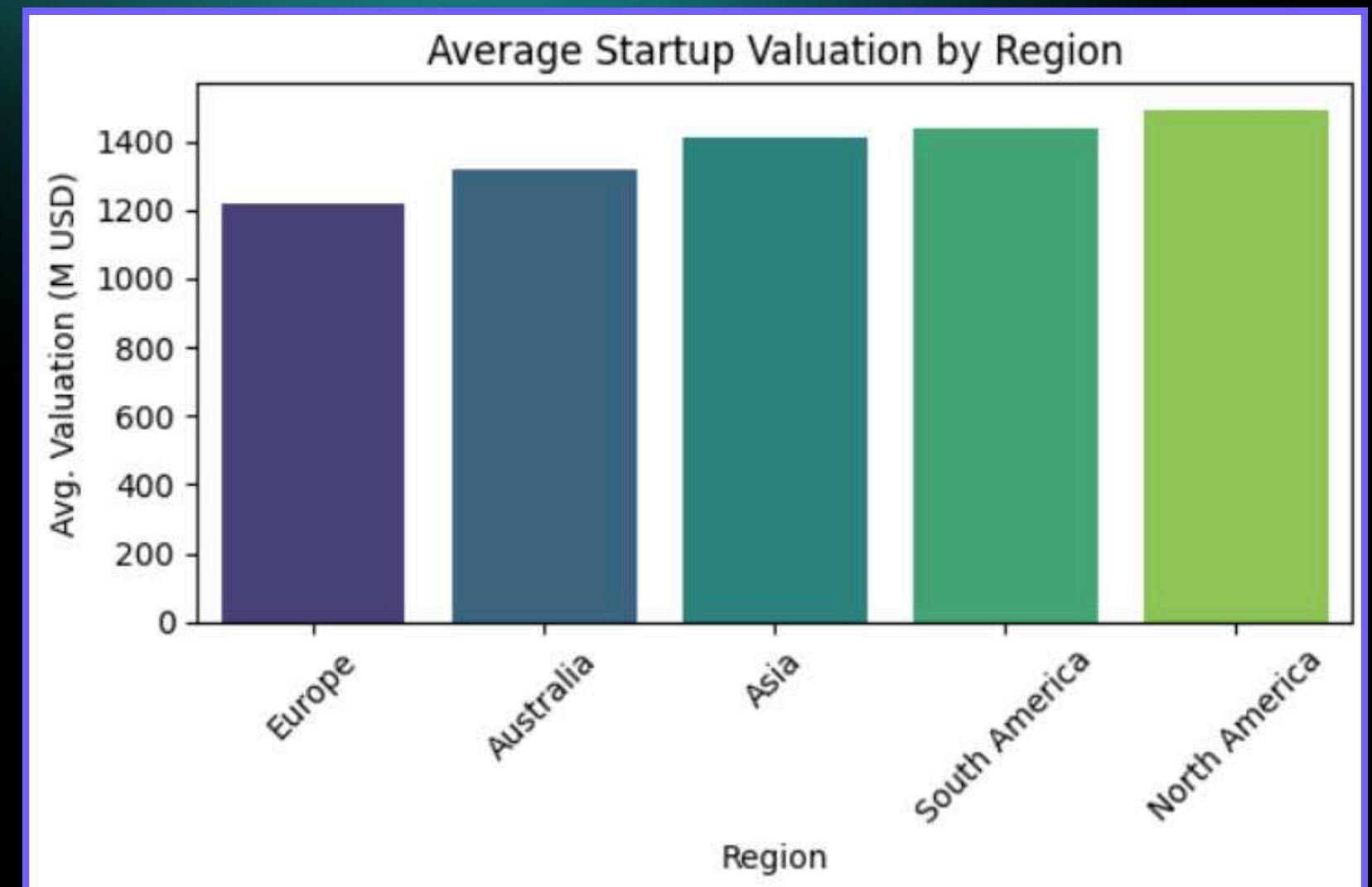
EXPLORATORY DATA ANALYSIS (EDA) Highlights

24. Funding Rounds vs Valuation:

```python
plt.figure(figsize=(8, 5))
sns.scatterplot(x=df['Funding Amount (M USD)'], y=df['Valuation (M USD)'], hue=df['Industry'], alpha=0.7)
plt.title('Funding Amount vs. Valuation')
plt.xlabel('Funding Amount (M USD)')
plt.ylabel('Valuation (M USD)')
plt.legend(title='Industry', bbox_to_anchor=(1, 1))
plt.show()
```
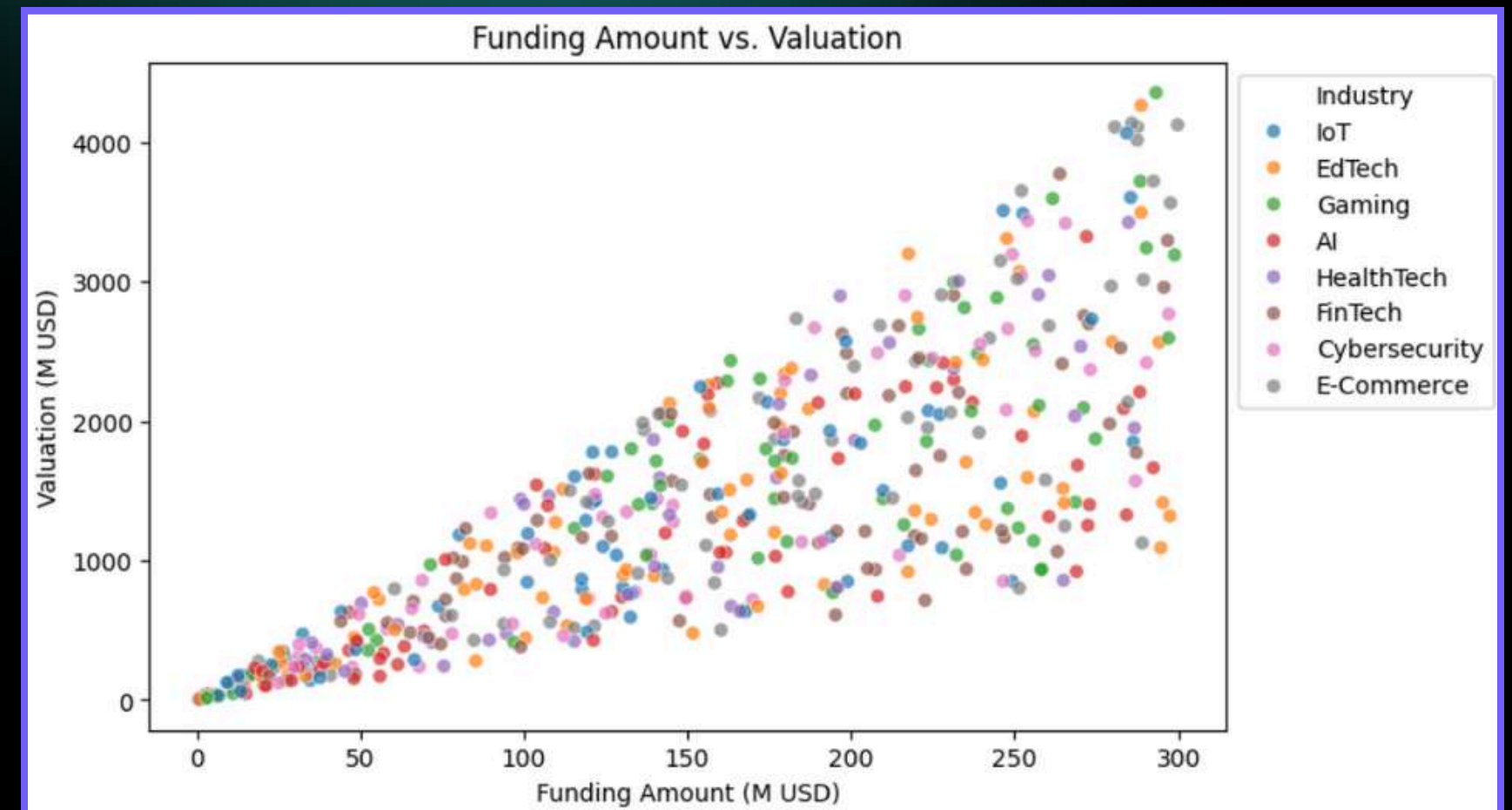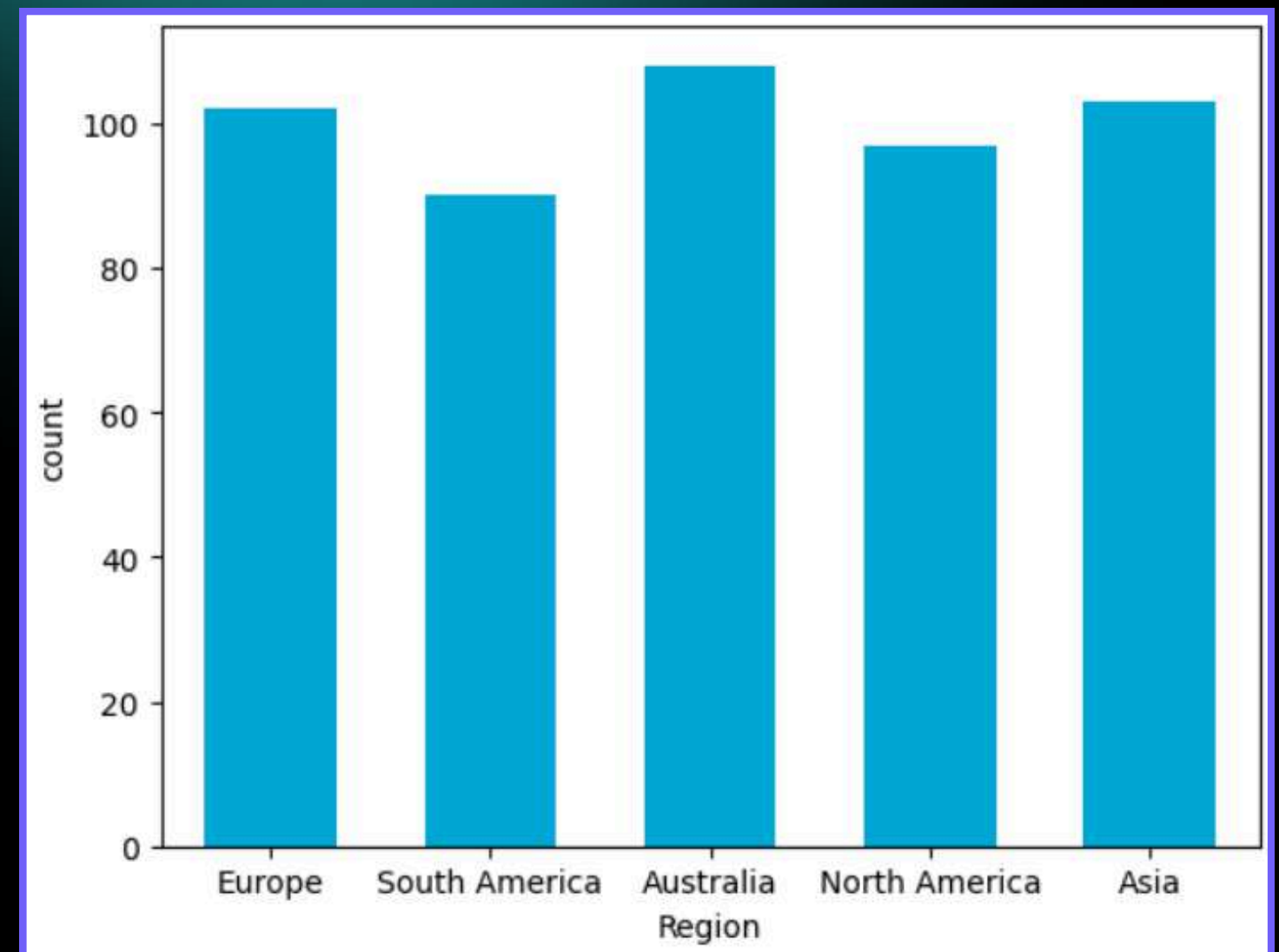
EXPLORATORY DATA ANALYSIS (EDA) Highlights

## 25. Highest startup count by Region:

```python
sns.countplot(data=df,x=df['Region'],width=0.6)
plt.show()
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

26. Employees vs Revenue:

```python
plt.figure(figsize=(10, 5))
sns.scatterplot(x=df['Employees'], y=df['Revenue (M USD)'], alpha=0.7, color='darkgreen')
plt.title('Employees vs. Revenue')
plt.xlabel('Number of Employees')
plt.ylabel('Revenue (M USD)')
plt.xscale('log')
plt.yscale('log')
plt.show()
```
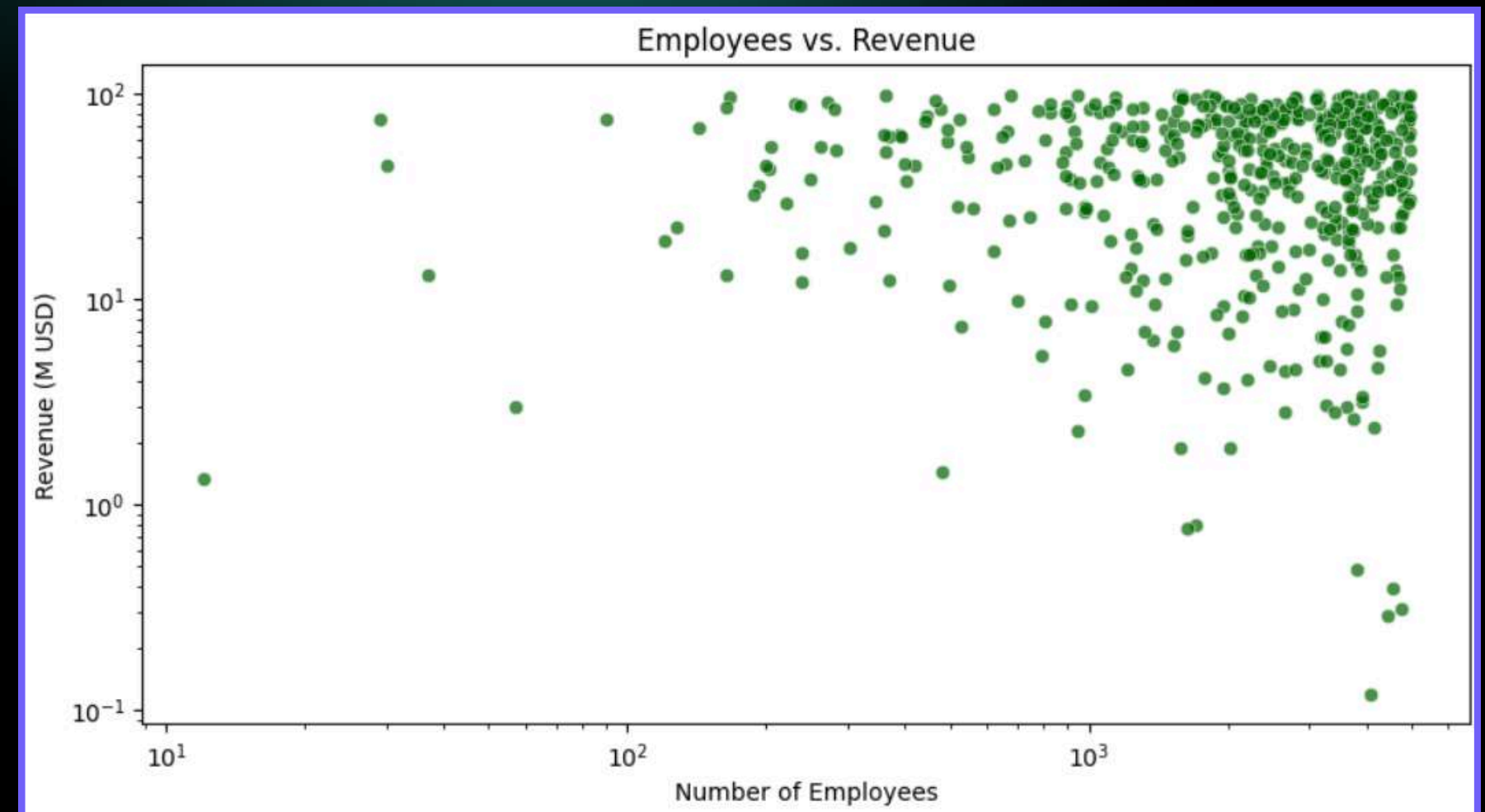
27. Percentage of Profitable Startups by Industry:

```python
plt.figure(figsize=(6, 4))
profit_counts = df.groupby('Industry')['Profitable'].mean().sort_values()
sns.barplot(x=profit_counts.index, y=profit_counts.values, palette='coolwarm')
plt.xticks(rotation=45, ha='right')
plt.title('Percentage of Profitable Startups by Industry')
plt.xlabel('Industry')
plt.ylabel('Profitability Rate')
plt.show()
```
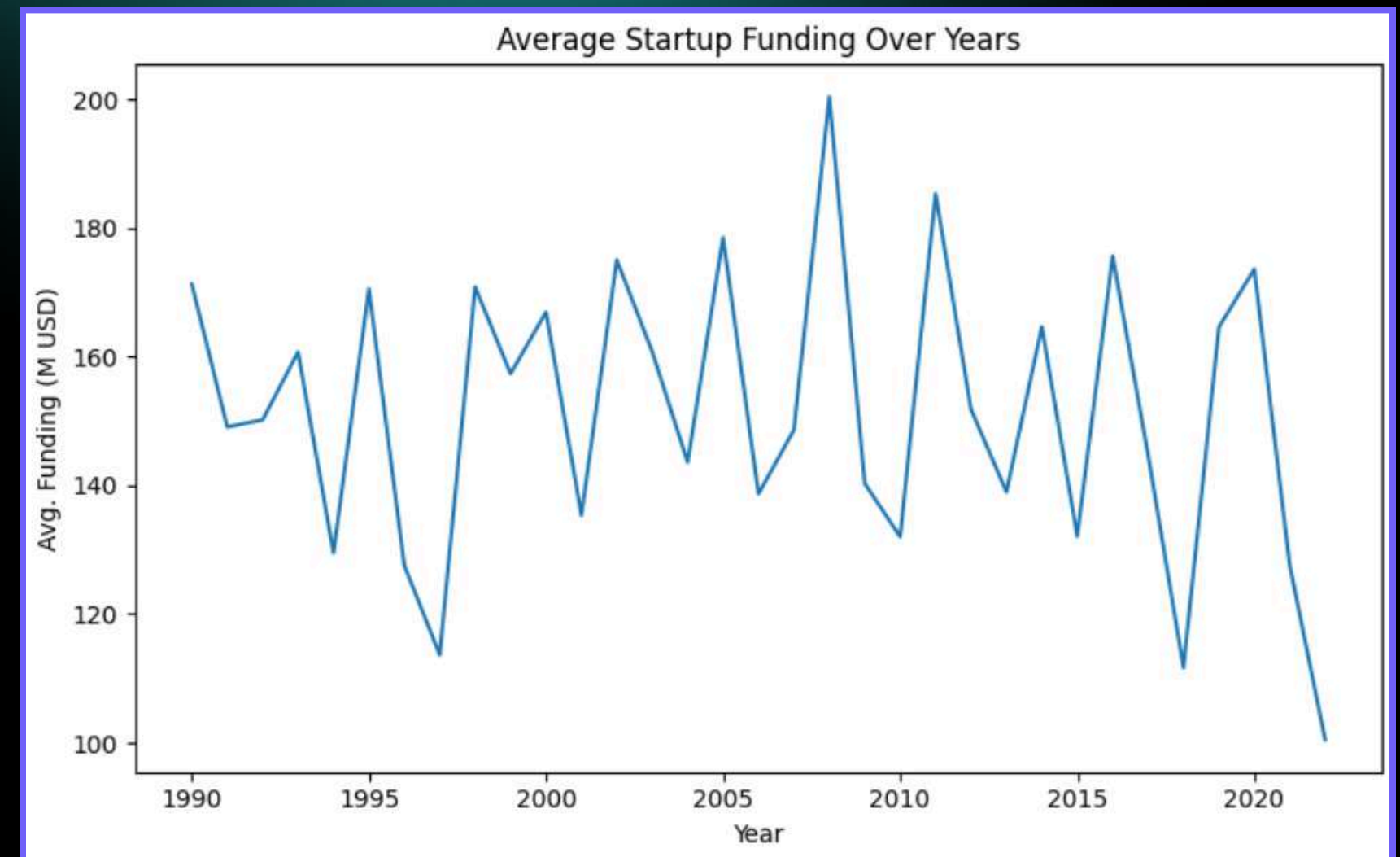

Percentage of Profitable Startups by Industry
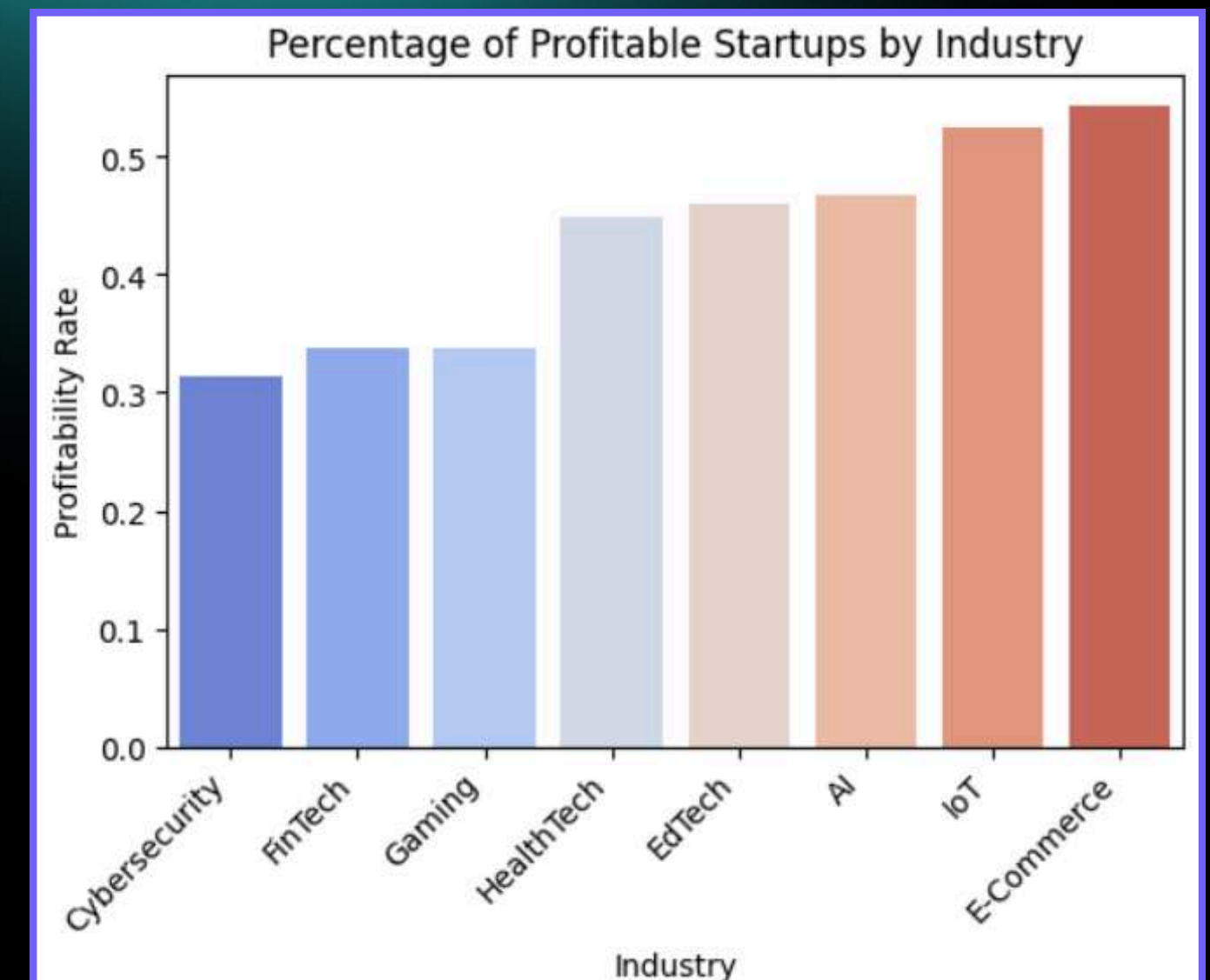
28. Yearly Average Funding:

```python
yearly_funding_avg = df.groupby('Year Founded')['Funding Amount (M USD)'].mean()
plt.figure(figsize=(8, 5))
sns.lineplot(x=yearly_funding_avg.index, y=yearly_funding_avg.values)
plt.title('Average Startup Funding Over Years')
plt.xlabel('Year')
plt.ylabel('Avg. Funding (M USD)')
plt.tight_layout()
plt.show()
```

EXPLORATORY DATA ANALYSIS (EDA) Highlights

29. Analysis on Diffrent Industries:

```python
plt.figure(figsize=(6, 4))
plt.bar(x=df['Industry'].value_counts().index,height=df['Industry'].value_counts().values)
plt.title("Analysis on Different Industries")
plt.xlabel("Companies")
plt.ylabel("Frequencies")
plt.show()
```
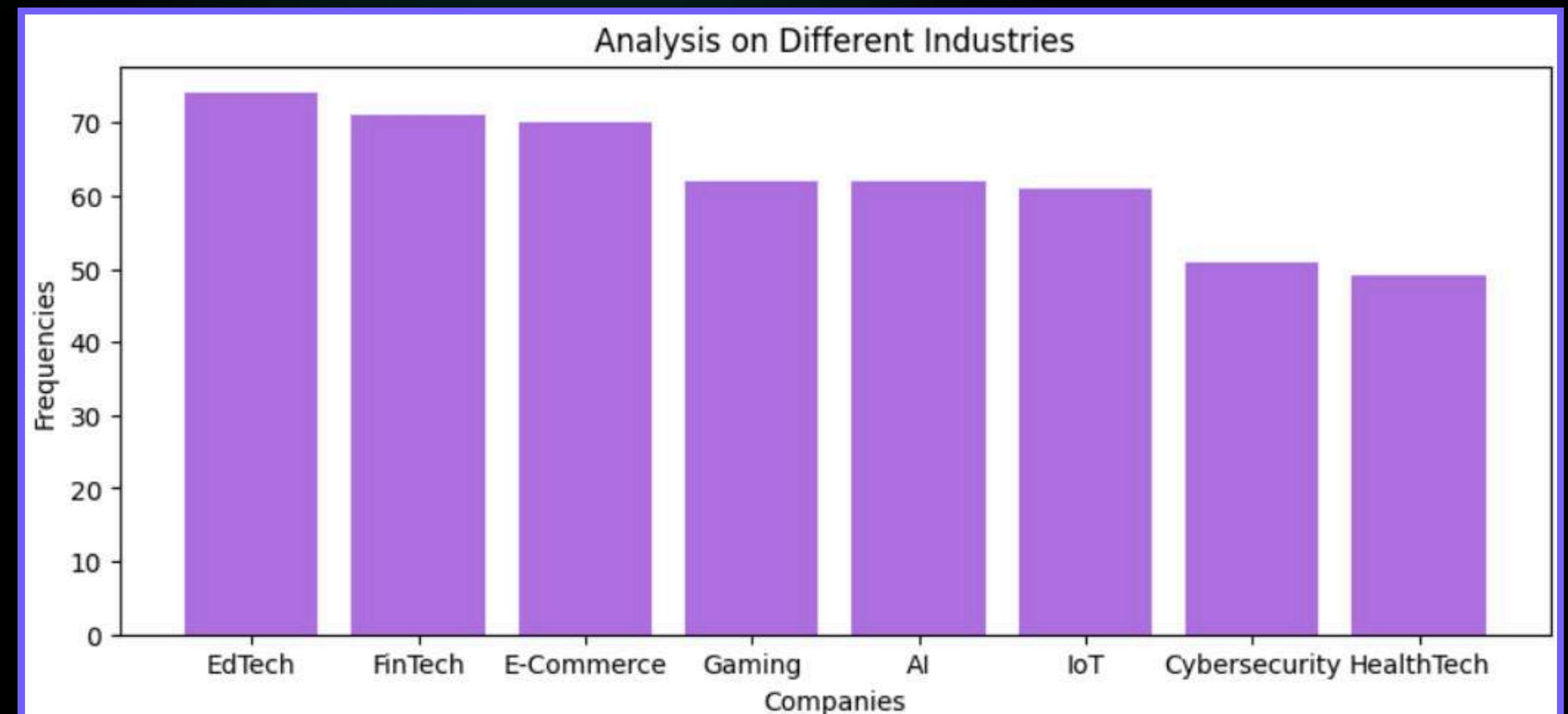
EXPLORATORY DATA ANALYSIS (EDA) Highlights

30. Compare Valuation & Funding Distributions:

```python
plt.figure(figsize=(10, 5))
sns.histplot(df['Valuation (M USD)'], color='blue', label='Valuation', kde=True, bins=30, alpha=0.6)
sns.histplot(df['Funding Amount (M USD)'], color='green', label='Funding Amount', kde=True, bins=30, alpha=0.6)
plt.legend()
plt.title('Valuation vs. Funding Amount Distribution')
plt.tight_layout()
plt.show()
```
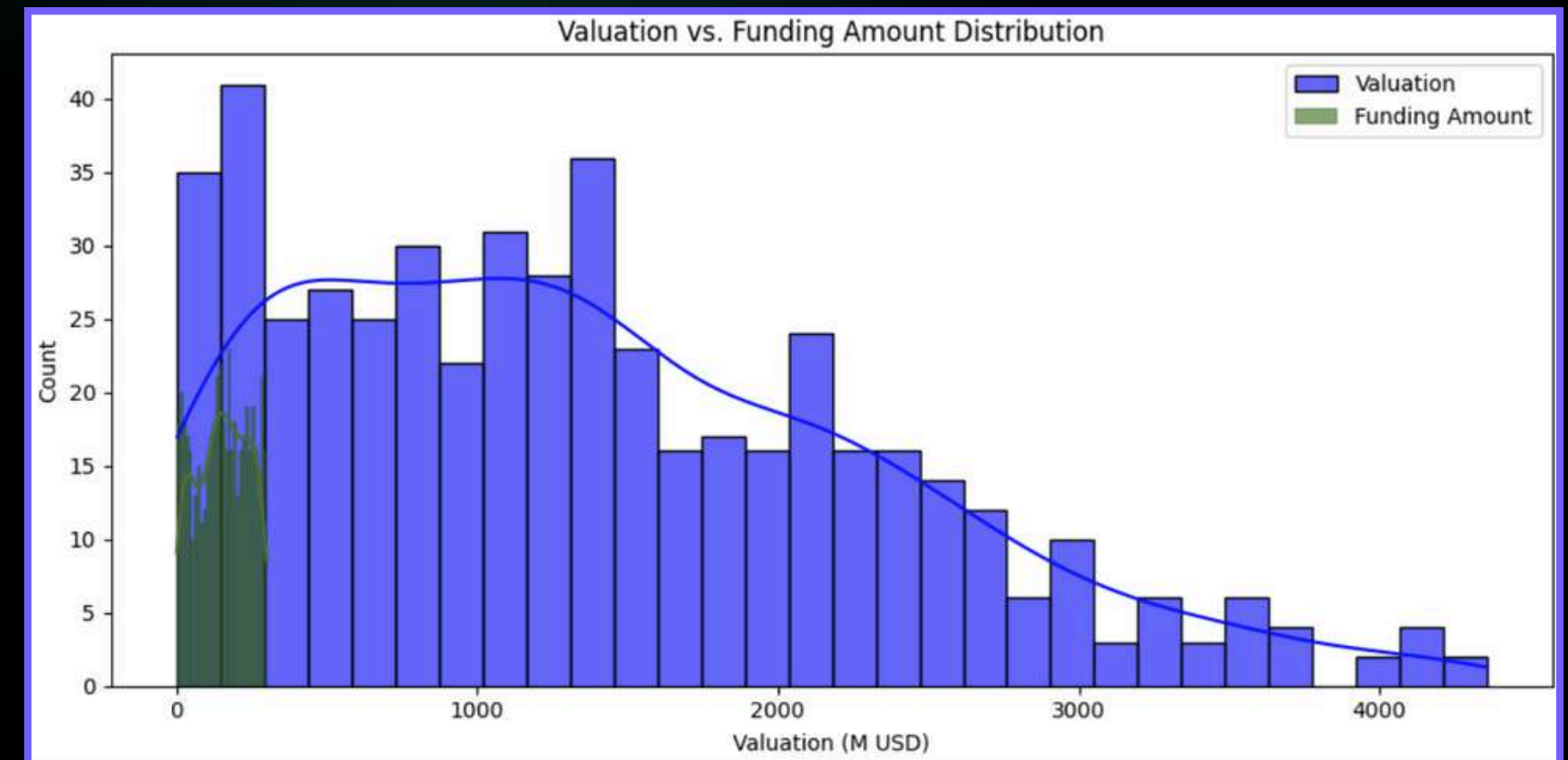
Conclusion & Key Takeaways:

(1) **Key Insights:**

- AI and FinTech dominate in funding and profitability.
- Profitable startups show higher revenue-to-employee efficiency.
- Geography significantly impacts valuation and market share.

(2) **Business Implications:**

- Investors should focus on early profitability signals and team efficiency.
- Emerging markets may offer undervalued opportunities with high potential.

THANK YOU !

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