

Decoding the UK Analyst Role: What Do Employers Want?

1 Data processing, analysis, and visualisation source code

Plots are saved to results/

```
[1]: import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
from collections import Counter
from itertools import combinations

df = pd.read_csv('../data/reed_uk_data_analyst_skills.csv')
```

```
[2]: print("Data shape:", df.shape)
print("\nFirst 5 rows:\n", df.head())
print("\nMissing values:\n", df.isnull().sum())
```

Data shape: (1528, 6)

First 5 rows:

	job_title	job_url
\		
0	Data Analyst	https://www.reed.co.uk/jobs/data-analyst/54606...
1	Junior Data Analyst	https://www.reed.co.uk/jobs/junior-data-analys...
2	Data Analyst Apprentice	https://www.reed.co.uk/jobs/data-analyst-appre...
3	Principal Data Analyst	https://www.reed.co.uk/jobs/principal-data-ana...
4	Data Analyst Apprentice	https://www.reed.co.uk/jobs/data-analyst-appre...

	location	job_type	\
0	London	Permanent, full-time	
1	Chertsey, Surrey	Permanent, full-time	
2	Stafford, Staffordshire	Permanent, full-time	
3	London	Permanent, full-time	
4	Trafford Park, Lancashire	Permanent, full-time	

	salary	skills
0	Competitive salary	power bi, python, sql, tableau
1	Competitive salary	excel, power bi
2	£17,000 - £19,000 per annum	excel, power bi, sql

3	Competitive salary	python, sql, tableau
4	£18,000 - £21,000 per annum	excel, power bi

Missing values:

```

job_title    0
job_url      0
location     0
job_type     0
salary       0
skills       0
dtype: int64

```

```

[3]: print("\nUnique job titles:\n", df['job_title'].value_counts())
      print("\nUnique locations:\n", df['location'].value_counts())
      print("\nUnique job types:\n", df['job_type'].value_counts())
      print("\nUnique salary entries:\n", df['salary'].value_counts())

      print("\nNumber of 'Not specified' entries:")
      print(f"Salary: {len(df[df['salary'] == 'Not specified'])}")
      print(f"Location: {len(df[df['location'] == 'Not specified'])}")
      print(f"Job type: {len(df[df['job_type'] == 'Not specified'])}")

```

Unique job titles:

```

job_title
Data Analyst                140
Trainee Software Developer   99
Data Analyst Trainee        97
Web Developer Trainee       91
Data Science Trainee        90
...
Growth Analyst              1
Financial Planning Analyst   1
CRM Analyst                  1
Interim Finance Analyst      1
Financial Planning & Analysis Assistant  1
Name: count, Length: 605, dtype: int64

```

Unique locations:

```

location
London                460
Manchester, Lancashire  58
Leeds, West Yorkshire  39
Birmingham, West Midlands (County)  33
City of London, London  24
...
Middleton, Manchester, Lancashire  1
Tadworth, Surrey                  1

```

Chelmsford, Essex	1
City of Westminster, London	1
Sandwich, Kent	1

Name: count, Length: 262, dtype: int64

Unique job types:

job_type	
Permanent, full-time	1338
Contract, full-time	139
Temporary, full-time	36
Permanent, full-time or part-time	12
Contract, part-time	1
Contract, full-time or part-time	1
Permanent, part-time	1

Name: count, dtype: int64

Unique salary entries:

salary	
£26,000 - £35,000 per annum	188
Competitive salary	164
£30,000 - £50,000 per annum	112
£25,000 - £35,000 per annum	93
Not specified	90
...	
£350 per day, inc benefits	1
£65,000 - £80,000 per annum	1
£25,396.80 per annum	1
£35,000 - £40,000 per annum, inc benefits	1
£53,000 - £57,000 per annum	1

Name: count, Length: 323, dtype: int64

Number of 'Not specified' entries:

Salary: 90
Location: 0
Job type: 0

1.1 Skills analysis

```
[4]: # powerbi to power bi
df['skills'] = df['skills'].str.replace(r'\bpowerbi\b', 'power bi', case=False,
    ↪ regex=True)

def split_skills(skills_text):
    return [skill.strip() for skill in str(skills_text).split(',')]

df['skills_list'] = df['skills'].apply(split_skills)
print(df[['skills', 'skills_list']].head())
```

	skills	skills_list
0	power bi, python, sql, tableau	[power bi, python, sql, tableau]
1	excel, power bi	[excel, power bi]
2	excel, power bi, sql	[excel, power bi, sql]
3	python, sql, tableau	[python, sql, tableau]
4	excel, power bi	[excel, power bi]

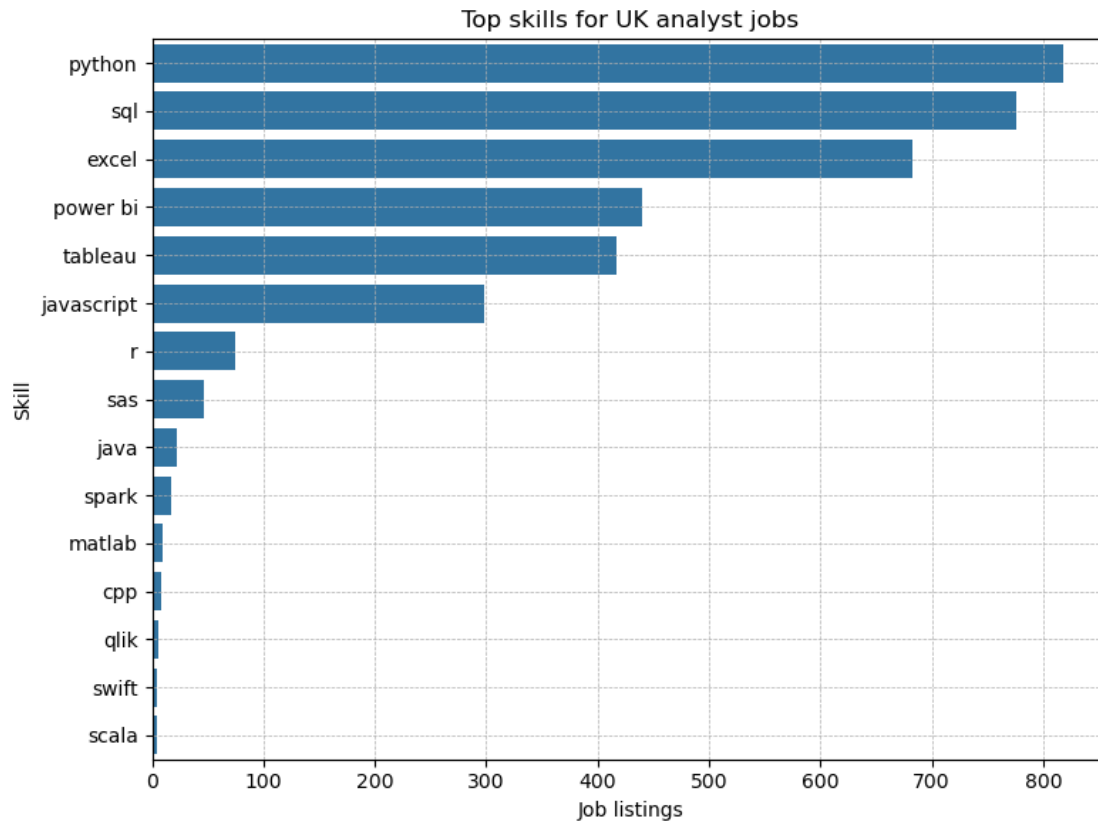
```
[5]: # Count occurrences of each skill
all_skills = []
for skills in df['skills_list']:
    all_skills.extend(skills)

skill_counts = Counter(all_skills)

skills_freq_df = pd.DataFrame(skill_counts.most_common(), columns=['Skill', 'Frequency'])
print(skills_freq_df)
```

	Skill	Frequency
0	python	818
1	sql	776
2	excel	683
3	power bi	440
4	tableau	417
5	javascript	298
6	r	75
7	sas	46
8	java	22
9	spark	17
10	matlab	10
11	c++	8
12	qlik	6
13	swift	5
14	scala	5

```
[6]: plt.figure(figsize=(8, 6))
sns.barplot(data=skills_freq_df, x='Frequency', y='Skill')
plt.title('Top skills for UK analyst jobs')
plt.xlabel('Job listings')
plt.ylabel('Skill')
plt.grid(True, which='major', linestyle='--', linewidth=0.5, axis='both')
plt.tight_layout()
plt.show()
plt.savefig('../results/top_skills.png', dpi=300)
```

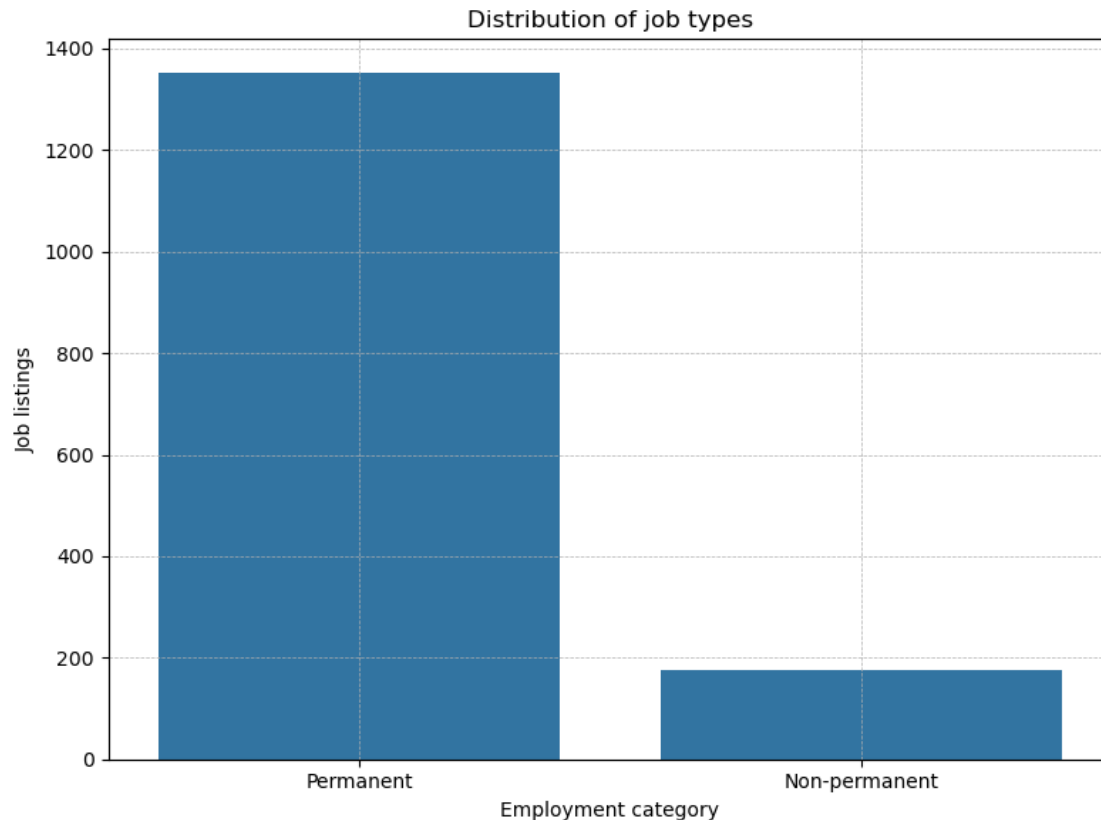


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1.2 Job type analysis

```
[7]: # Permanent vs non permanent (contract/temporary)
df['employment_category'] = df['job_type'].apply(lambda x: 'Non-permanent' if
    ('Contract' in x or 'Temporary' in x) else 'Permanent')

plt.figure(figsize=(8, 6))
sns.barplot(data=df['employment_category'].value_counts())
plt.title('Distribution of job types')
plt.xlabel('Employment category')
plt.ylabel('Job listings')
plt.grid(True, which='major', linestyle='--', linewidth=0.5, axis='both')
plt.tight_layout()
plt.show()
plt.savefig('../results/job_type_distribution.png', dpi=300)
```



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1.3 Location analysis

```
[8]: # Handles variants of London to just London
is_london = df['location'].str.contains('London', case=False, na=False)
df.loc[is_london, 'location_clean'] = 'London'

# Takes the first part of the location string (main city)
# "Stoke-on-Trent, Staffordshire" become "Stoke-on-Trent"
df.loc[~is_london, 'location_clean'] = df.loc[~is_london, 'location'].str.
    ↪split(',', n=1).str[0].str.strip()

# Handles variants of business park and industrial park to just the city
park_estate_pattern = r'\s*(Business Park|Industrial Park)$'
df['location_clean'] = df['location_clean'].str.replace(park_estate_pattern,
    ↪'', regex=True, case=False).str.strip()

# Handles variants of England to just England
is_england_region = df['location_clean'].str.contains('England', case=False,
    ↪na=False)
```

```

df.loc[is_england_region, 'location_clean'] = 'England (region)'

# pd.set_option('display.max_rows', None)
# pd.set_option('display.max_columns', None)

# print("\nCleaned locations:\n", df['location_clean'].value_counts())

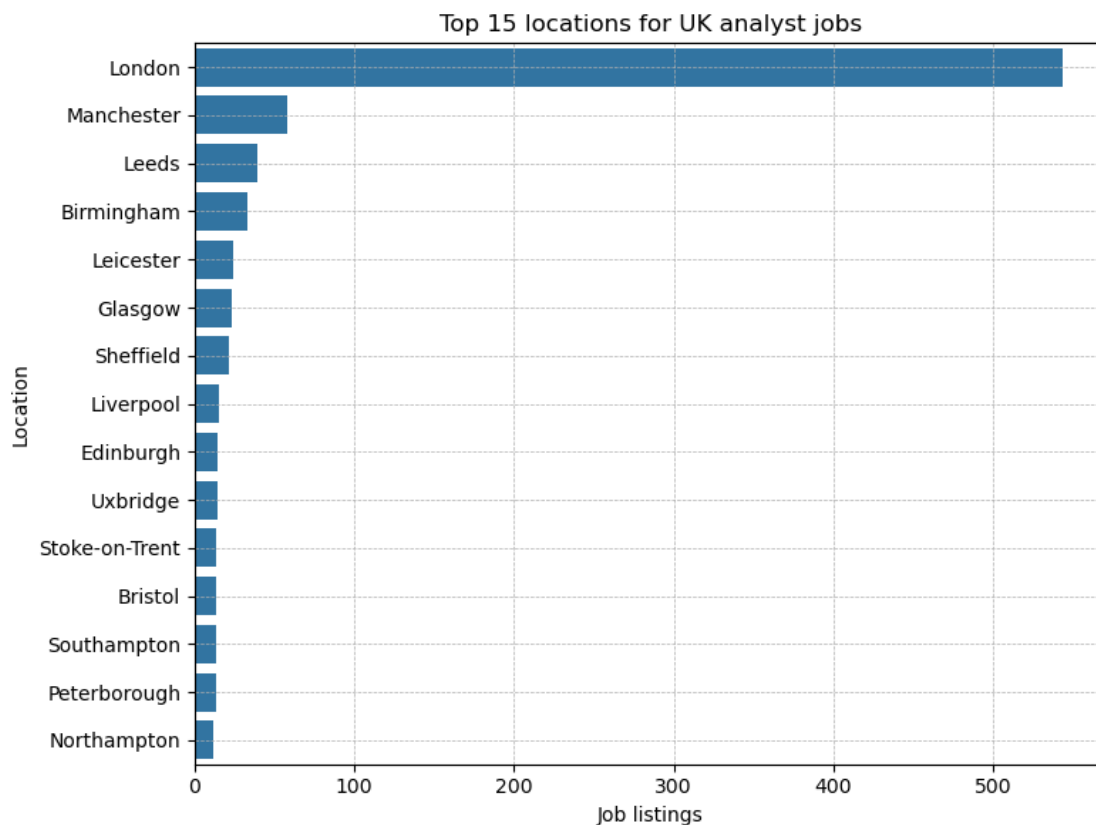
# pd.reset_option('display.max_rows')
# pd.reset_option('display.max_columns')

```

```

[9]: plt.figure(figsize=(8, 6))
sns.barplot(y=df['location_clean'].value_counts().head(15).index,
            x=df['location_clean'].value_counts().head(15).values)
plt.title('Top 15 locations for UK analyst jobs')
plt.ylabel('Location')
plt.xlabel('Job listings')
plt.grid(True, which='major', linestyle='--', linewidth=0.5, axis='both')
plt.tight_layout()
plt.show()
plt.savefig('../results/top_locations.png', dpi=300)

```



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1.4 Salary analysis

```
[10]: # Clean salary by removing the extra text such as inc benefits...
df['salary_clean'] = df['salary'].str.extract(r'(.*(?:per annum|per day|per_
    ↳hour|Competitive salary|Not specified|Salary negotiable|Salary not_
    ↳specified))')

# salary_type column with "per annum specified" or "others" (per annum for_
    ↳analysis, only british pound is used)
df['salary_type'] = np.where((df['salary_clean'].str.contains('per annum',_
    ↳case=False)) & (df['salary_clean'].str.contains('&')), 'per annum_
    ↳specified', 'others')

# Extract all numbers from salary strings
numbers = df['salary_clean'].str.extractall(r'&?([\d,]+(?:\.\d+)?')[0].str._
    ↳replace(',', '.').astype(float)

grouped_numbers = numbers.groupby(level=0).agg(list)

# per annum averages
# if single number use that, if two numbers take mean
df['annum_avg'] = grouped_numbers.apply(lambda x: x[0] if len(x) == 1 else_
    ↳sum(x)/2 if len(x) == 2 else None)

# annum_avg only for per annum specified, others are NaNs
df['annum_avg'] = df['annum_avg'].where(df['salary_type'] == 'per annum_
    ↳specified')

valid_annual_salaries = df['annum_avg'].dropna()

print("Summary statistics for per annum")
print(valid_annual_salaries.describe())
print("\nMedian per annum salary:", valid_annual_salaries.median())

# Highest salary
highest_salary_row = df.loc[df['annum_avg'].idxmax()]
print("\nHighest salary row:\n", highest_salary_row)

# Lowest salary
lowest_salary_row = df.loc[df['annum_avg'].idxmin()]
print("\nLowest salary row:\n", lowest_salary_row)
```



```
# pd.set_option('display.max_rows', None)
# pd.set_option('display.max_columns', None)

# print(df['salary_clean'].value_counts())
# print(df['salary_type'].value_counts())
# print(df['annum_avg'].value_counts().sort_index(ascending=False))

# pd.reset_option('display.max_rows')
# pd.reset_option('display.max_columns')
```

Summary statistics for per annum

```
count      1093.000000
mean       44219.675252
std        19861.637757
min         18000.000000
25%        30500.000000
50%        40000.000000
75%        52500.000000
max        380000.000000
```

Name: annum_avg, dtype: float64

Median per annum salary: 40000.0

Highest salary row:

```
job_title      MS Dynamics 365 CE Solution Architects
job_url        https://www.reed.co.uk/jobs/ms-dynamics-365-ce...
location              London
job_type              Permanent, full-time
salary          £60,000 - £700,000 per annum
skills          javascript, sql
skills_list      [javascript, sql]
employment_category      Permanent
location_clean          London
salary_clean          £60,000 - £700,000 per annum
salary_type          per annum specified
annum_avg              380000.0
Name: 1405, dtype: object
```

Lowest salary row:

```
job_title      Data Analyst Apprentice
job_url        https://www.reed.co.uk/jobs/data-analyst-appre...
location              Stafford, Staffordshire
job_type              Permanent, full-time
salary          £17,000 - £19,000 per annum
skills          excel, power bi, sql
skills_list      [excel, power bi, sql]
employment_category      Permanent
location_clean          Stafford
```

```

salary_clean          £17,000 - £19,000 per annum
salary_type            per annum specified
annum_avg              18000.0
Name: 2, dtype: object

```

1.4.1 Competitive salary analysis: what does competitive salary mean?

```

[11]: # Filter jobs with "Competitive salary"
competitive_jobs = df[df['salary_clean'] == "Competitive salary"]
print(f"Number of 'Competitive salary' job listings: {len(competitive_jobs)}")

# Get top skills in competitive salary jobs
competitive_skills = []
for skills in competitive_jobs['skills_list']:
    competitive_skills.extend(skills)

top_skills = [skill for skill, _ in Counter(competitive_skills).most_common(5)]
print(f"\nTop 5 skills in 'Competitive salary' jobs: {top_skills}")

# Find jobs with similar skills that have specified salaries (per annum)
similar_jobs = df[(df['salary_type'] == 'per annum specified') &
    ↪(df['skills_list'].apply(lambda x: any(skill in x for skill in top_skills)))]
print("\nEstimated per annum salary for 'Competitive salary' jobs:",
    ↪similar_jobs['annum_avg'].median())

```

Number of 'Competitive salary' job listings: 164

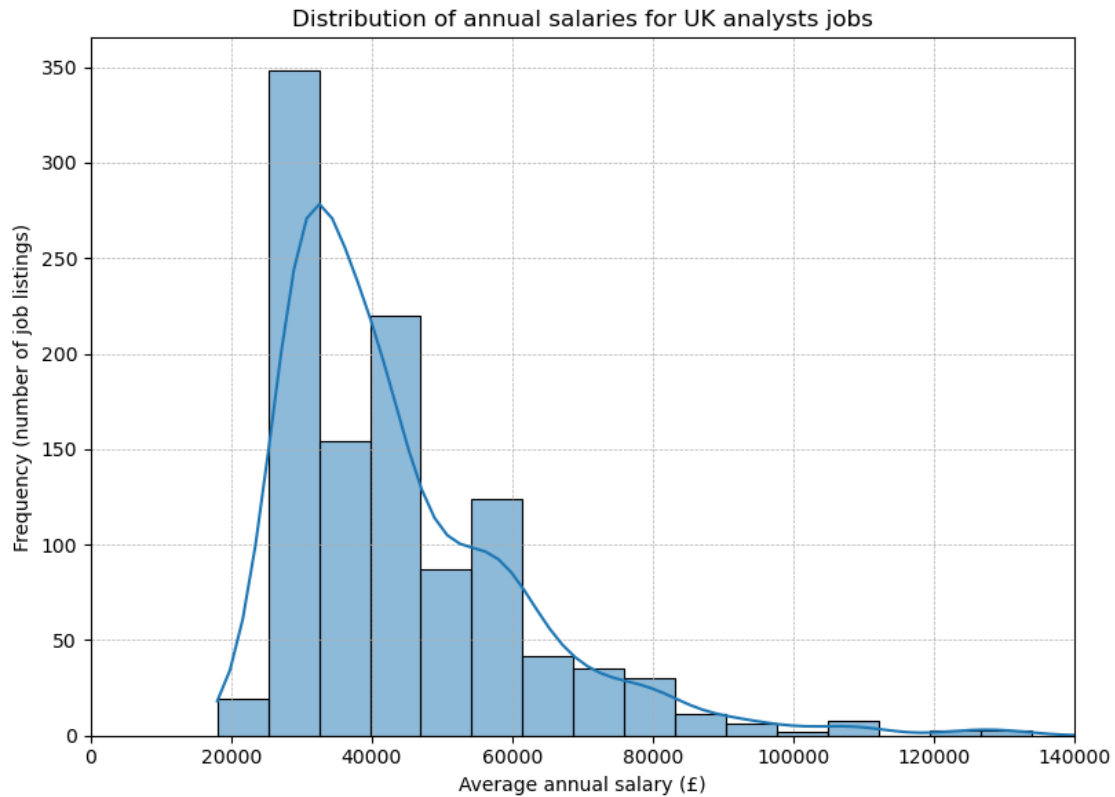
Top 5 skills in 'Competitive salary' jobs: ['sql', 'power bi', 'python', 'tableau', 'excel']

Estimated per annum salary for 'Competitive salary' jobs: 40000.0

```

[12]: plt.figure(figsize=(8, 6))
sns.histplot(valid_annual_salaries, bins=50, kde=True)
plt.title('Distribution of annual salaries for UK analysts jobs')
plt.xlabel('Average annual salary (£)')
plt.ylabel('Frequency (number of job listings)')
plt.grid(True, which='major', linestyle='--', linewidth=0.5, axis='both')
plt.tight_layout()
plt.xlim(0, 140000)
plt.show()
plt.savefig('../results/salary_distribution.png', dpi=300)

```



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1.5 Multivariate analysis

1.5.1 Salary vs skills

```
[13]: skills_salary = []

all_skills = skills_freq_df['Skill'].tolist()

for skill in all_skills:

    has_skill = df['skills_list'].apply(lambda x: skill in x)
    skill_salaries = df.loc[has_skill, 'annum_avg'].dropna()

    # Median , mean, and job count
    median_salary = skill_salaries.median()
    mean_salary = skill_salaries.mean()
    count = len(skill_salaries)

    skills_salary.append({
        'Skill': skill,
```

```

        'Median salary': median_salary,
        'Mean salary': mean_salary,
        'Job count': count
    })

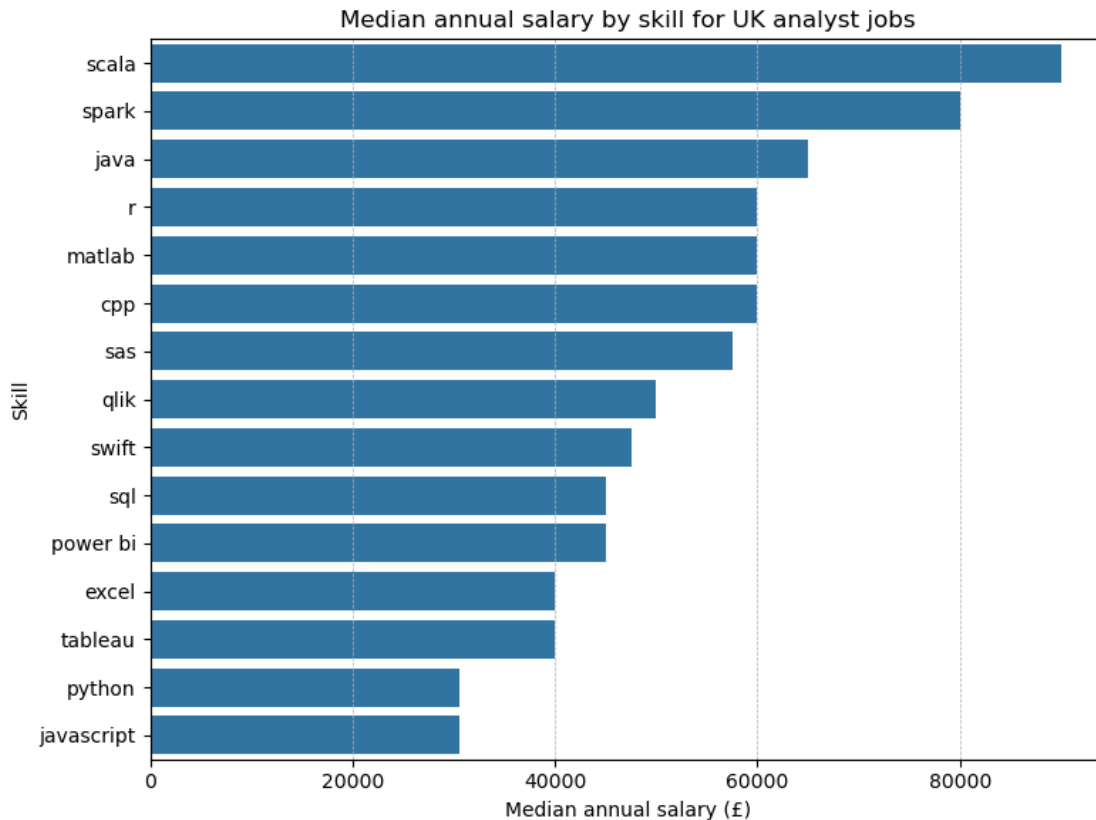
# Convert to df and sort by median salary
skills_salary_df = pd.DataFrame(skills_salary)
skills_salary_df = skills_salary_df.sort_values(by='Median salary',
↪ascending=False)

print(skills_salary_df[['Skill', 'Median salary', 'Mean salary', 'Job count']])

plt.figure(figsize=(8, 6))
sns.barplot(x='Median salary', y='Skill', data=skills_salary_df)
plt.title('Median annual salary by skill for UK analyst jobs')
plt.xlabel('Median annual salary (£)')
plt.ylabel('Skill')
plt.grid(True, which='major', linestyle='--', linewidth=0.5, axis='x')
plt.tight_layout()
plt.show()
plt.savefig('../results/salary_vs_skill.png', dpi=300)

```

	Skill	Median salary	Mean salary	Job count
14	scala	90000.0	87500.000000	3
9	spark	80000.0	71500.000000	5
8	java	65000.0	74115.384615	13
6	r	60000.0	59659.397059	51
10	matlab	60000.0	55777.777778	9
11	c++	60000.0	65312.500000	8
7	sas	57500.0	57989.181818	44
12	qlik	50000.0	43833.333333	3
13	swift	47500.0	49875.000000	4
1	sql	45000.0	51186.549892	461
3	power bi	45000.0	49644.988347	236
2	excel	40000.0	42185.901589	472
4	tableau	40000.0	43691.712629	194
0	python	30500.0	42008.306326	577
5	javascript	30500.0	32377.162630	289



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1.5.2 Location vs skills

```
[14]: top_5_locations = df['location_clean'].value_counts().head(5).index.tolist()
all_skills = skills_freq_df['Skill'].tolist()

# Store skills by location
skill_location_matrix = pd.DataFrame(index=top_5_locations + ['Others'],
    columns=all_skills, dtype=float)

# Top 5 locations
for location in top_5_locations:
    location_jobs = df[df['location_clean'] == location]
    total_jobs = len(location_jobs)

    for skill in all_skills:
        skill_count = sum(location_jobs['skills_list'].apply(lambda x: skill in x))
        percentage = (skill_count / total_jobs) * 100
        skill_location_matrix.loc[location, skill] = percentage
```

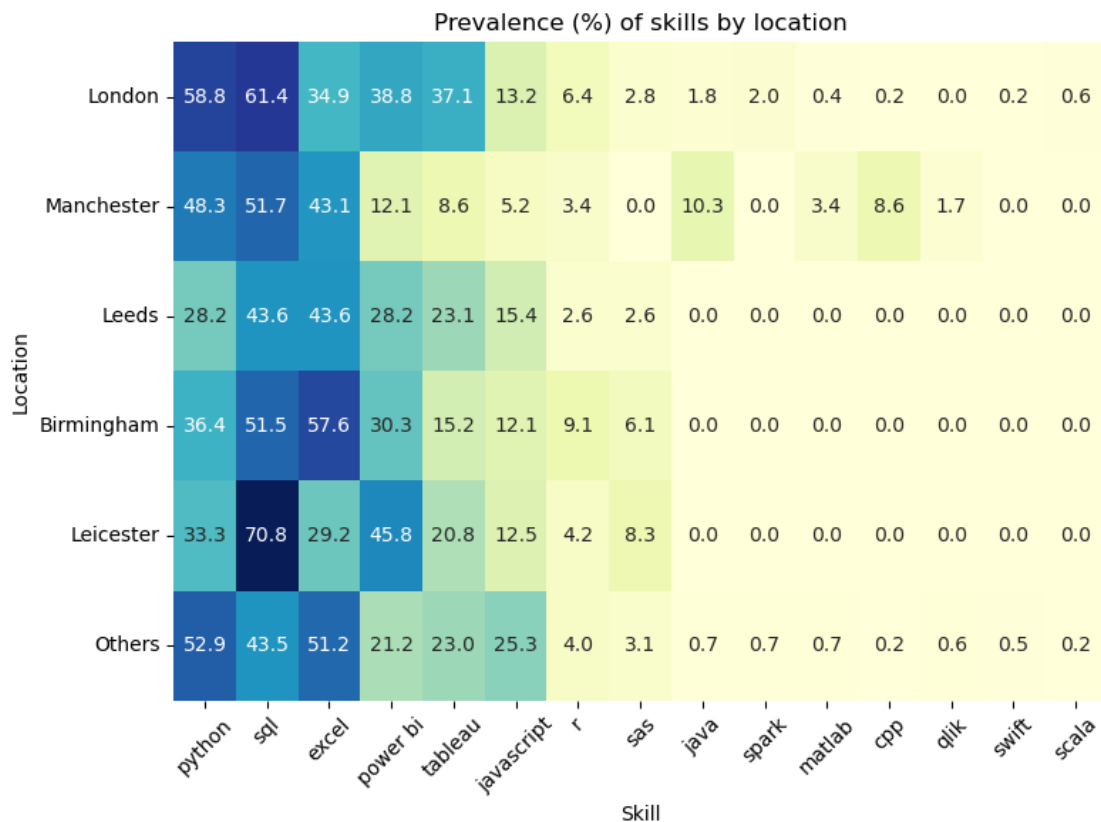
```

# Other locations
other_locations_jobs = df[~df['location_clean'].isin(top_5_locations)]
total_other_jobs = len(other_locations_jobs)

for skill in all_skills:
    skill_count = sum(other_locations_jobs['skills_list'].apply(lambda x: skill_
    in x))
    percentage = (skill_count / total_other_jobs) * 100
    skill_location_matrix.loc['Others', skill] = percentage

plt.figure(figsize=(8,6))
sns.heatmap(skill_location_matrix, annot=True, fmt='.1f', cbar=False,
    cmap='YlGnBu')
plt.title('Prevalence (%) of skills by location')
plt.ylabel('Location')
plt.xlabel('Skill')
plt.xticks(rotation=45)
plt.yticks(rotation=0)
plt.tight_layout()
plt.show()
plt.savefig('../results/location_vs_skill.png', dpi=300)

```



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1.5.3 Skills combinations

```
[15]: skills_for_combo = skills_freq_df['Skill'].tolist()

pair_counts = Counter()
total_jobs = len(df)

# Iterate through each job's skill list
for skill_list in df['skills_list']:
    present_target_skills = [s for s in skill_list if s in skills_for_combo]
    for pair in combinations(sorted(present_target_skills), 2):
        pair_counts[pair] += 1

# Get top 10 pairs
pair_counts_df = pd.DataFrame(pair_counts.most_common(10), columns=['Skill_
    pair', 'Frequency'])
# Clean up the skill pair format
pair_counts_df['Skill pair'] = pair_counts_df['Skill pair'].apply(lambda x:
    f'{x[0]}, {x[1]}')

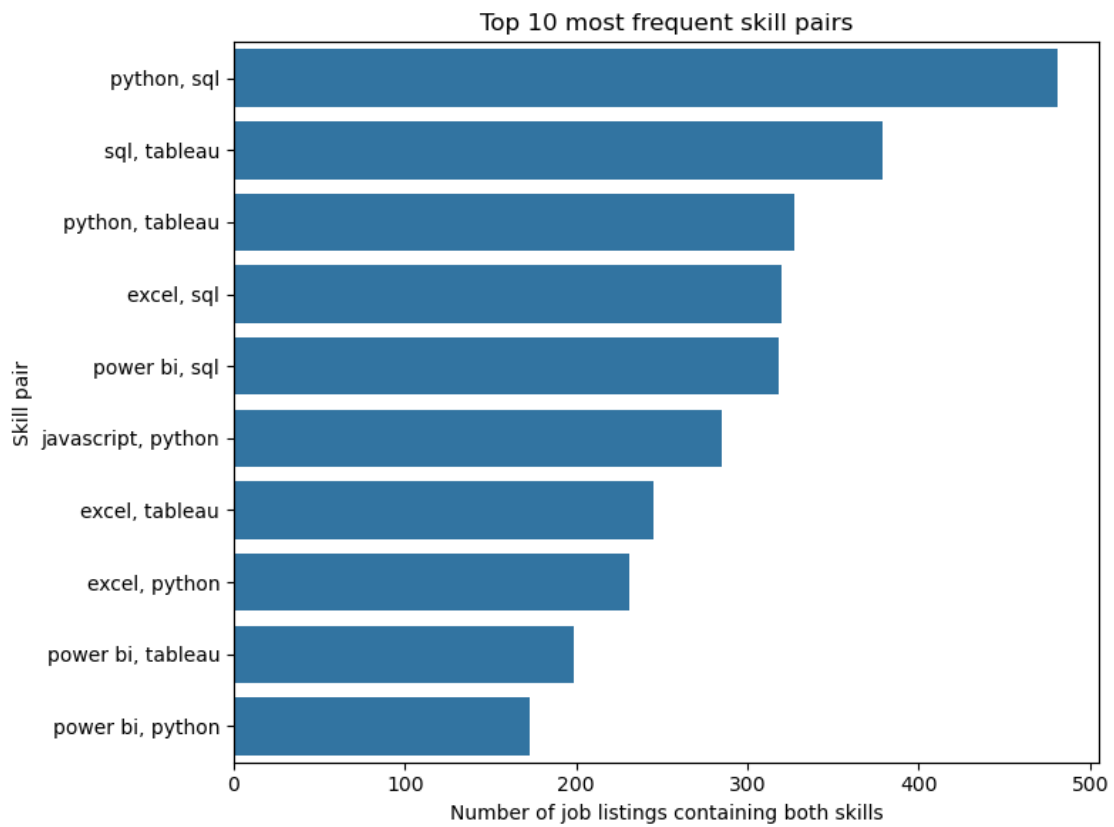
print("\nTop 10 most frequent skill pairs:")
print(pair_counts_df)

plt.figure(figsize=(8, 6))
sns.barplot(data=pair_counts_df, x='Frequency', y='Skill pair')
plt.title('Top 10 most frequent skill pairs')
plt.xlabel('Number of job listings containing both skills')
plt.ylabel('Skill pair')
plt.tight_layout()
plt.show()
plt.savefig('../results/skills_combinations.png', dpi=300)
```

Top 10 most frequent skill pairs:

	Skill pair	Frequency
0	python, sql	481
1	sql, tableau	379
2	python, tableau	327
3	excel, sql	320
4	power bi, sql	318
5	javascript, python	285
6	excel, tableau	245

7	excel, python	231
8	power bi, tableau	199
9	power bi, python	173



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