数据集2: GitHub Dataset

1. 数据摘要
   1.1属性

- `name` 仓库的名称
- `stars_count` 仓库的star数量
- `forks_count` 仓库的fork数量
- `watchers` 仓库当前有多少观看者
- `pull_requests` 拉取该仓库的请求数量
- `primary_language` 仓库主要使用的编程语言
- `languages_used` 该仓库所有使用过的编程语言的列表
- `commit_count` 该仓库的提交记录数量
- `create_at` 仓库创建的时间和日期
- `license` 这个仓库使用的证书

```
import pandas as pd
github=pd.read_csv('dataset/repository_data.csv')
github.columns.tolist()
```

```
['name',
 'stars_count',
 'forks_count',
 'watchers',
 'pull_requests',
 'primary_language',
 'languages_used',
 'commit_count',
 'created_at',
 'licence']
```

1.2 标称属性可能取值的频数

- `name` 仓库的名称

```
github['name'].value_counts()
```

```
name
dotfiles                                5590
blog                                    2038
docs                                    1350
website                                 1163
scripts                                  649
                                        ...
markdown-to-presentation                   1
moodle-client                              1
event-sourcing-graph                       1
react-native-100-Demos                     1
MSI-Z690-Carbon-i7-12700KF-Hackintosh      1
Name: count, Length: 2410862, dtype: int64
```

- `primary_language` 主要使用的编程语言

```
github['primary_language'].value_counts()
```

```
primary_language
JavaScript              451954
Python                  451473
Java                    202394
C++                     150066
PHP                     116058
                         ...
LoomScript                   1
Ragel in Ruby Host           1
Edje Data Collection         1
Sieve                        1
Ox                           1
Name: count, Length: 497, dtype: int64
```

- `languages_used` 使用过的所有语言列表

```
github['languages_used'].value_counts()
```

```
languages_used
['Python']
257679
['JavaScript']
157741
['Java']
117624
['C#']
60299
['PHP']
56333

...
['Svelte', 'TypeScript', 'JavaScript', 'HTML', 'CSS', 'Rust']
   1
['Dockerfile', 'Shell', 'JavaScript', 'PowerShell']
   1
['TypeScript', 'HTML', 'Vue', 'JavaScript', 'Python', 'Shell']
    1
['C++', 'C', 'Pascal', 'Batchfile', 'GDB']
    1
['HTML', 'C++', 'TypeScript', 'JavaScript']
   1
Name: count, Length: 328148, dtype: int64
```

- `licence` 选择的开源协议

```
github['licence'].value_counts()
```

```
licence
MIT License
784251
Apache License 2.0
210698
Other
167987
GNU General Public License v3.0
159443
BSD 3-Clause "New" or "Revised" License
47078
GNU General Public License v2.0
43297
GNU Affero General Public License v3.0
21554
BSD 2-Clause "Simplified" License
16819
The Unlicense
14400
GNU Lesser General Public License v3.0
14002
Mozilla Public License 2.0
10668
Creative Commons Zero v1.0 Universal
10353
ISC License
8232
GNU Lesser General Public License v2.1
6168
Eclipse Public License 1.0
3699
Do What The F*ck You Want To Public License
3493
Creative Commons Attribution 4.0 International
3292
Creative Commons Attribution Share Alike 4.0 International
2664
MIT No Attribution
2193
zlib License
1512
Boost Software License 1.0
1421
Eclipse Public License 2.0
1206
BSD Zero Clause License
770
SIL Open Font License 1.1
761
Artistic License 2.0
685
Open Software License 3.0
644
Microsoft Public License
470
European Union Public License 1.2
429
```

```
BSD 3-Clause Clear License
295
LaTeX Project Public License v1.3c
266
BSD 4-Clause "Original" or "Old" License
251
Universal Permissive License v1.0
193
Academic Free License v3.0
143
European Union Public License 1.1
93
University of Illinois/NCSA Open Source License
90
PostgreSQL License
66
Open Data Commons Open Database License v1.0
57
Educational Community License v2.0
25
Mulan Permissive Software License, Version 2
20
Vim License
20
CeCILL Free Software License Agreement v2.1
19
Microsoft Reciprocal License
15
CERN Open Hardware Licence Version 2 - Permissive
4
CERN Open Hardware Licence Version 2 - Strongly Reciprocal
2
CERN Open Hardware Licence Version 2 - Weakly Reciprocal
2
GNU Free Documentation License v1.3
1
Name: count, dtype: int64
```

1.3 数值属性的五数概括

缺失值的个数统计

```
missing_values=github.isnull().sum()
missing_values=pd.DataFrame(missing_values,columns=
['missing_values']).T
missing_values=missing_values.loc[:,
(missing_values!=0).any(axis=0)]
missing_values
```

```
.dataframe tbody tr th {
    vertical-align: top;
}

.dataframe thead th {
    text-align: right;
}
```

	NAME	PRIMARY_LANGUAGE	LANGUAGES_USED	COMMIT_COUNT	LICENCE
missing_values	13	218573	221984	1921	1378200

- `stars_count` 仓库获得的星星
  `stars_count` 属性的五数概括

```
num_stars_count = pd.to_numeric(github['stars_count'].dropna())
num_stars_count.describe()[3:]
```

```
min         2.0
25%         7.0
50%        12.0
75%        30.0
max    359805.0
Name: stars_count, dtype: float64
```

- `forks_count` 仓库的分支数量

```
num_forks_count = pd.to_numeric(github['forks_count'].dropna())
num_forks_count.describe()[3:]
```

```
min         0.0
25%         1.0
50%         4.0
75%        11.0
max    242208.0
Name: forks_count, dtype: float64
```

- `watchers` 查看者数量

```
num_watchers = pd.to_numeric(github['watchers'].dropna())
num_watchers.describe()[3:]
```

```
min       0.0
25%       2.0
50%       3.0
75%       6.0
max    9544.0
Name: watchers, dtype: float64
```

- `pull_requests` 拉取请求数

```
num_pull_requests = pd.to_numeric(github['pull_requests'].dropna())
num_pull_requests.describe()[3:]
```

```
min          0.0
25%          0.0
50%          1.0
75%          6.0
max     301585.0
Name: pull_requests, dtype: float64
```

+`commit_count`提交次数

```
num_commit_count = pd.to_numeric(github['commit_count'].dropna())
num_commit_count.describe()[3:]
```

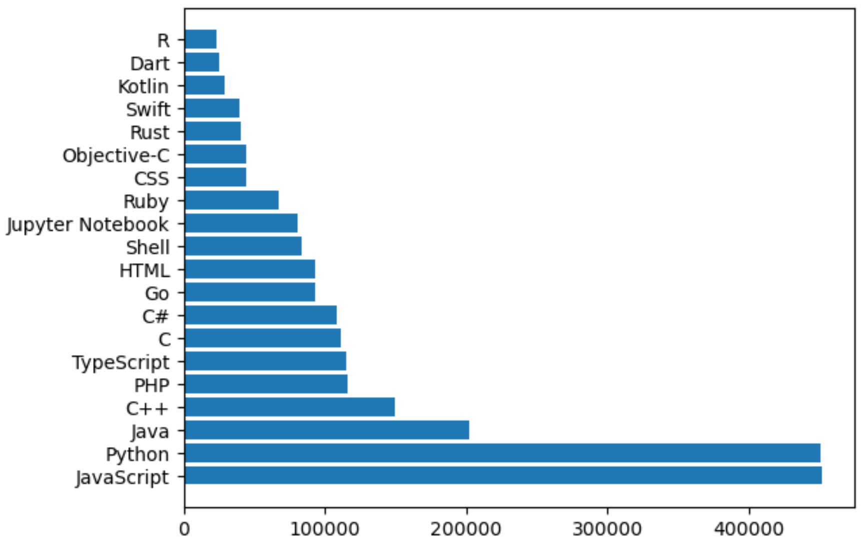
- `created_at` 创建时间(年)

```
year_counts = pd.to_datetime(github['created_at']).dt.year
year_counts.describe()[3:]
```

2.数据可视化

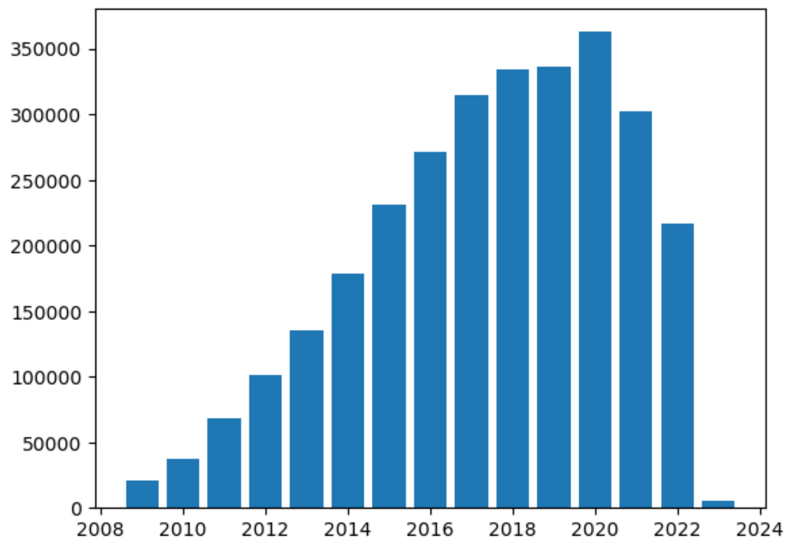
```
2.1 主要使用的编程语言
```

```
import matplotlib.pyplot as plt
category_counts = github['primary_language'].value_counts().sort_values(ascending=False)[:20]
plt.barh(category_counts.index,category_counts.values)
plt.show()
```



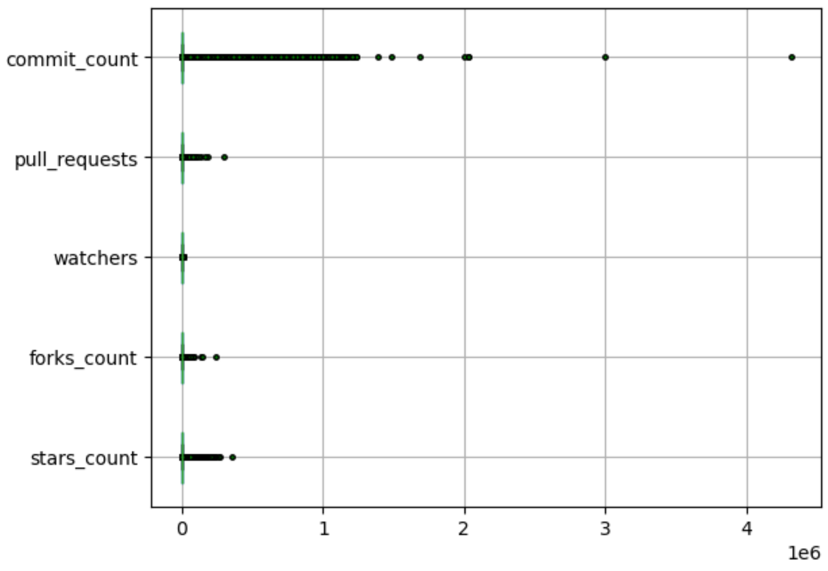
```
2.2 仓库创建时间 属性的直方图
```

```
year_counts=year_counts.value_counts()
plt.bar(year_counts.index,year_counts.values)
plt.show()
```



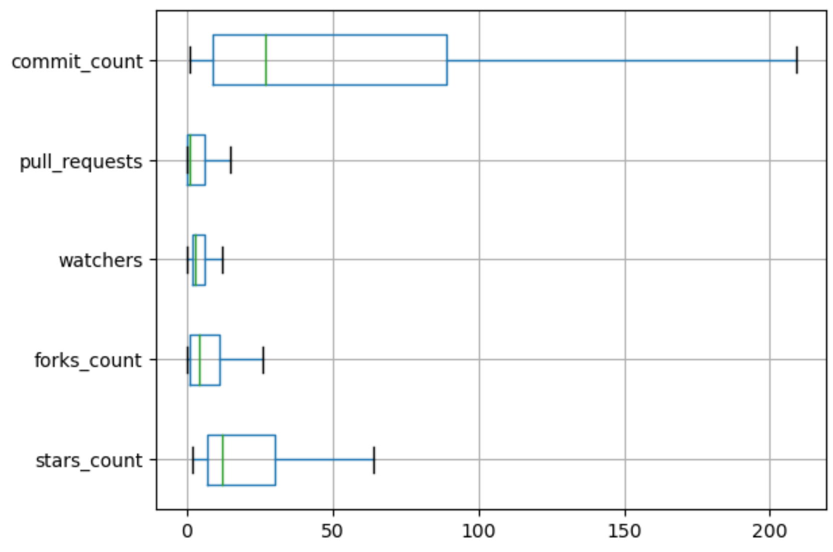
2.7 仓库各项数值属性

```
github_num = github[['stars_count','forks_count','watchers','pull_requests','commit_count']].dropna()
github_num.boxplot(flierprops={'marker': '.', 'markerfacecolor': 'green', 'markersize': 5, 'linestyle':
'none'},whis=(5,95),vert=False)
plt.show()
```



异常值过多,取消异常值

```
github_num.boxplot(showfliers=False,vert=False)
plt.show()
```



3. 缺失值处理
   3.1 剔除缺失部分

```
print(github.shape)
github_df_cleaned = github.dropna()
print(github_df_cleaned.shape)
```

```
(2917951, 10)
(1471611, 10)
```

3.2 用最高频率值来填补缺失值

```
github_cleaned = github.copy()
replace_values = missing_values.copy().rename(index={'missing_values':'replace_values'})
for col in replace_values.columns:
    if missing_values.loc['missing_values',col] == 0:
        continue
    mode = github[col].mode()[0]
    github_df_cleaned[col].fillna(mode,inplace=True)
    replace_values.loc['replace_values',col] = mode
replace_values
```

```
C:\Users\3647\AppData\Local\Temp\ipykernel_16656\754578149.py:7: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  github_df_cleaned[col].fillna(mode,inplace=True)
```

```
.dataframe tbody tr th {
    vertical-align: top;
}

.dataframe thead th {
    text-align: right;
}
```

	NAME	PRIMARY_LANGUAGE	LANGUAGES_USED	COMMIT_COUNT	LICENCE
replace_values	dotfiles	JavaScript	['Python']	2	MIT License

3.3 通过属性的相关关系填补缺失值

虽然主要使用语言属性和仓库使用语言列表有相关关系,但是本数据集中往往同时为NaN,无法填补

3.3 用数据对象之间的相似性填补缺失值

```
import numpy as np
from sklearn.metrics.pairwise import nan_euclidean_distances
import pandas as pd
from tqdm import tqdm

github = pd.read_csv('dataset/github_dataset.csv')

rows_with_missing = github[github.isnull().any(axis=1)]
numeric_rows_with =
rows_with_missing[['stars_count','forks_count','issues_count','pull_requests','contributors']]
rows_without_missing = github[~github.isnull().any(axis=1)]
numeric_rows_without =
rows_without_missing[['stars_count','forks_count','issues_count','pull_requests','contributors']]
interpoted = rows_with_missing.copy()
for row in numeric_rows_with.itertuples():
    # 计算当前行与其他行的欧氏距离，忽略NaN值
    distances = nan_euclidean_distances([numeric_rows_with.loc[row.Index]], numeric_rows_without)[0]
    nearest_row_index = np.argmin(distances)
    nearest_row = rows_without_missing.iloc[nearest_row_index]
    # 使用最近邻行的值填充缺失值
    interpoted.loc[row.Index] = nearest_row
interpoted
```

```
.dataframe tbody tr th {
    vertical-align: top;
}

.dataframe thead th {
    text-align: right;
}
```

	REPOSITORIES	STARS_COUNT	FORKS_COUNT	ISSUES_COUNT	PULL_REQUESTS	CONTRIBUTORS	LANGUAGE
0	ethereum/aleth	0	0	313	27	154	C++
1	ethereum/aleth	0	0	313	27	154	C++
10	iamrajiv/new-keptn-docs-engine	0	1	81	3	0	JavaScript
30	donnemartin/system-design-primer	0	0	164	164	115	Python
37	thrau/jarchivelib	183	33	23	4	7	Java
...	...	...	...	...	...	...	...
1014	SauravMukherjee44/Portfolio-Saurav-Mukherjee	37	18	1	0	2	CSS
1015	sirinath/blog	0	0	2	0	23	Shell
1019	mrdbourke/food-not-food	45	9	1	0	2	Jupyter Notebook

	REPOSITORIES	STARS_COUNT	FORKS_COUNT	ISSUES_COUNT	PULL_REQUESTS	CONTRIBUTORS	LANGUAGE
1032	lynxerzhang/AS3Util	3	1	1	0	0	ActionScript
1042	rijusougata13/movie-recommender	1	1	2	0	2	HTML

145 rows × 7 columns