开源社区数据分析

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内容

1 为什么
Why

2 数据&可视化
Data&Visualization

3 问题
Problems

4 举个例子
Example

X-lab
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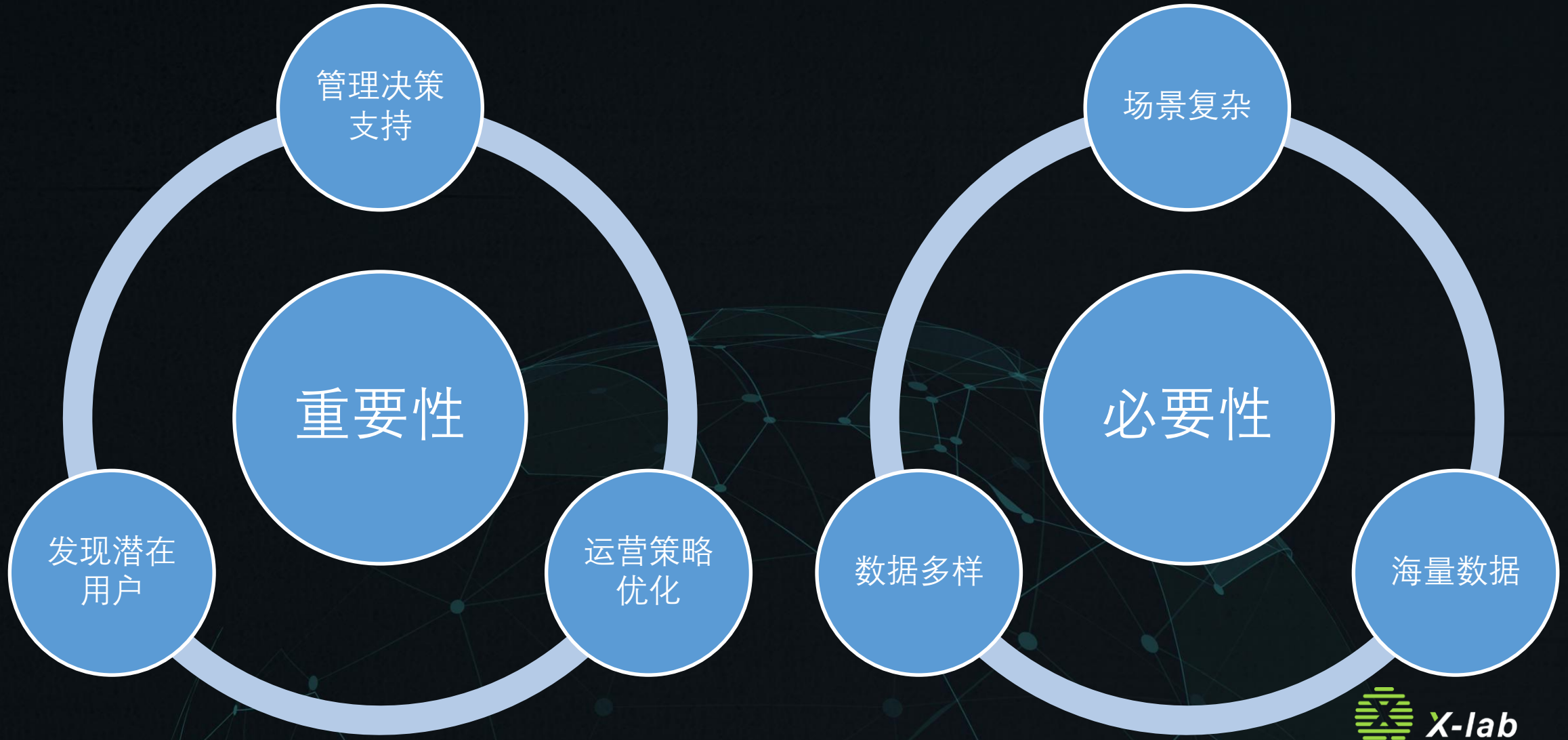
01 为什么

Why



02 / 数据 Data

02 数据

Data

GitHub 事件日志

- 2015 至今共计 30 亿+ 条行为日志记录
- 覆盖全域所有项目的所有数据
- 覆盖 star、fork、issue、pull request、release、push、wiki 等主要协作数据

- 用数据说话，才能知道真相
  - GitHub 数据
    - Octoverse 2020：用户总量 5600W，新建仓库 6000W
    - 2020 日志数据：活跃用户 1454W，活跃仓库 5421W
  - TiDB(2W+ star) vs uni-app(3W+ star)

wanganxp commented on 20 Feb

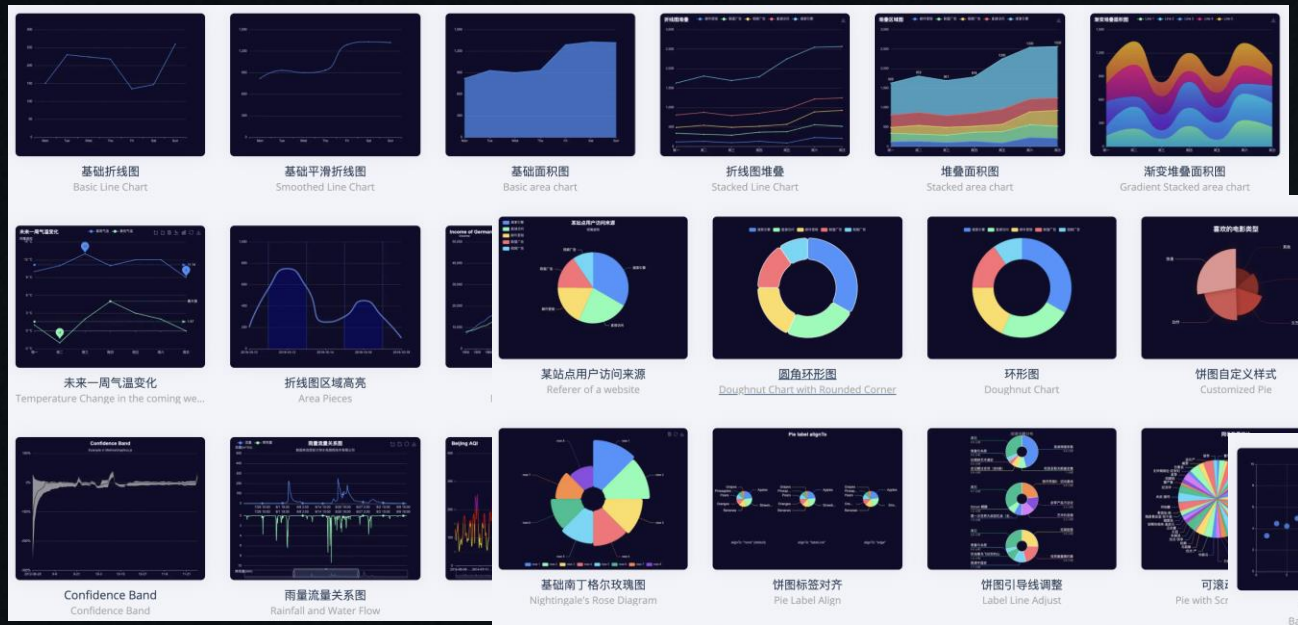
uni-app的用户量远超你家报告里列的其他开源项目。pinggap和用户量和star都和uni-app没法比

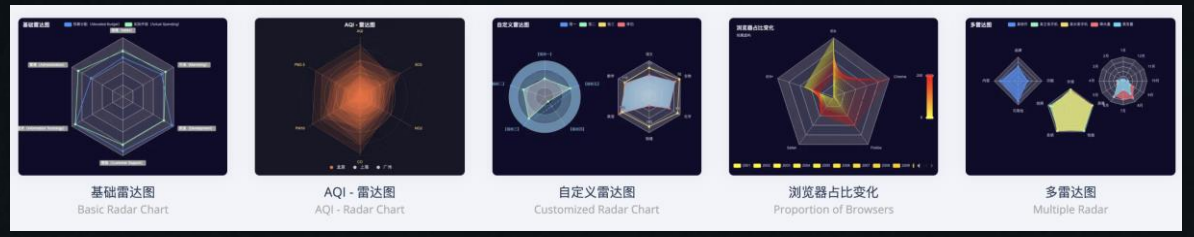
#	name	language	activity	developer_count	issue_comment	open_issue	open_pull	review_comment	merge_pull	commits	additions	deletions
3	pingcap/tidb	Go	2013.85	261	22443	729	1554	3161	1235	9191	115905	91389
40	dcloudio/uni-app	JavaScript	346.85	194	640	115	12	0	8	9	18	14

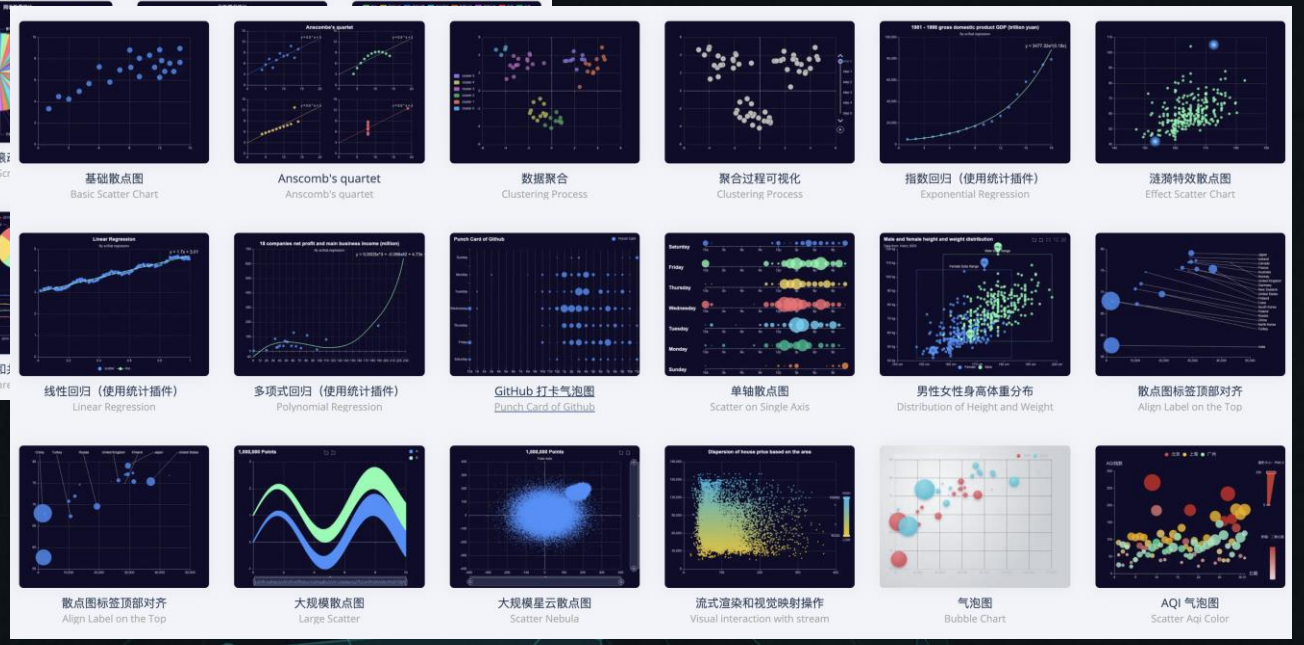
02 可视化

Visualization

传统图表：echarts, AntV



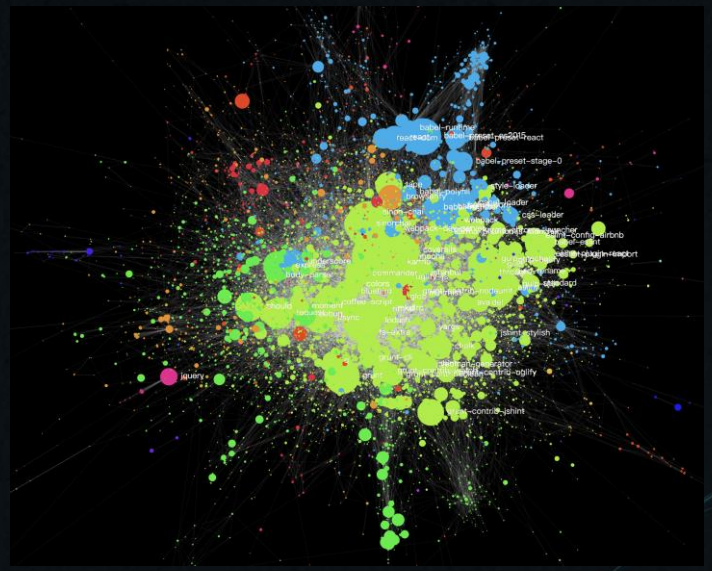




02 可视化

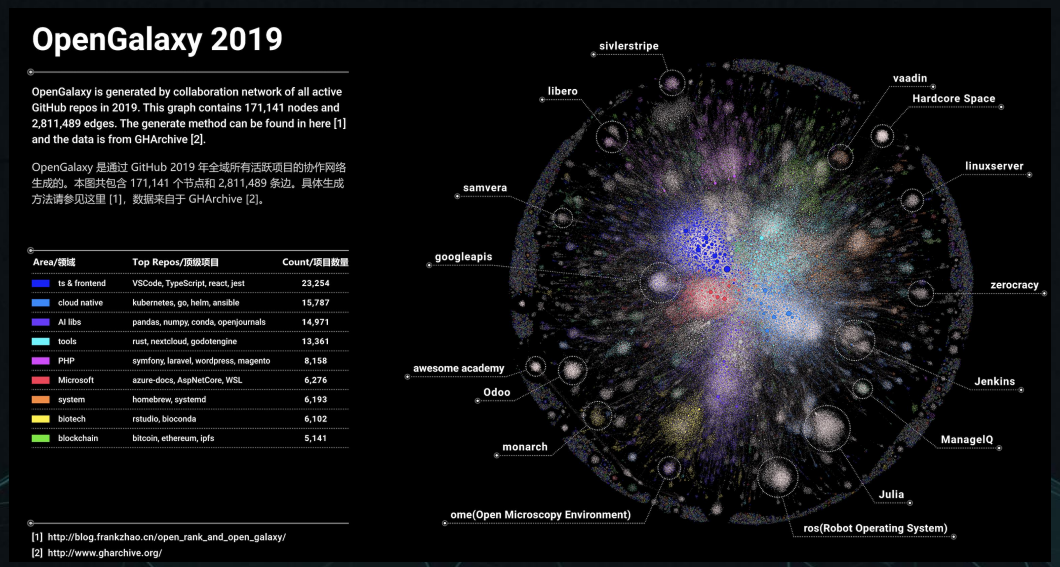
Visualization

图（Graph）类型



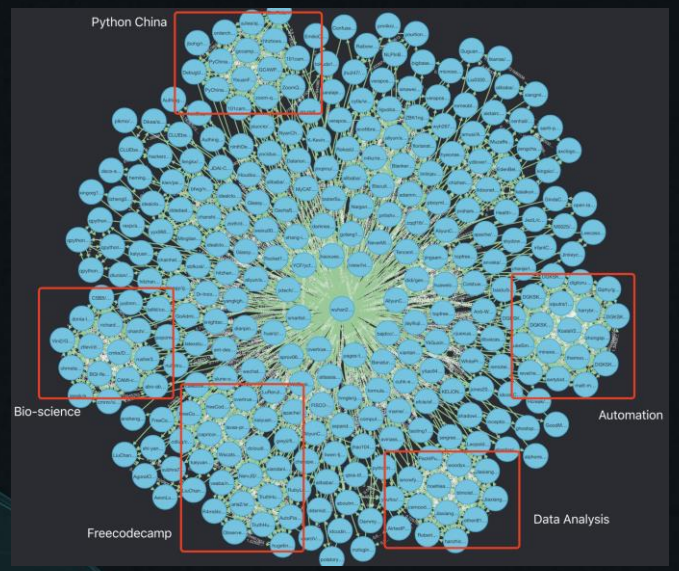
npm 包依赖网络

echarts GraphGL
54,000 节点
10,000 边
npm 总量 181W



OpenGalaxy 2019

Gephi
171,141 节点
2,811,489 边
GitHub 总量



Wuhan2020 协作项目关系图

Neo4j
300 节点
862 边

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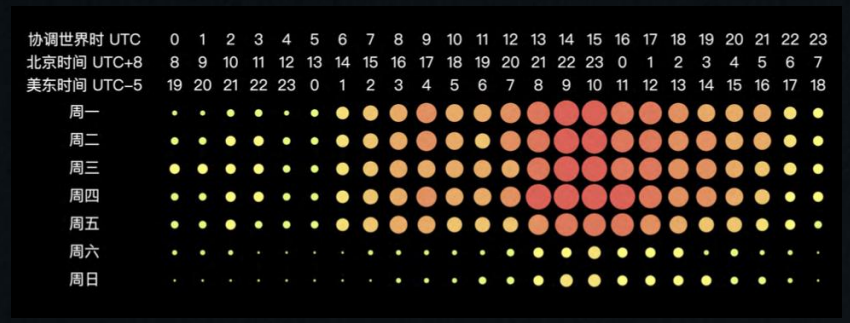
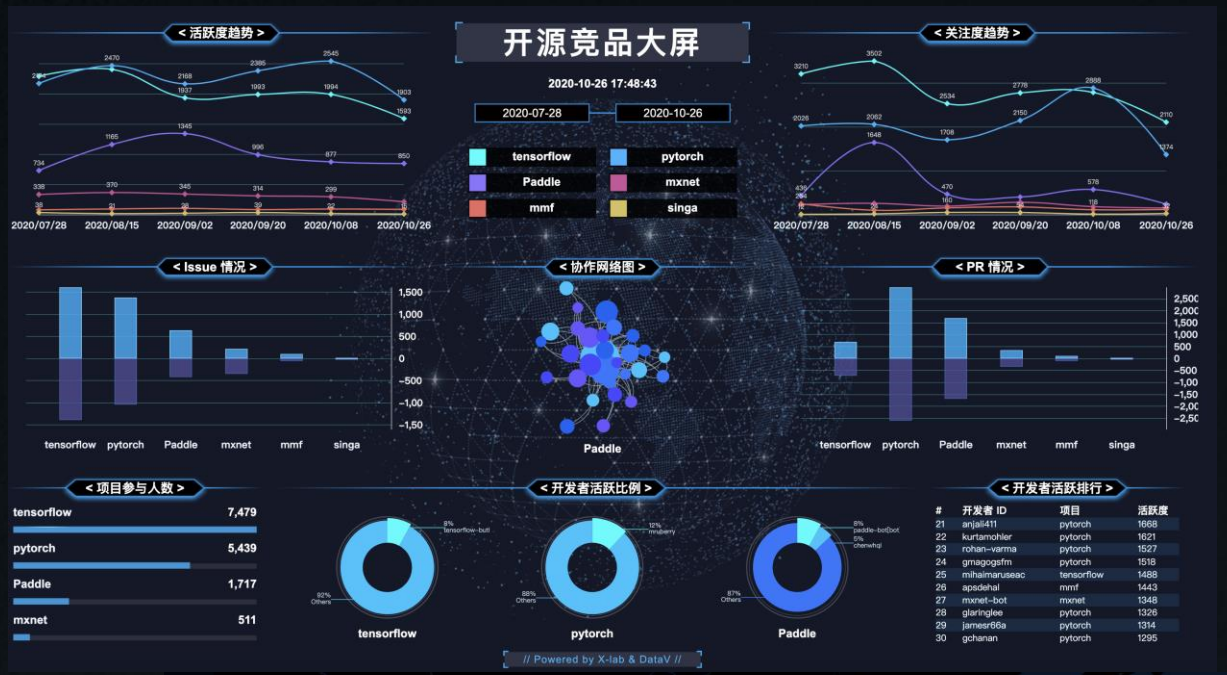
02 可视化

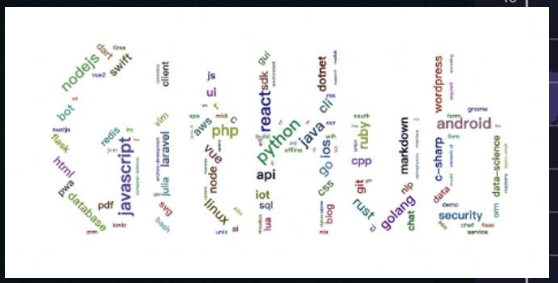
Visualization

自定义可视化

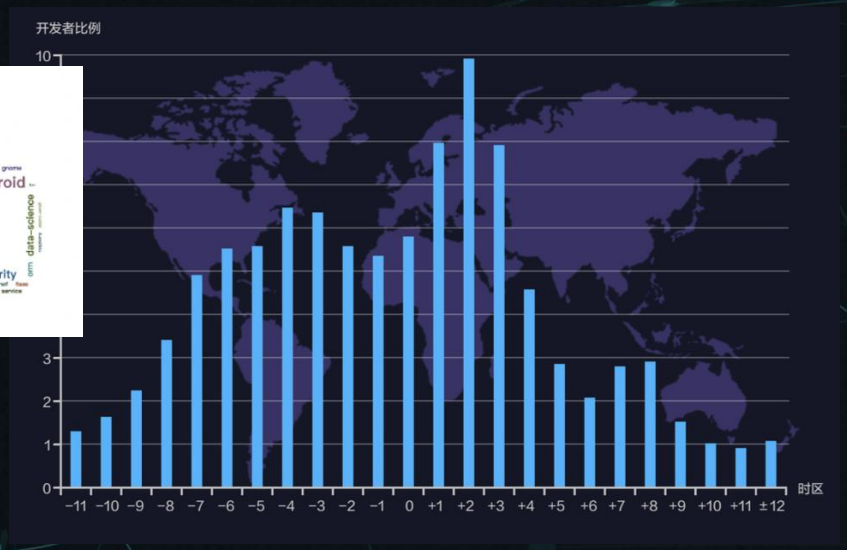


日志时间分布打孔图





词云



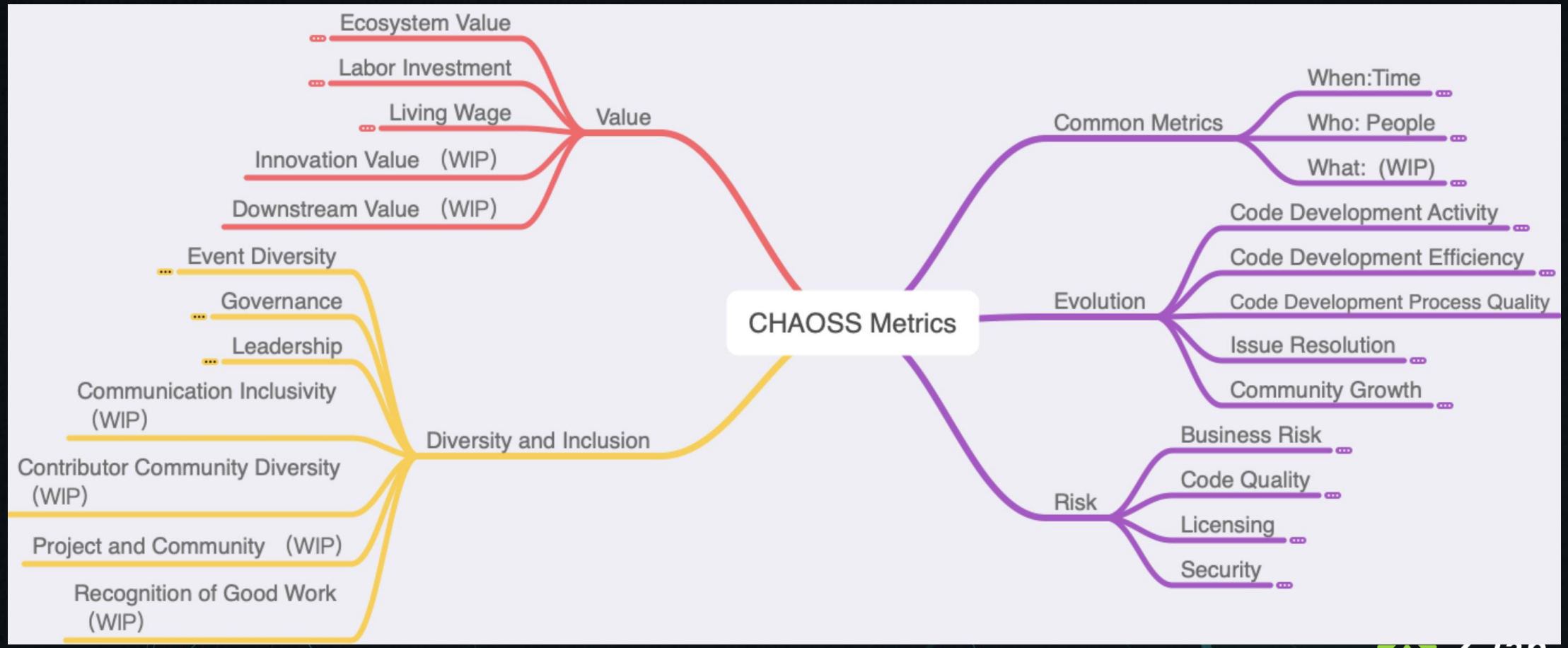
人员分布时区柱状图

聚合数据大屏

http://oss.x-lab.info/github-insight-report-2020.pdf
http://oss.x-lab.info/github-insight-report-2020-en.pdf

03 问题
Problems

指标体系——项目健康度



03 问题
Problems

全域
- 项目聚类分类
  - 开源项目分布在哪些领域
  - 给定一个项目，如何预测其所属领域
  - 根据项目类型，可描述开发者画像
- 项目中心度
  - 开源世界中，哪些项目更加重要
  - 项目选型/项目价值预估

项目
- 项目活跃度
  - 项目活跃情况如何？趋势如何？
- 开发者画像
  - 那些参与项目的人都是谁，他们是做什么的？
  - 谁在关注该项目，有什么诉求？
- 研发行为监测
  - 项目是否存在数据异常，有哪些需要注意的风险点？

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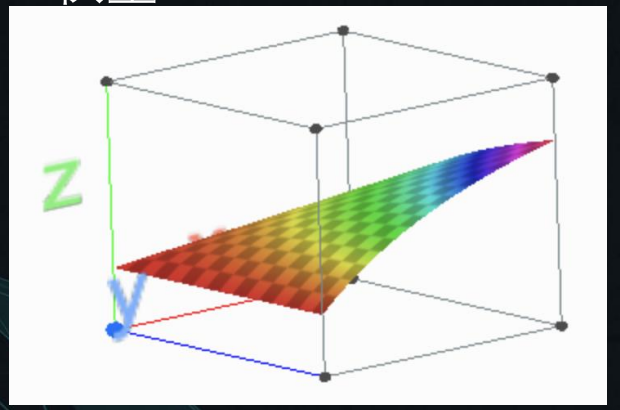
03 问题

Problems

基于 GitHub 的基本操作：开发者活跃于项目 Who-When-What

→ 开发者在项目中活跃，提 Issue，回复 Issue，提 PR，回复 PR，review PR，PR 合入

→ 开发者在具体实例上的活跃度 $A_{di} = \sum w_{ai} C_{ai}, w_{ai} = 2,1,3,1,4,5$??? 权重



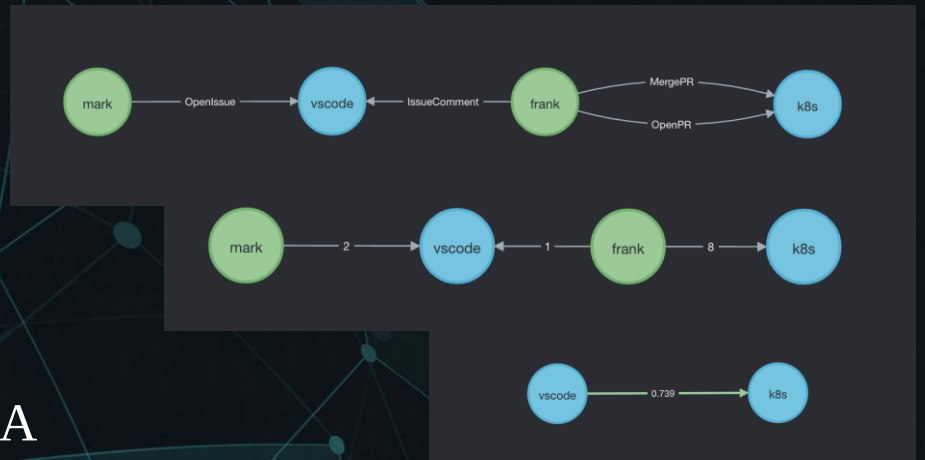
→ 开发者在项目上的活跃度 $A_{dr} = \sqrt{\sum A_{di}}$

→ 项目的总体活跃度 $A_r = \sum A_{dr}$

→ 同一项目中开发者之间的协作关联度 $RDP_{ab} = \sum \frac{A_{ai} A_{bi}}{A_{ai} + A_{bi}}$

→ 开发者在全域上的协作关联度 $RDG_{ab} = \sum RDP_{ab}$

→ 不同项目间的协作关联度 $RP_{ab} = \sum \frac{A_a A_b}{A_a + A_b}$??? 聚合



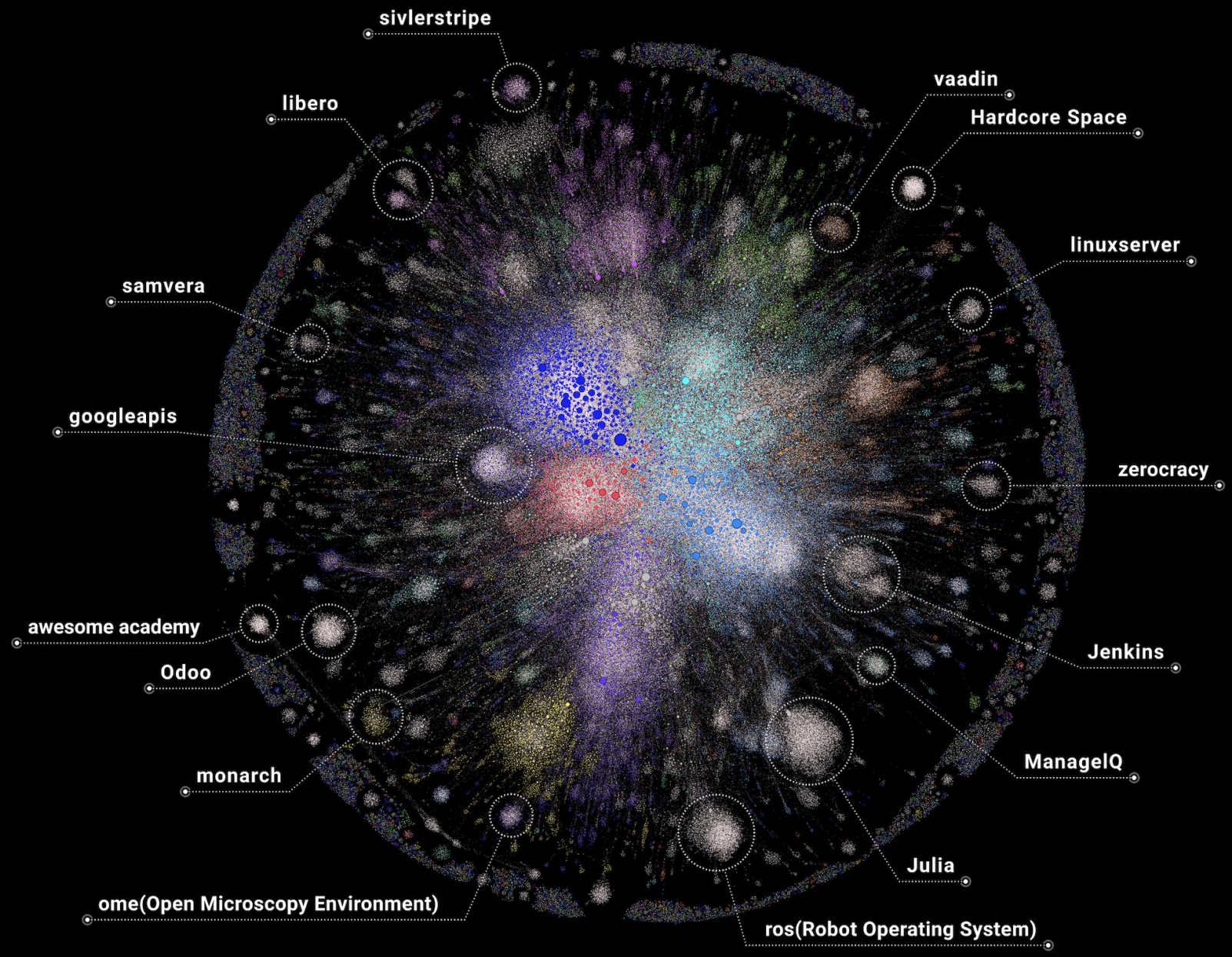
→ 上述均为一段时间内的统计数据，某时间点：180 天 EMA

OpenGalaxy 2019

OpenGalaxy is generated by collaboration network of all active GitHub repos in 2019. This graph contains 171,141 nodes and 2,811,489 edges. The generate method can be found in here [1] and the data is from GHArchive [2].

OpenGalaxy 是通过 GitHub 2019 年全域所有活跃项目的协作网络生成的。本图共包含 171,141 个节点和 2,811,489 条边。具体生成方法请参见这里 [1]，数据来自于 GHArchive [2]。

Area/领域	Top Repos/顶级项目	Count/项目数量
ts & frontend	VSCode, TypeScript, react, jest	23,254
cloud native	kubernetes, go, helm, ansible	15,787
AI libs	pandas, numpy, conda, openjournals	14,971
tools	rust, nextcloud, godotengine	13,361
PHP	symfony, laravel, wordpress, magento	8,158
Microsoft	azure-docs, AspNetCore, WSL	6,276
system	homebrew, systemd	6,193
biotech	rstudio, bioconda	6,102
blockchain	bitcoin, ethereum, ipfs	5,141



[1] http://blog.frankzhao.cn/open_rank_and_open_galaxy/

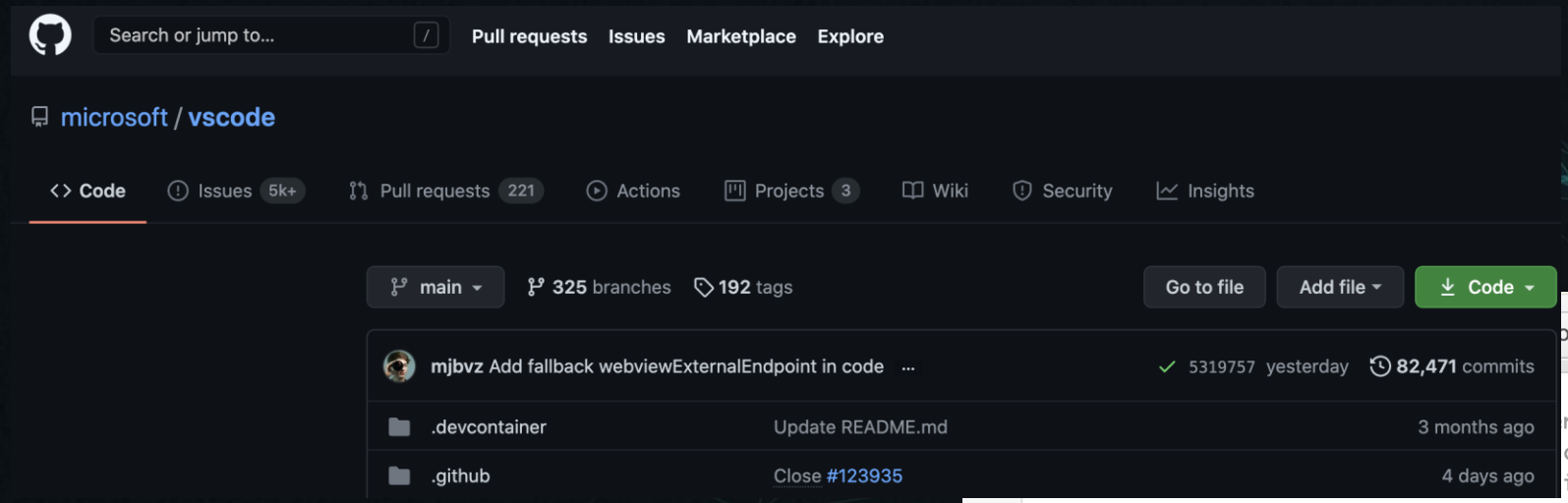
[2] http://www.gharchive.org/

04 举个例子

Example

VSCode

- 开源世界的核心，最流行 IDE
- 准备工作：获取项目的地址、创建时间、数据库 ID



https://github.com/microsoft/vscode

https://docs.github.com/en/graphql/overview/explorer

```
# We'll get you started with a simple query showing your username!
query {
  repository(owner:"microsoft", name:"vscode") {
    createdAt
    databaseId
  }
}
```

```
{
  "data": {
    "repository": {
      "createdAt": "2015-09-03T20:23:38Z",
      "databaseId": 41881900
    }
  }
}
```

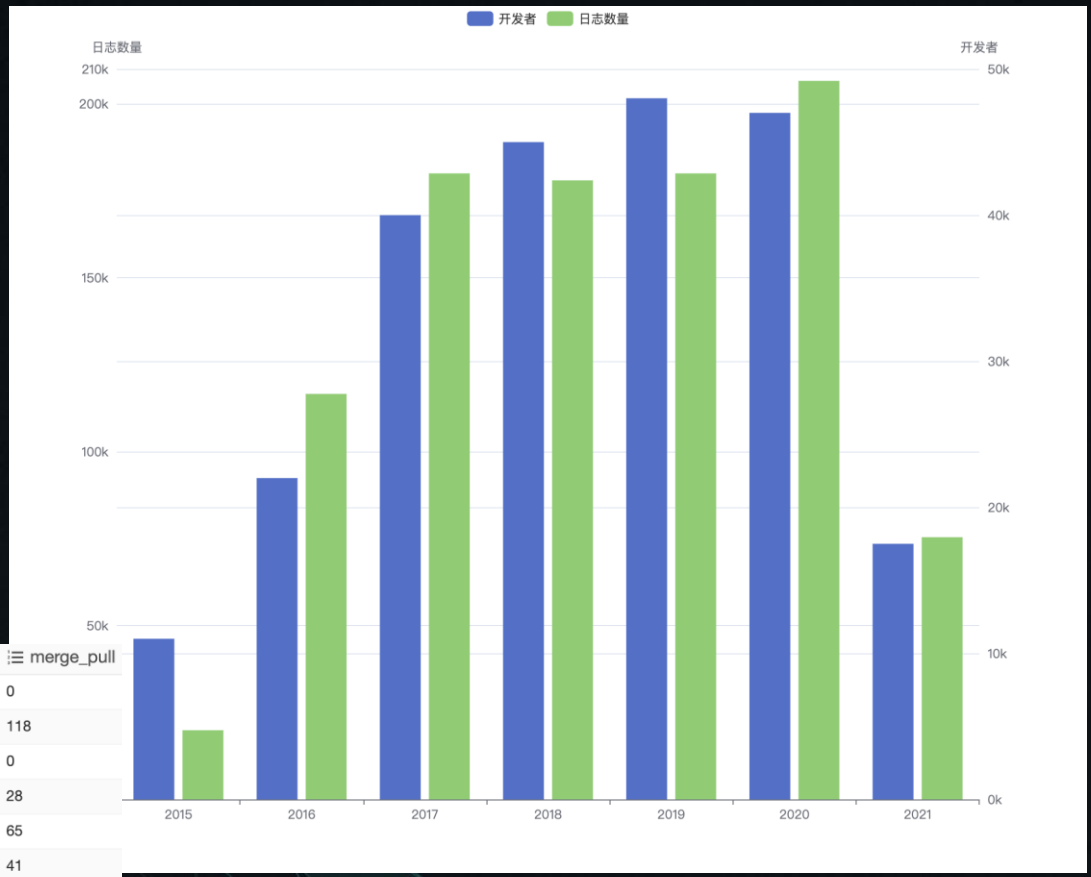
04 举个例子

Example

VSCode 案例分析

VSCode 2020 开发者活跃度

序号	login	activity	issue_comment	open_issue	open_pull	review_pull	merge_pull
1	vscode-triage-bot	9703	9703	0	0	0	0
2	bpasero	7836	4175	700	133	318	118
3	vscodebot[bot]	6912	6912	0	0	0	0
4	isidorn	5526	4231	282	33	123	28
5	mjbvz	4643	3337	152	75	113	65
6	jrieken	4587	2969	411	45	114	41
7	joaomoreno	4064	2767	238	49	111	46
8	sandy081	3875	2737	319	39	52	35
9	Tyriar	3469	2326	337	41	39	38
10	roblourens	3207	2085	289	29	83	25
11	connor4312	2788	2000	193	41	21	39
12	alexr00	2610	1424	154	81	70	71
13	alexdima	2499	1817	106	46	33	40
14	gjsjohnmurray	2387	2065	51	18	24	14
15	rebornix	2366	1502	216	45	23	41
16	aeschli	2246	1626	108	45	16	41
17	deepak1556	2076	1470	32	45	53	39
18	JacksonKearl	1771	1012	253	24	24	17
19	weinand	1593	1295	125	2	8	2
20	github-actions[bot]	1539	1537	1	0	0	0



VSCode 历史日志/开发者数量

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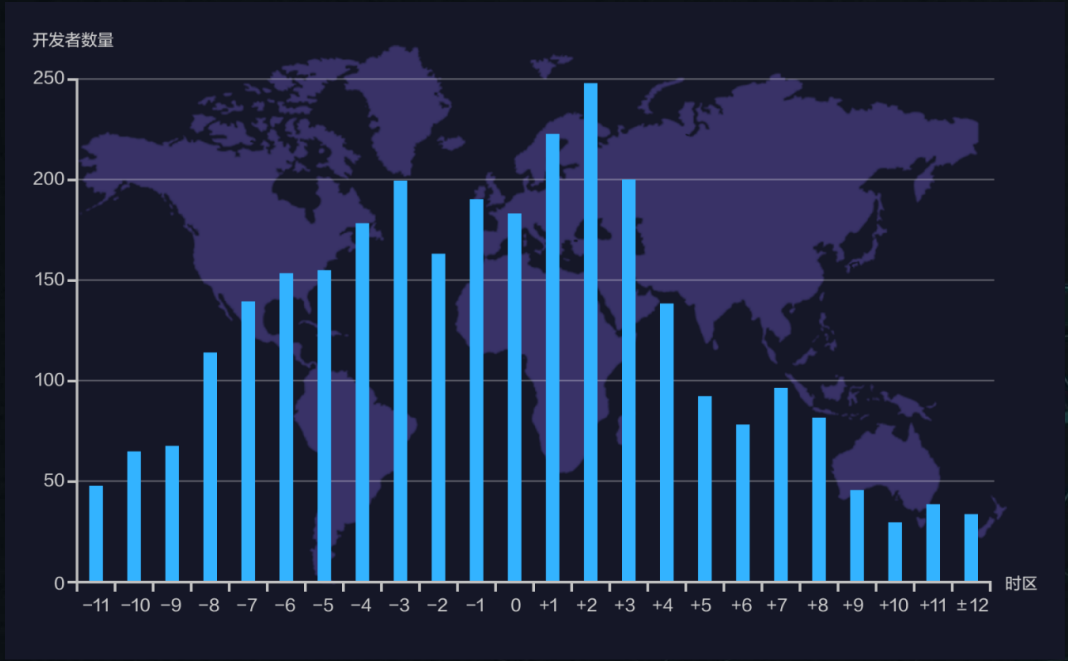
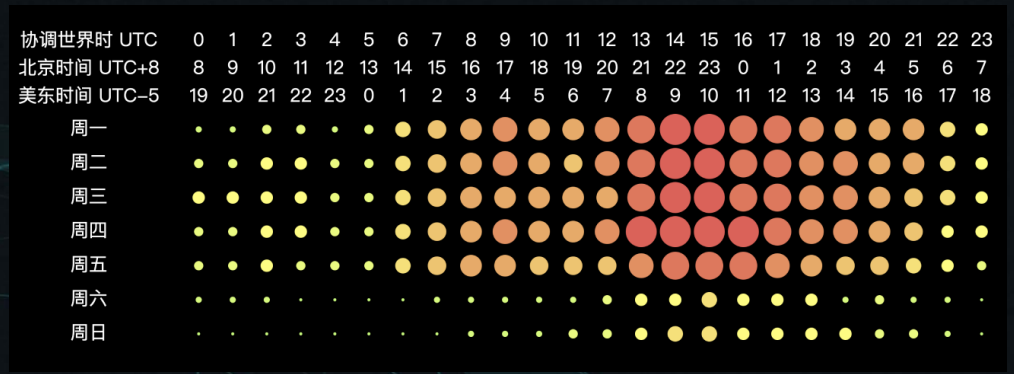
04 举个例子

Example

VSCode 案例分析



VSCode 2020 开发者时区分布



VSCode 2020 工作时间分布

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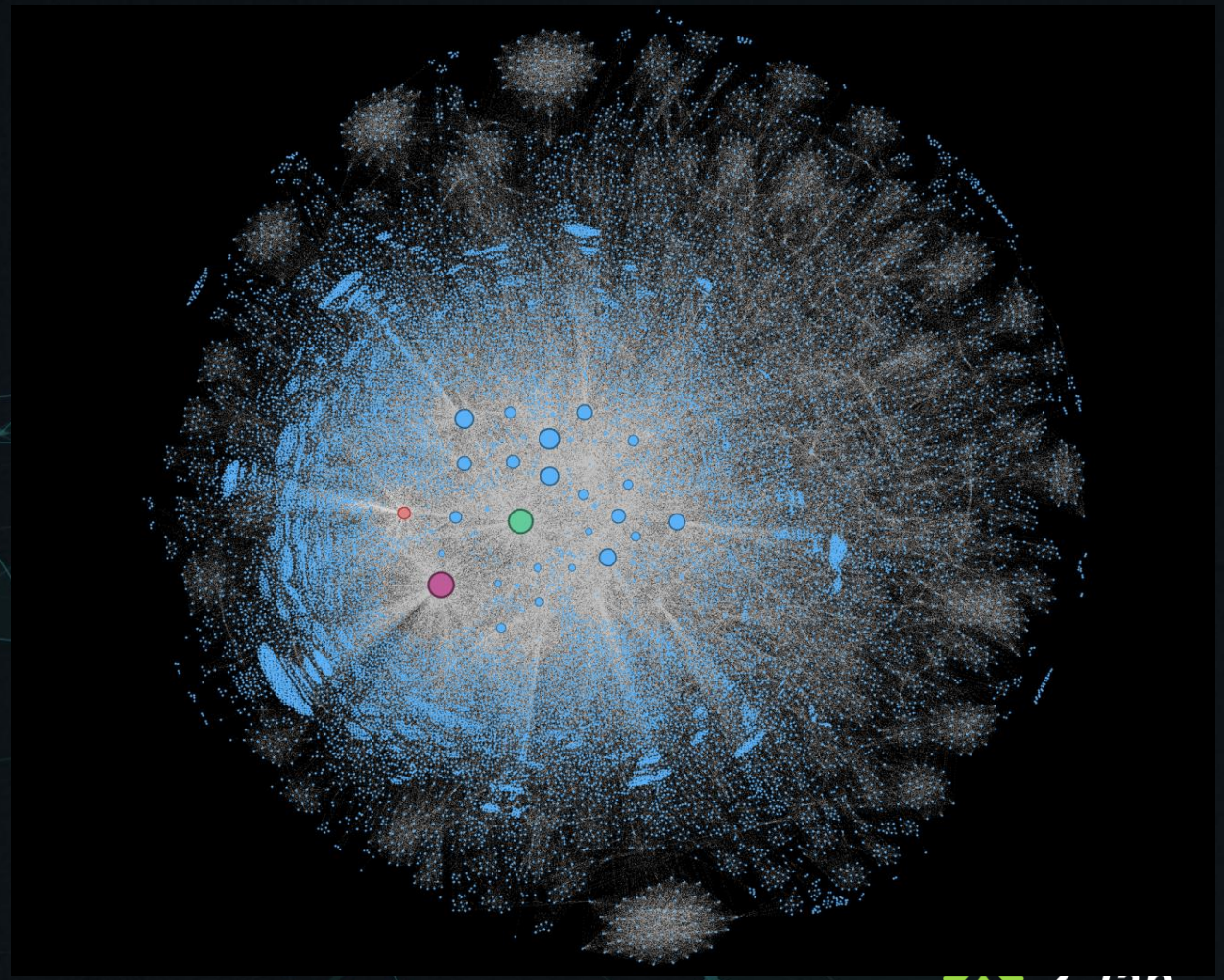
04 举个例子

Example

VSCode 案例分析

序号	domain	count
1	gmail.com	150
2	users.noreply.github.com	91
3	microsoft.com	54
4	qq.com	7
5	hotmail.com	6
6	google.com	5
7	fb.com	5
8	outlook.com	4
9	me.com	3
10	yahoo.com	3
11	icloud.com	2
12	umich.edu	2
13	kdrag0n.dev	2
14	github.com	2
15	googlemail.com	2
16	foxmail.com	2
17	163.com	2

VSCode 2020 开发者邮箱后缀分布



VSCode 2020 开发者协作网络

04 举个例子

Example

VSCode 案例分析

#	Repo	Relation	PageRank
1	microsoft/TypeScript	799	544
2	microsoft/vscode-remote-release	594	162
3	microsoft/vscode-python	458	157
4	DefinitelyTyped/DefinitelyTyped	410	564
5	Microsoft/vscode-cpptools	360	102
6	microsoft/terminal	323	243
7	electron/electron	255	256
8	flutter/flutter	236	645
9	microsoft/vscode-docs	227	40
10	gatsbyjs/gatsby	220	504

VSCode 2020 项目协作关联 Top10

#	repo_name	resolve_period_avg	response_period_avg	resolve_period_median	response_period_median	count
1	microsoft/vscode	7d3h	1d17h	1d2h	2h33m	6154

VSCode 2021 Issue 响应解决周期

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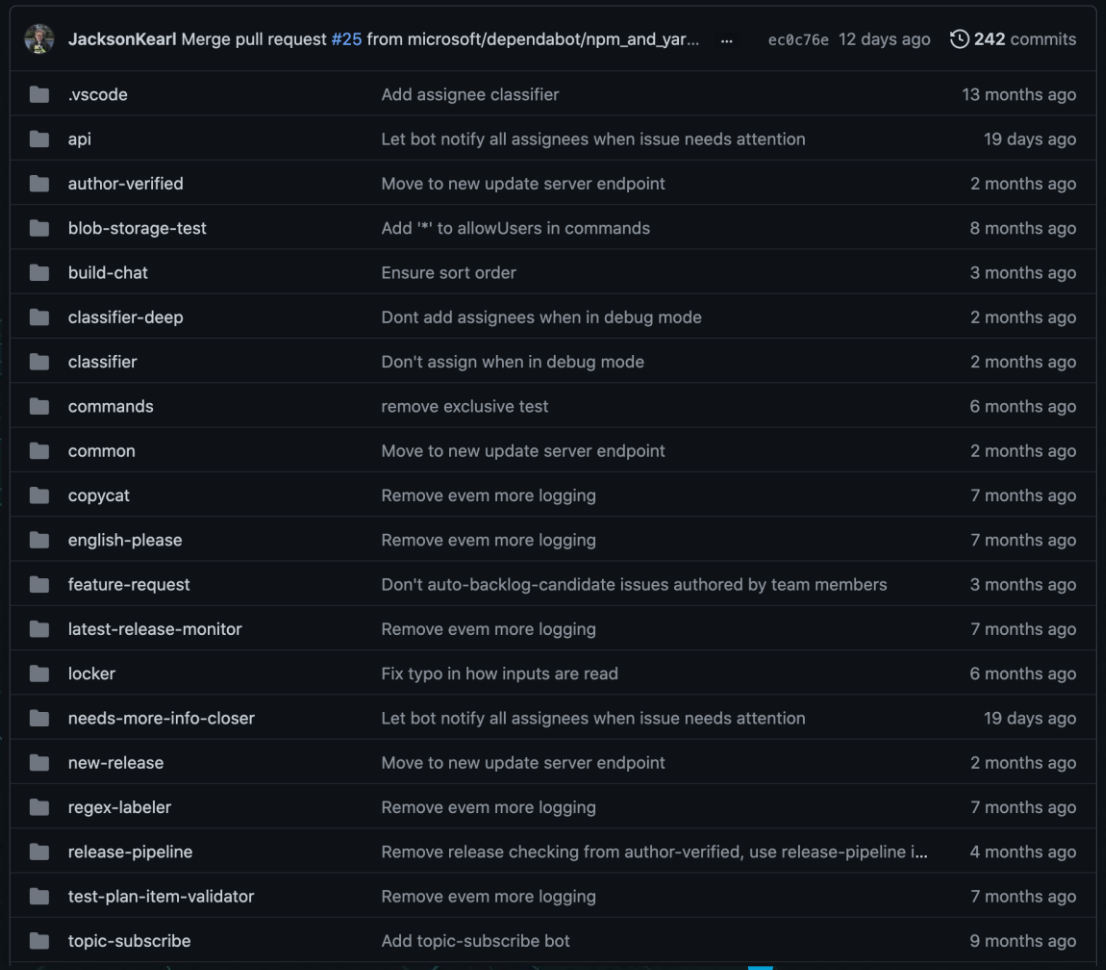
04 举个例子

Example

VSCode 案例分析之社区流程

- build-chat：将构建信息发送到 Slack 中
- classifier/classifier-deep：Issue 自动打标/基于机器学习
- copycat：跨仓库 Issue 拷贝
- english-please：非英文开 Issue 提示使用英文
- locker：Issue 关闭一段时间后自动锁定
- needs-more-info-closer：需要用户反馈的 Issue 若一段时间没有回复自动关闭
- regex-labeler：根据 Issue 描述中正则匹配结果打标签
- topic-subscribe：根据 label 提醒某些账户关注当前 Issue



另一些注重流程的有趣社区：Kubernetes、React、OpenDigger

https://github.com/microsoft/vscode-github-triage-actions/

05 大作业

Assignment

某开源项目的 2020 年深入数据分析

数据类
- 基础的统计数据分析、可视化
- 开发者数据统计、可视化
- 关联数据的分析，如协作关联度高的其他项目
- 其他任意想做的数据分析

流程类
- 项目的日常协作流程调研
- 开发者参与流程调研
- 项目 CI/CD 的流程调研

课程提供

- 全域数据的 Clickhouse 数据库只读访问能力
- 预置常用数据统计的 SQL
- 分析过程中的指导答疑

https://github.com/X-lab2017/open-digger

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THANK YOU

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