

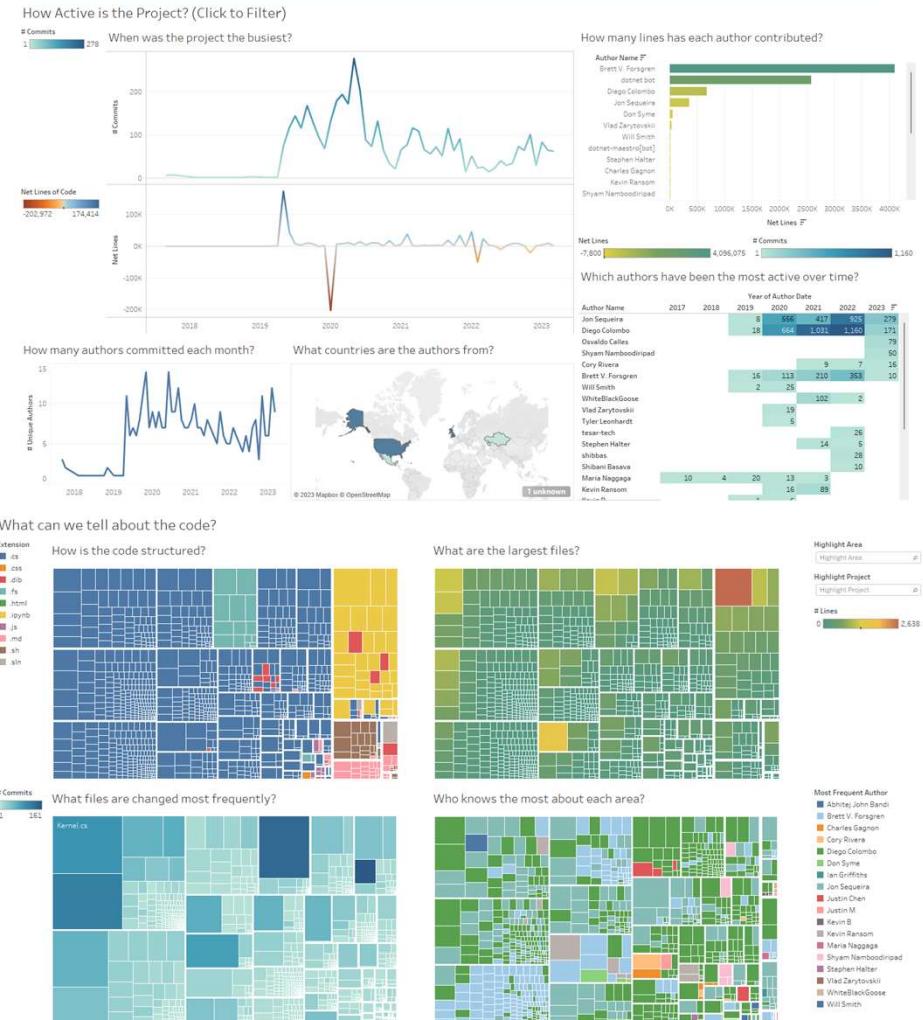


VISUALIZING CODE

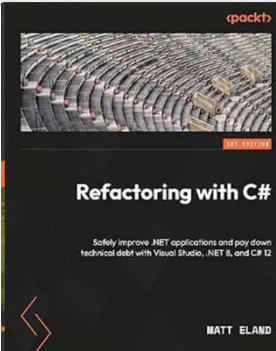


MATT ELAND - [@INTEGERMAN](#)

AI SPECIALIST @ **Leading EDJE**



WHO IS THIS MAN? AND WHY IS HE VISUALIZING CODE?



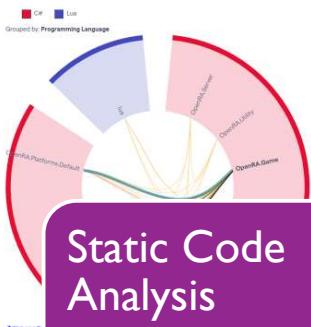
AI SPECIALIST @  **Leading EDJE**



THIS TALK IS INSPIRED BY A BOOK



TALK STRUCTURE



Static Code Analysis

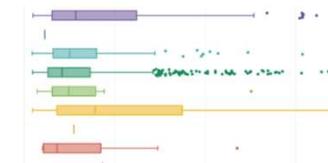
- SonarCloud
- NDepend

```
comits = []
for commit in repo.commits:
    if len(commit.committer.name) > 0:
        comits.append(commit)

# Print the first 10 commits
for i in range(10):
    print(comits[i].commit.message)
```

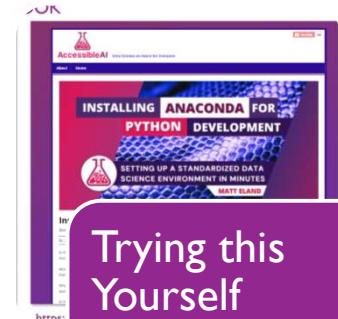
Git as a Data Source

- Data in git
- GitStractor



Exploratory Data Analysis

- Pandas
- Plotly
- Jupyter Notebooks



Trying this Yourself

- Getting Started
- Additional Reading



STATIC CODE ANALYSIS

[This Photo](#) by Unknown Author is licensed under [CC BY-NC-ND](#)

COMMERCIAL TOOLING: SONARCLOUD & NDEPEND

135k Lines of Code
Last analysis 21 hours ago: 6712862 Update build.yml

Quality Gate: Not computed
The Quality Gate helps you see if your New Code is deployable or not. Ask your admin to set a New Code definition to get one.

Category	Value	Grade
RELIABILITY	260 Bugs	E
Maintainability	3.2k Code Smells	A
SECURITY	4 Vulnerabilities	D
SECURITY REVIEW	9 Security Hotspots	E
COVERAGE	0.0% Coverage	C
DUPLICATIONS	1.8% Duplications	B

ndepend report summary

application name: OpenRA (v1.0.0.0)
report build date: 12/28/2021 16:54:18
analysis duration: 00:14:978
ndepend version: 2021.2.5 Professional Developer Edition
baseline for comparison: Baseline is same code base snapshot.
code coverage data: Not Defined. To import Code Coverage Data, please read this online documentation.

Diagrams

- Dependency Graph
- Dependency Matrix
- Treemap Metric View
- Abstraction vs. Instability

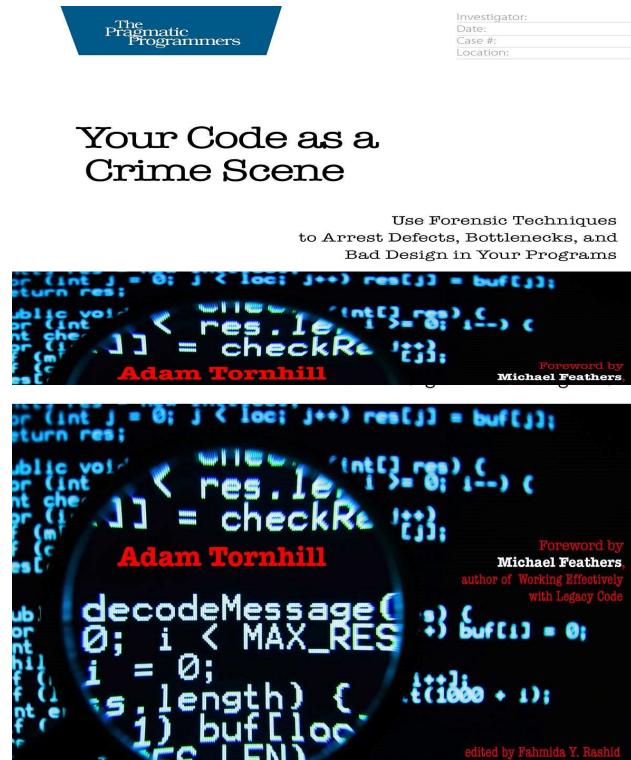
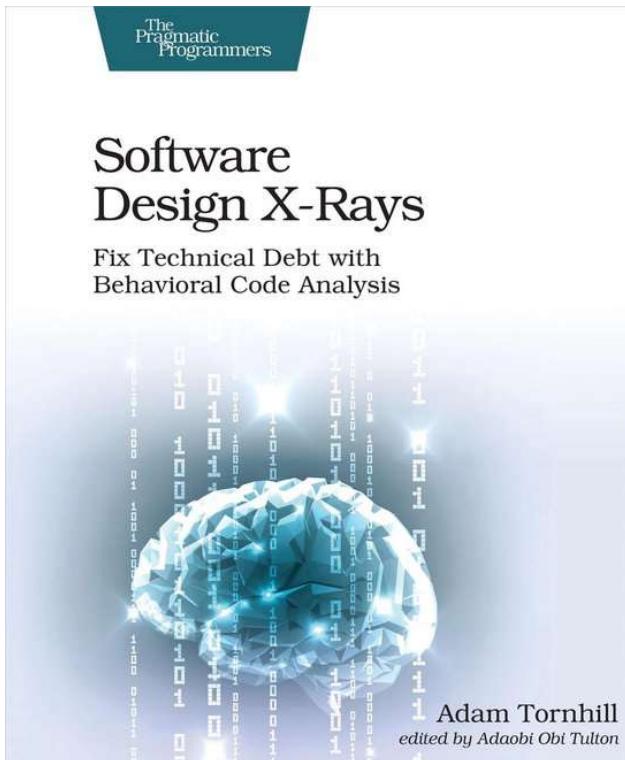
Application Metrics

- # Lines of Code: 74 149 = no diff
0 (NotMyCode) = no diff
Estimated Dev Effort: 1 845d = no diff
- Debt: 12.54% = no diff
Rating: C (46d effort to reach B)
Debt: 231d = no diff
- # Types: 2 958 = no diff
8 Assemblies = no diff
95 Namespaces = no diff
The technical-debt is incomplete because no coverage data specified.
- Quality Gates: Fall: 4, Warn: 0, Pass: 7
- Rules: Critical: 10, Violated: 74, Ok: 79
- Coverage

SonarCloud.com

NDepend.com

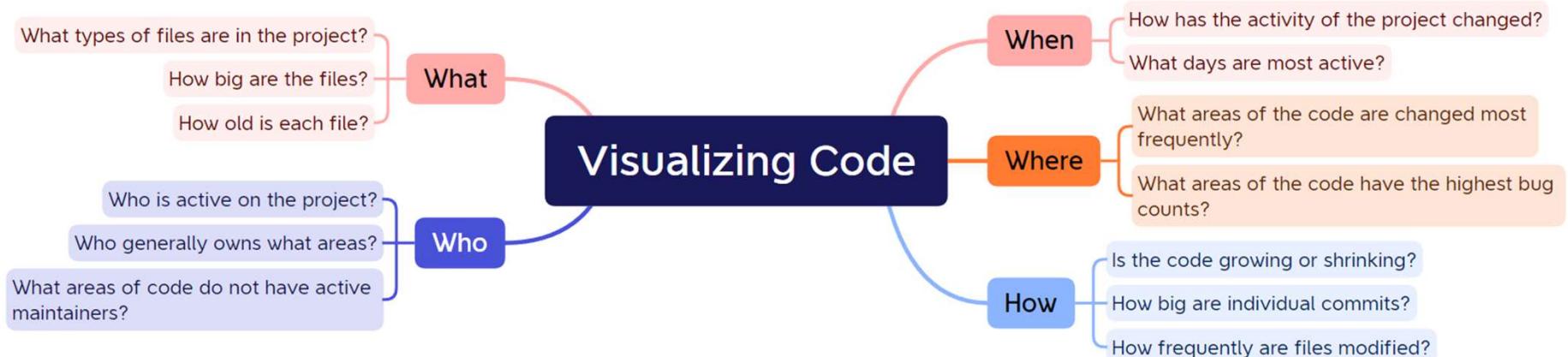
SOME MORE BOOKS THAT INSPIRED THIS...



GIT AS A DATA SOURCE



WHAT CAN OUR PROJECTS TELL US?



WHY?

Understand new
projects

Communicate
code to others

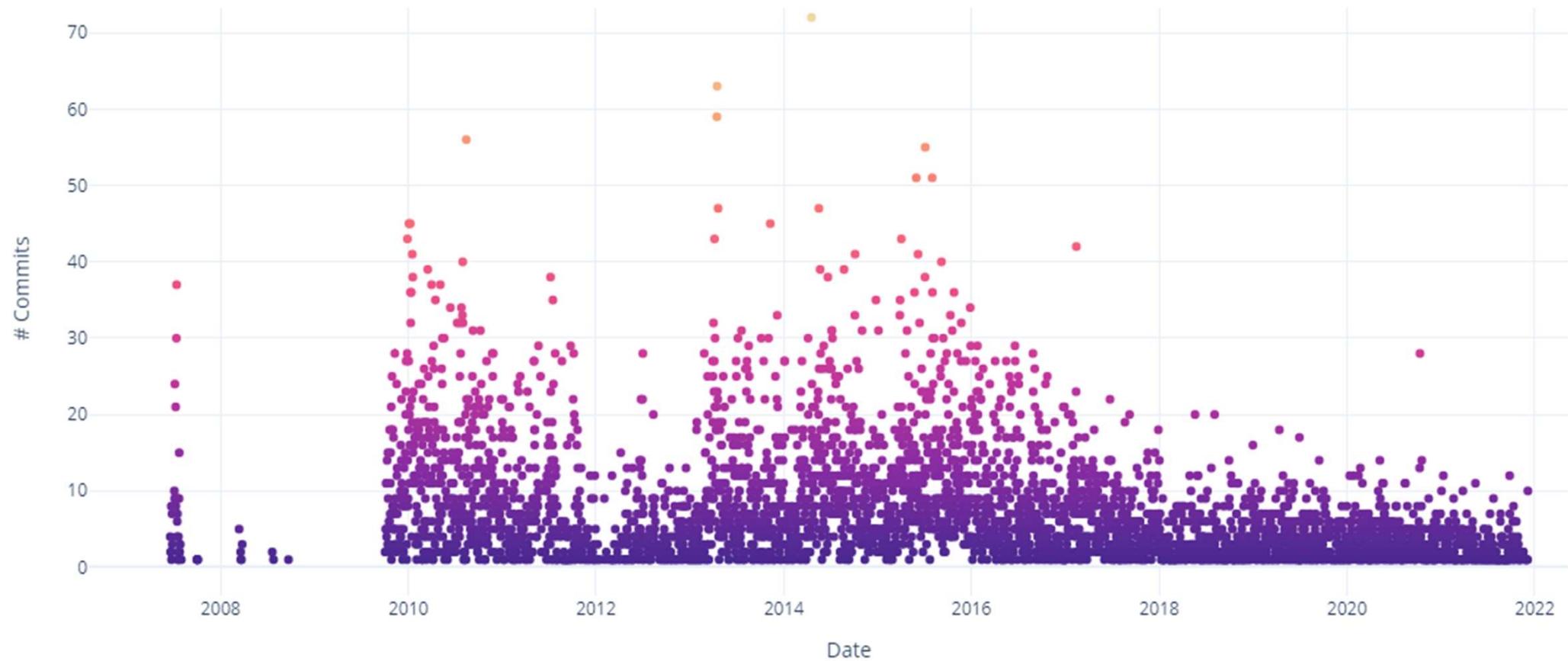
Spot trends

Identify areas to
share knowledge
in

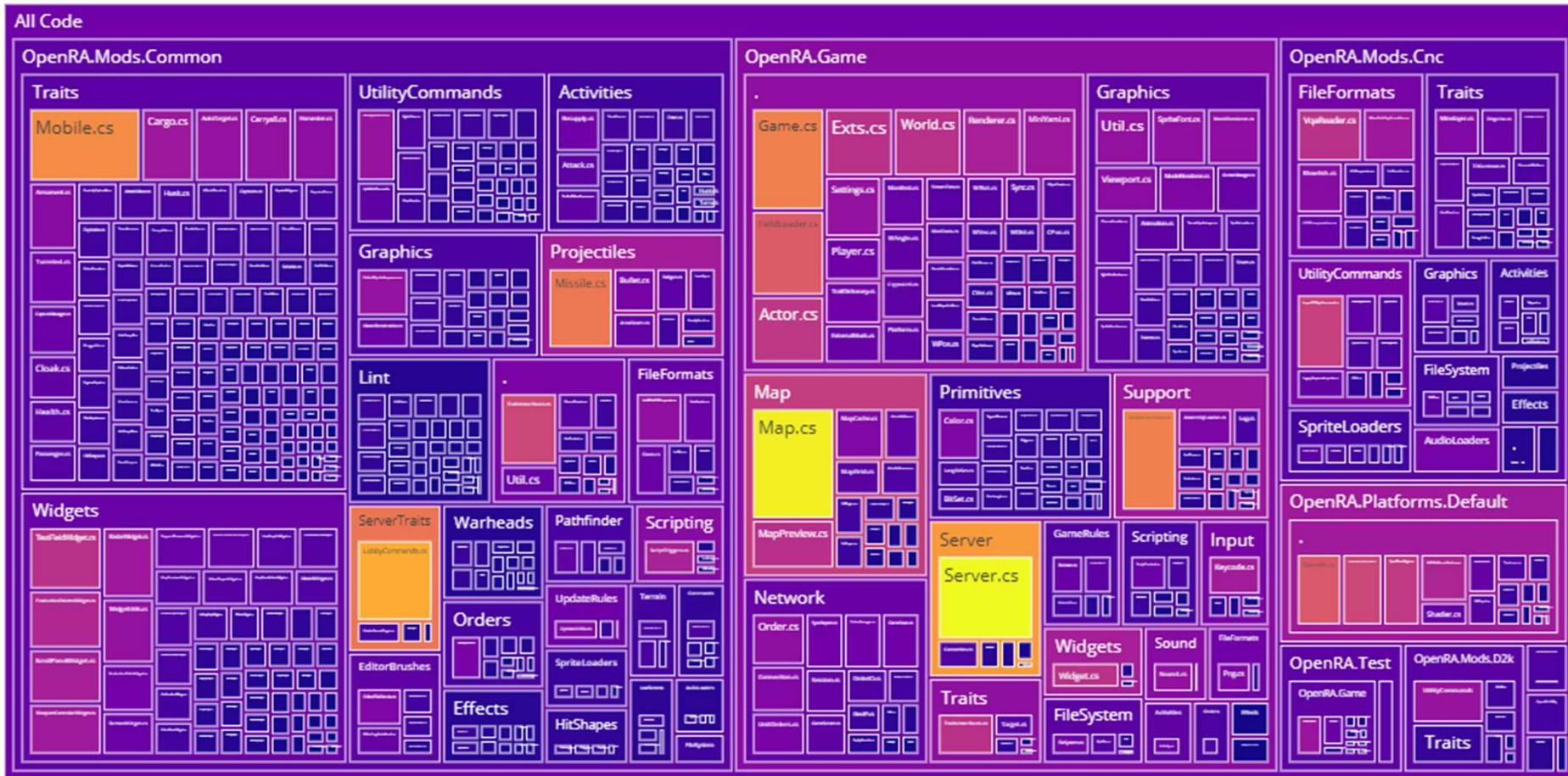
Celebrate
accomplishments

Because it looks
cool

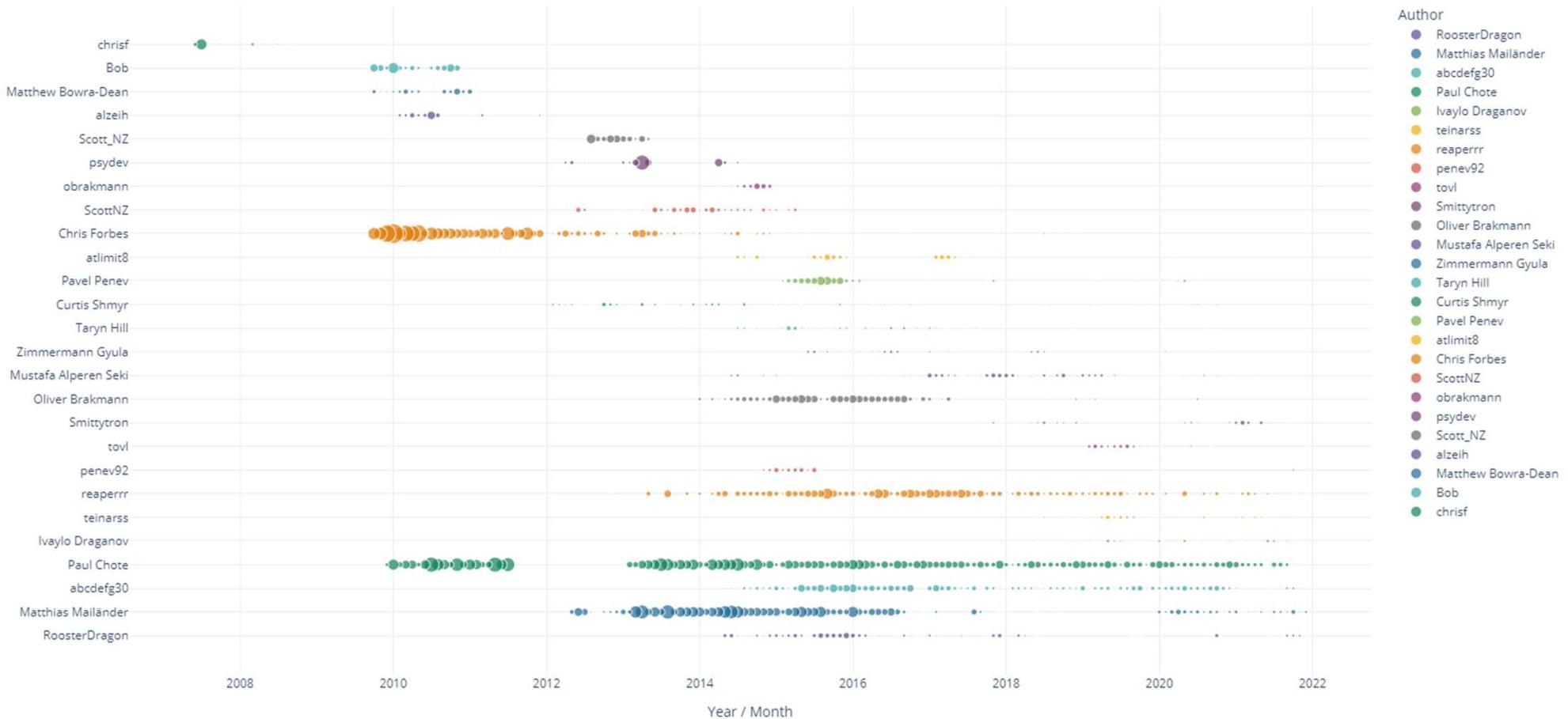
COMMIT INFORMATION



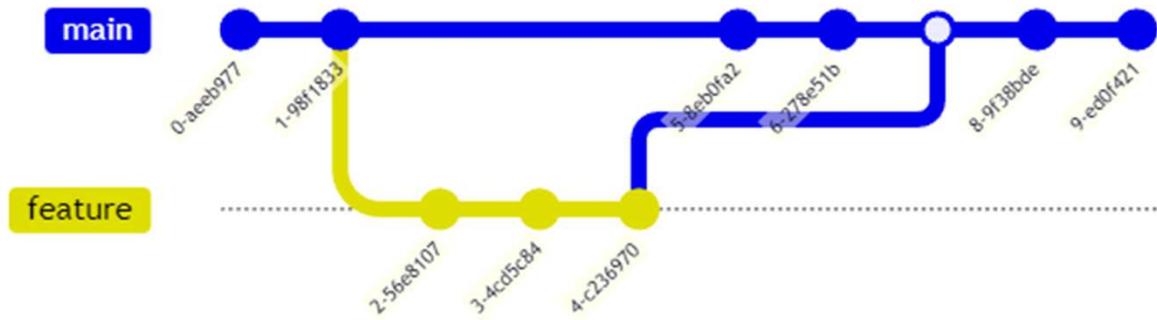
FILE INFORMATION



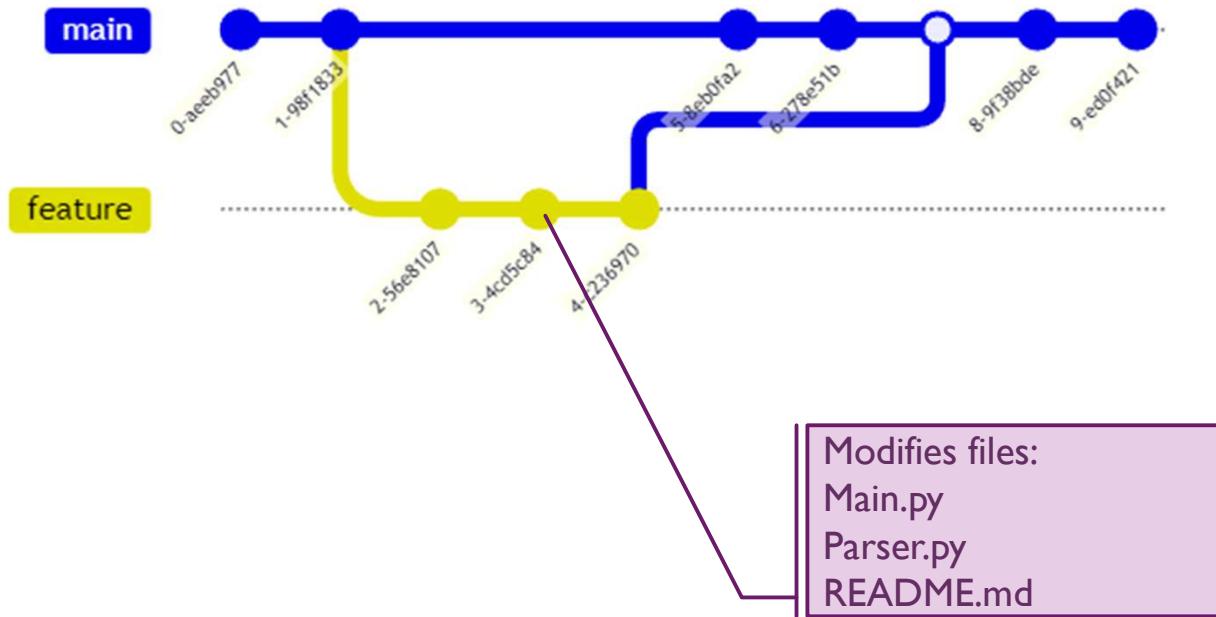
AUTHOR INFORMATION



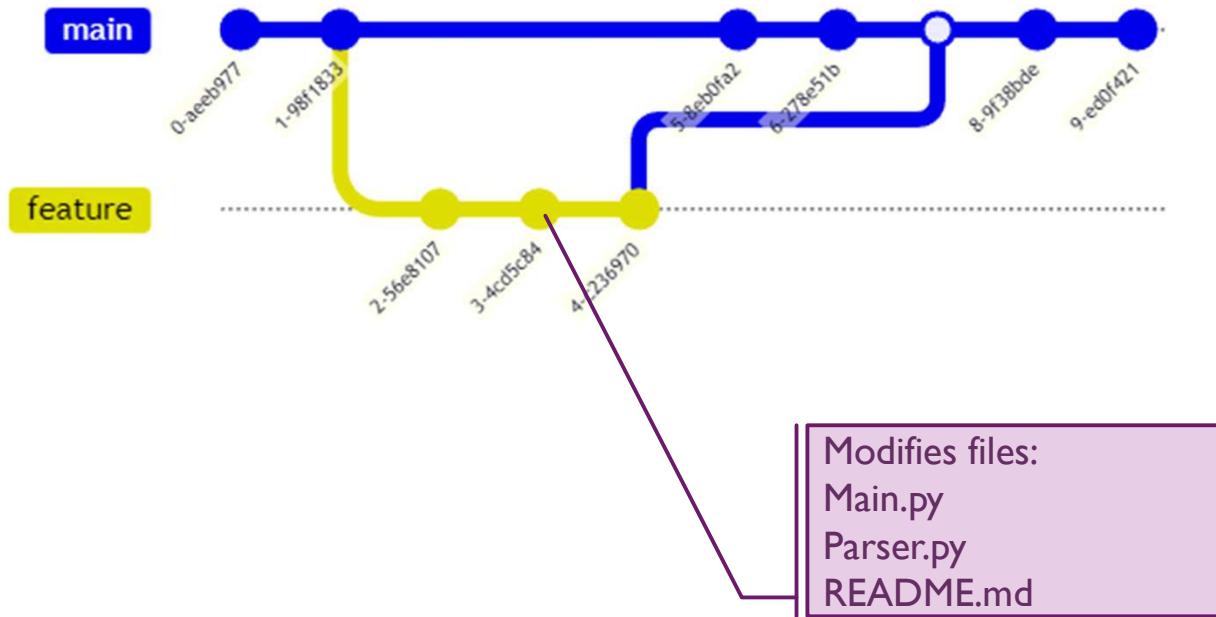
GIT AS A DATA SOURCE



GIT AS A DATA SOURCE



GIT AS A DATA SOURCE

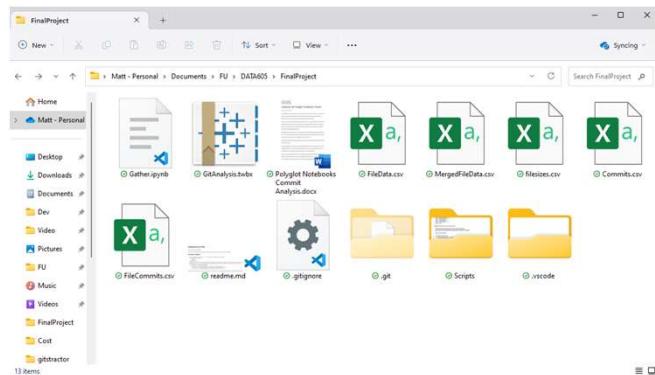
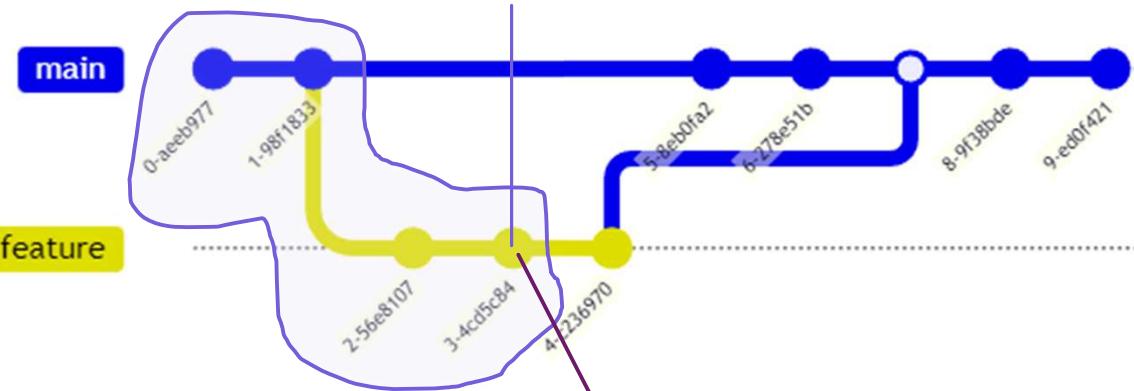


Inferred Metrics:

- Files modified
- Files added
- Files deleted
- Lines added
- Lines deleted

GIT AS A DATA SOURCE

Includes the current file state up to this point!

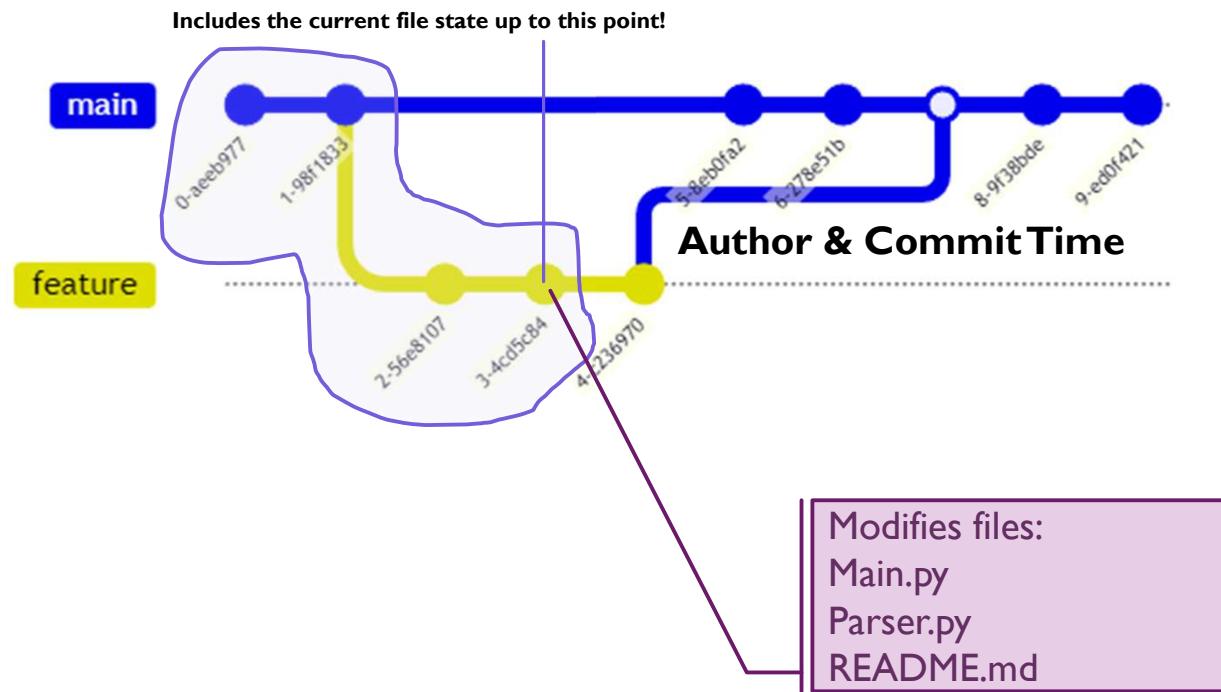


Modifies files:
Main.py
Parser.py
README.md

Inferred Metrics:

- Files modified
- Files added
- Files deleted
- Lines added
- Lines deleted

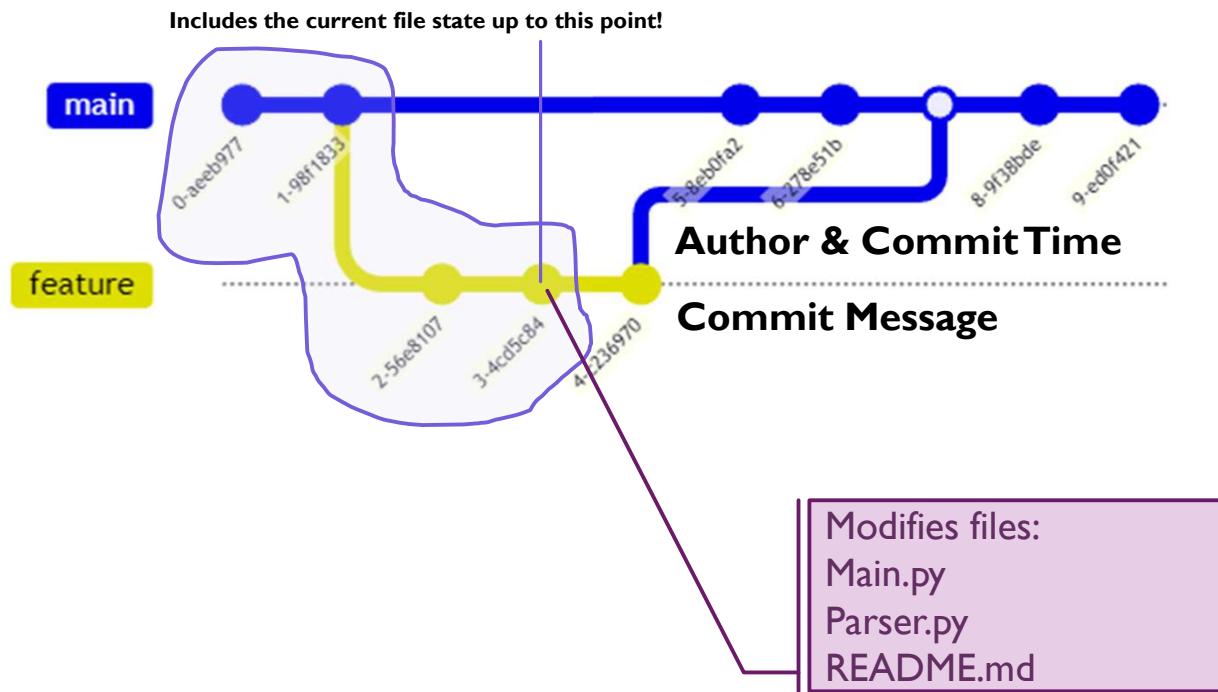
GIT AS A DATA SOURCE



Inferred Metrics:

- Files modified
- Files added
- Files deleted
- Lines added
- Lines deleted

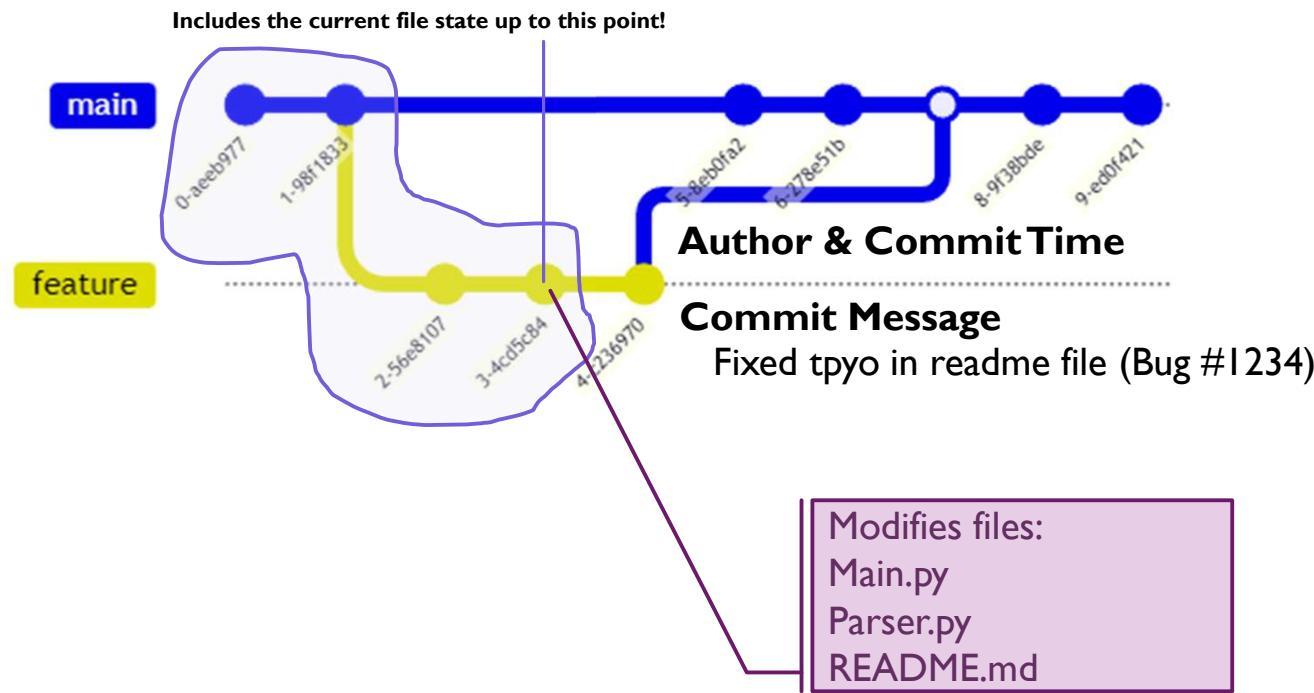
GIT AS A DATA SOURCE



Inferred Metrics:

- Files modified
- Files added
- Files deleted
- Lines added
- Lines deleted

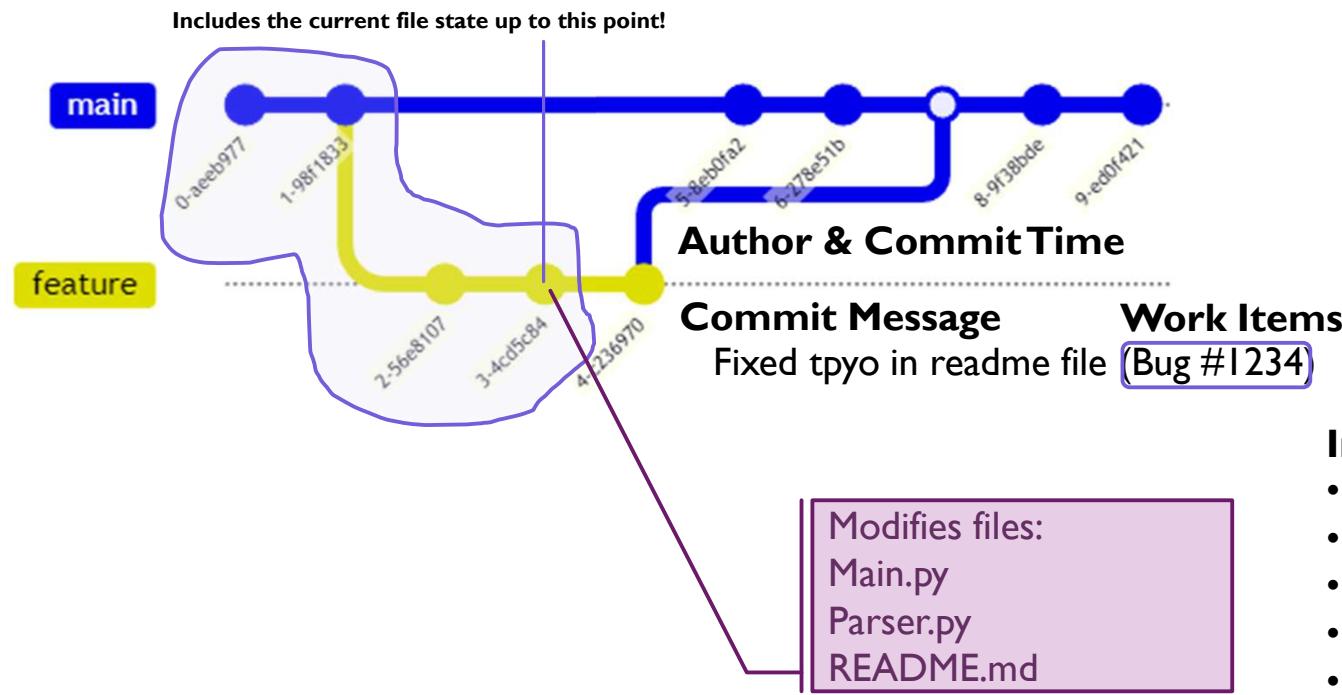
GIT AS A DATA SOURCE



Inferred Metrics:

- Files modified
- Files added
- Files deleted
- Lines added
- Lines deleted

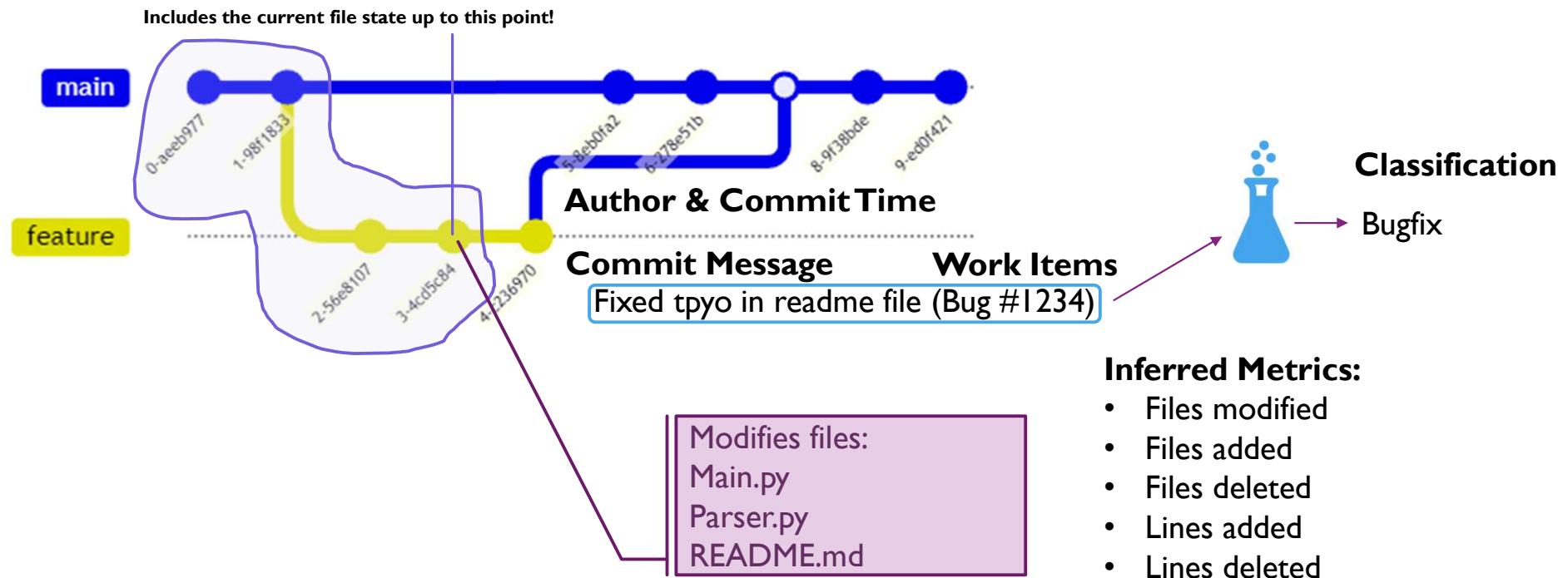
GIT AS A DATA SOURCE



Inferred Metrics:

- Files modified
- Files added
- Files deleted
- Lines added
- Lines deleted

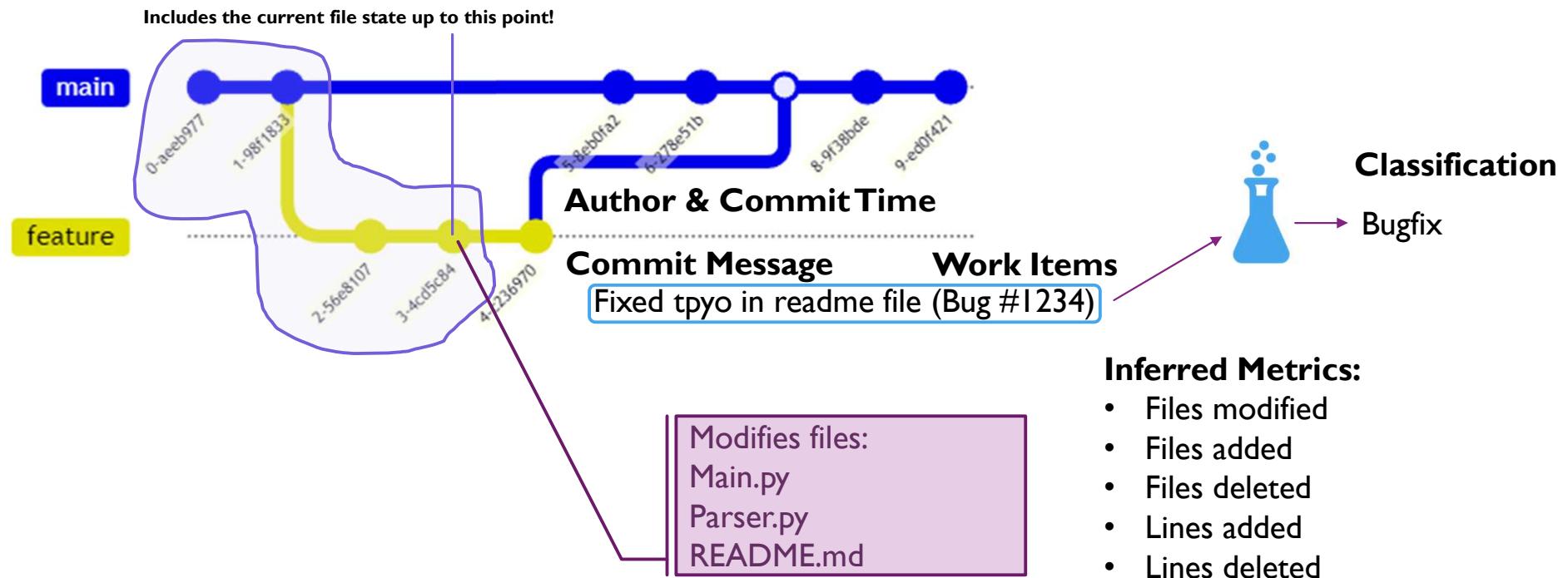
GIT AS A DATA SOURCE



CLASSIFYING COMMITS

Message	Classification
Fixed tpyo on line 37	BugFix
Prevented NullReferenceException	BugFix
Added Dark Theme	Feature
Updated NUnit Version	Chore
Support for GZIP compression	Feature
Incremented build number	Chore
YOLO!	Unknown

GIT AS A DATA SOURCE



GIT DATA FILES



AuthorDailyCommits.
csv



AuthorMonthlyCom
mits.csv



AuthorQuarterlyCom
mits.csv



Authors.csv



AuthorWeeklyCommi
ts.csv



AuthorYearlyCommits
.csv



Commits.csv



FileCommits.csv



Files.csv

ANALYZING IN JUPYTER NOTEBOOKS



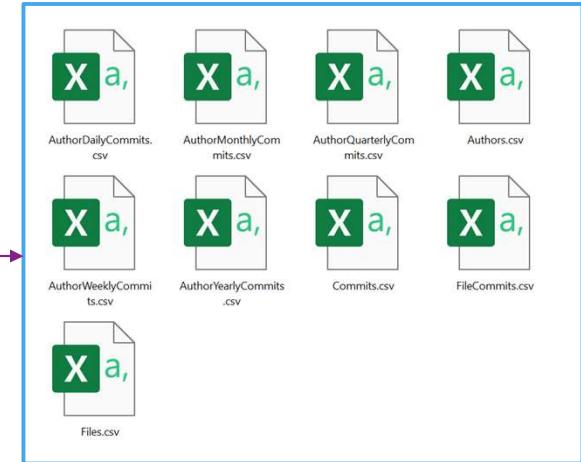
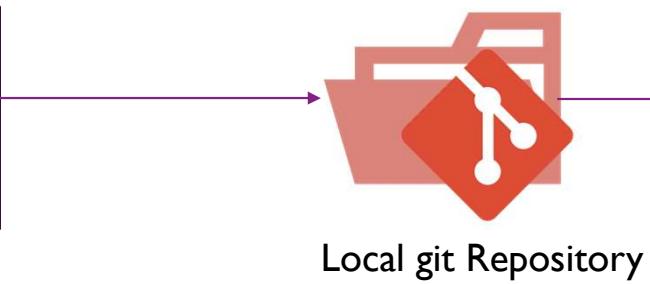
INTRODUCING “GITSTRACTOR”

AN OPEN-SOURCE TOOL FOR
EXTRACTING CSV DATA SOURCES
FROM GIT REPOSITORIES



GITSTRACTOR EXTRACT

GitStractor-Extract
- Repo URL
- Destination Path
- Author Map
- Ignorable Files



GITSTRACTOR EXTRACT



GITSTRACTOR EXTRACT



GITTRACTOR.COM

IntegerMan / gitstractor

Code Issues Pull requests Discussions Actions Projects Wiki Security Insights Settings

Sponsor Unpin Unwatch Fork Starred

main 3 branches 2 tags Go to file Add file Code About

IntegerMan Issue #5: Better modal author display 1775a4d on Apr 2 60 commits

.github Create .github/FUNDING.yml 7 months ago
.vscode Fixed build issues 7 months ago
GitStractor v0.1.1 Release 7 months ago
Images Added Power BI instructions and template 7 months ago
Notebooks Issue #5: Better modal author display 7 months ago
PowerBI Added Power BI instructions and template 7 months ago
PythonPrototype Doing a decent bit of data visualization with what I have presently 7 months ago
.gitignore Added NDepend Project 7 months ago
CODE_OF_CONDUCT.md Create CODE_OF_CONDUCT.md 7 months ago
CONTRIBUTING.md Create CONTRIBUTING.md 7 months ago
LICENSE Initial commit 7 months ago
README.md Added Power BI instructions and template 7 months ago

README.md

GitStractor - Git Repository Analysis Tool

Project by Matt Eland (@IntegerMan)

Type to search

A library for visualizing the commits, authors, and files of any git repository

GitStractor.com

visualization git utilities
static-code-analysis dotnet code-analysis
data-visualization data-analysis powerbi
repository-management

Readme MIT license Code of conduct Activity 17 stars 3 watching 0 forks

Releases 2 tags Create a new release

Sponsor this project

IntegerMan Matt Eland

MAIN INNOVATION

GITSTRACTOR DEMO

EXTRACTING DATA FROM A SMALL LOCAL REPOSITORY



ADVANTAGES OF APPROACH

Works with any
cloneable git
repository

Works with any
language that
stores code in
files

Highlights
patterns

Works on
whatever is
currently ‘head’

All data stays local

LIMITATIONS OF APPROACH

Supports git
repositories only

No knowledge of
file contents

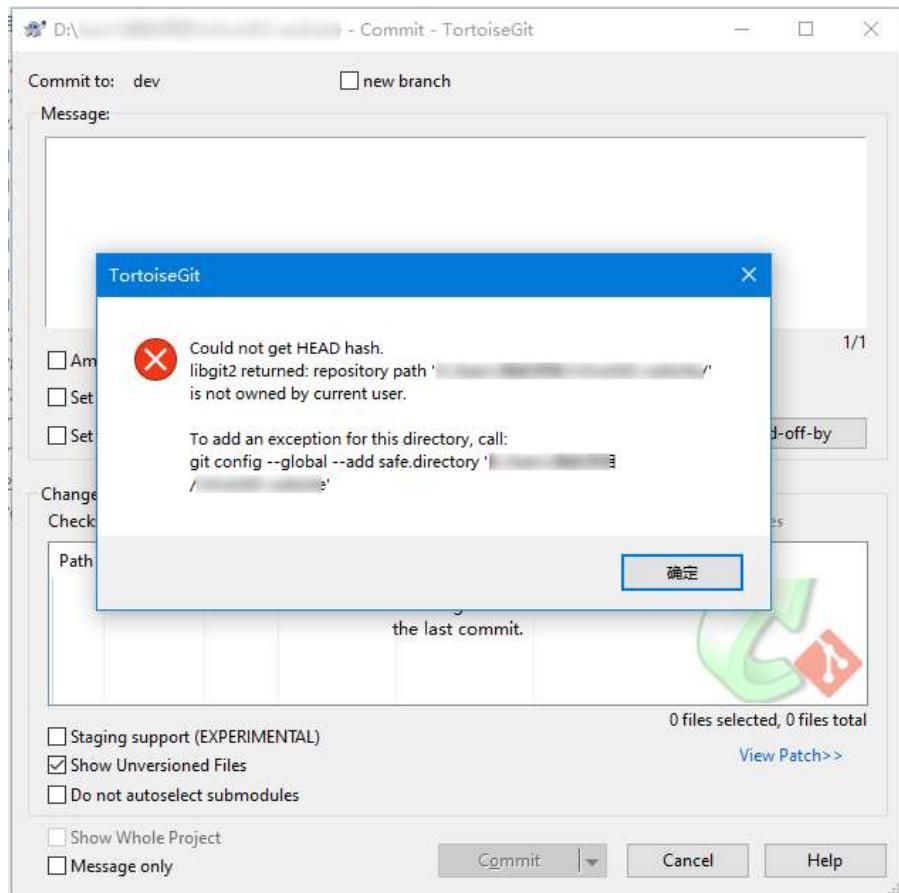
Requires data
extraction &
pre-processing

Doesn't handle
advanced git features

- Submodules
- Links

Must sequentially
process all commits

GIT SECURITY: GRANTING PERMISSION TO FILES

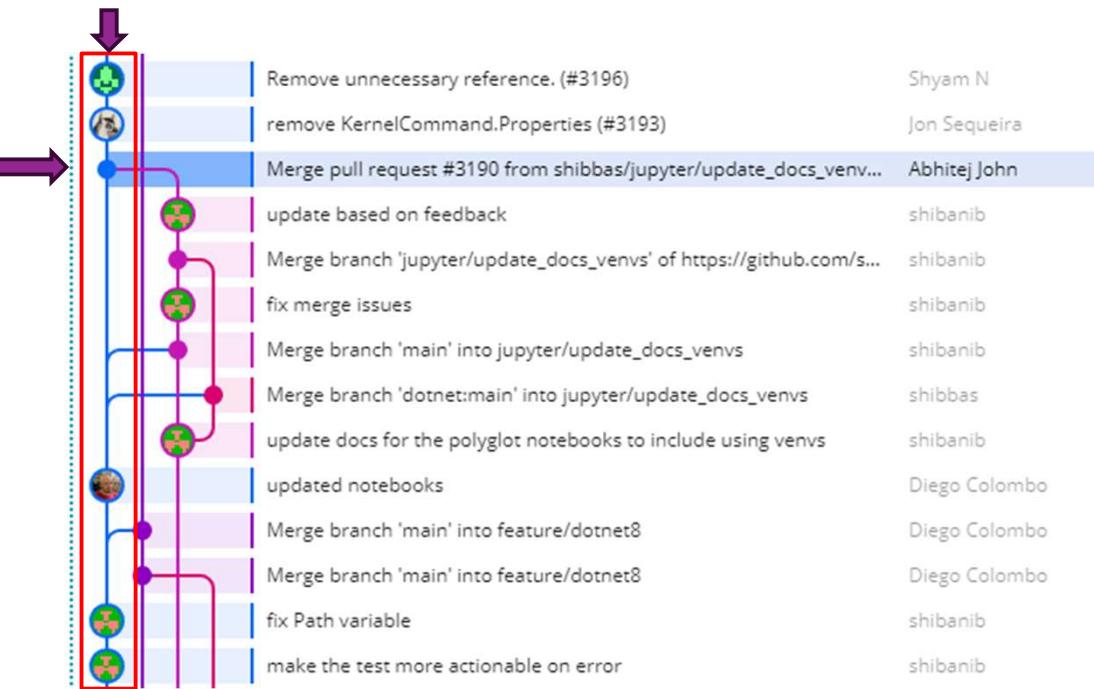


HUGE DISCLAIMER:

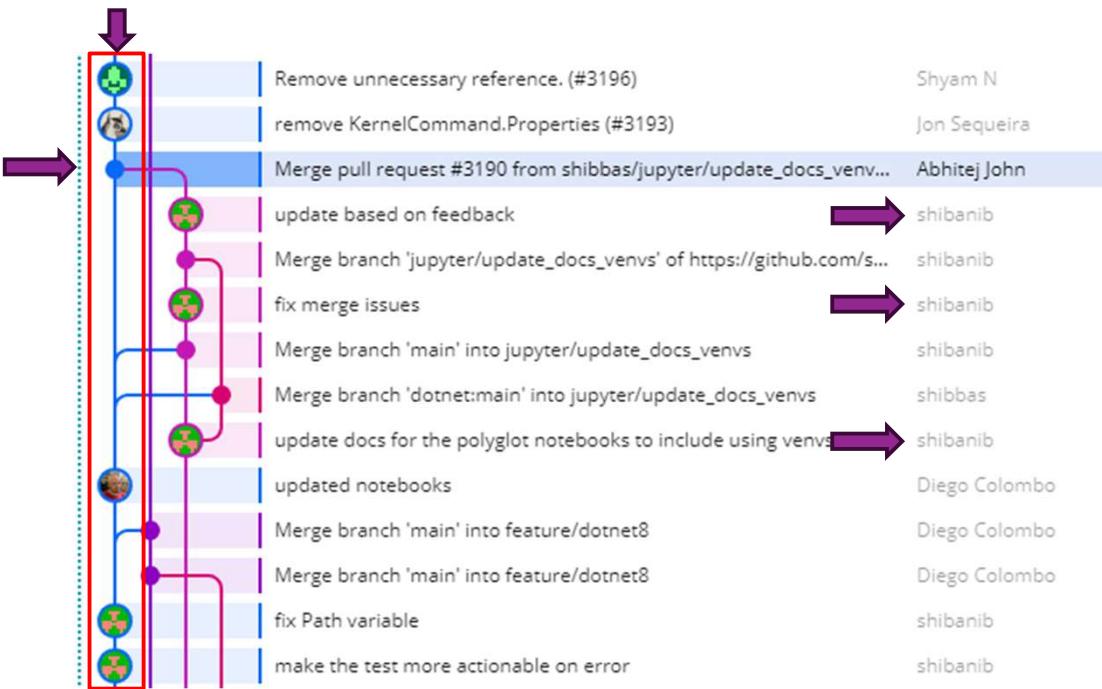
THIS IS A TECHNICAL PREVIEW



CHALLENGES: DO YOU LOOK AT JUST ONE BRANCH?



CHALLENGES: DO YOU LOOK AT JUST ONE BRANCH?



CHALLENGES: AUTHOR VS COMMITTER

handle array type in tabular data resource mapping	Diego Colombo	9/1/2023 @ 11:49 AM	44c63b
Fix encoding problem (#3156) * Fix encoding problem StdioKern...	Shyam N	8/31/2023 @ 10:42 AM	d0e43b
Variable declaration addition (#3152) * Variable declaration progr...	bleaphar	8/31/2023 @ 10:36 AM	a08147
additional combinatorial tests for HTTP parser, diagnostic fixes for ...	Jon Sequeira	8/26/2023 @ 2:03 PM	5d7d77
Merge pull request #3112 from ocallesp/remove-buildalyzer-with-c...	Osvaldo Calles	8/26/2023 @ 12:30 PM	4ad53d
improve parsing and diagnostics for HTTP version node (#3153) * ...	Jon Sequeira	8/25/2023 @ 5:19 PM	478815
PowerShell code cleanup and partial fix for signaling command fail...	Jon Sequeira	8/25/2023 @ 1:18 PM	2ebbb6
Combinatorial testing for diagnostics (#3151) * add some negative...	Jon Sequeira	8/25/2023 @ 1:18 PM	f23f89
Code cleanup	Osvaldo Calles	8/25/2023 @ 1:16 PM	cd211d
Update readme.md add setup loop and availability	Diego Colombo	8/24/2023 @ 1:37 PM	faf9f1
Update readme.md add user icon	Diego Colombo	8/24/2023 @ 1:25 PM	618c32
Update readme.md use emoji for user	Diego Colombo	8/24/2023 @ 1:18 PM	dd4197
Update readme.md colour for boxes	Diego Colombo	8/24/2023 @ 1:16 PM	7df42d
Update readme.md change alpha value	Diego Colombo	8/24/2023 @ 1:13 PM	332978
update sample	Jon Sequeira	8/24/2023 @ 1:09 PM	ed9808
Create readme.md	Jon Sequeira	8/23/2023 @ 7:40 PM	17e5c2
add diagnostics for missing header names or values (#3147) * fix ...	Jon Sequeira	8/23/2023 @ 7:35 PM	5d2fd9
support some additional diagnostics, improve header binding (#31...	Jon Sequeira	8/22/2023 @ 2:22 PM	25ae3e
Code cleanup	Osvaldo Calles	8/21/2023 @ 8:50 PM	dd529d
Fix unit-tests	Osvaldo Calles	8/21/2023 @ 3:48 PM	31be41
Remove Buildalyzer	Osvaldo Calles	8/21/2023 @ 3:48 PM	106570
Add utilities to create Roslyn Workspace without binlogs	Osvaldo Calles	8/21/2023 @ 3:46 PM	0110e6
adding logging around grammar loading	Diego Colombo	8/21/2023 @ 12:26 PM	13586d
fix warnings	Jon Sequeira	8/18/2023 @ 3:27 PM	af1f76
combinatorial testing of HTTP parser; bug fixes	Jon Sequeira	8/18/2023 @ 3:27 PM	ae21c1
Stabilize API for Microsoft.DotNet.Interactive.Documents (Part 1) (#...	Shyam N	8/17/2023 @ 4:52 PM	548673
fixes based on previous PR feedback	Jon Sequeira	8/15/2023 @ 4:49 PM	13cba0
fix proxy forwarding of unknown magic commands (#3135)	Jon Sequeira	8/14/2023 @ 10:08 PM	1a2a2d
use noda time package in package restore tests	Diego Colombo	8/14/2023 @ 6:53 PM	8b25e2

commit: 548673

Stabilize API for Microsoft.DotNet.Interactive.Documents (Part 1) (#3139)

Shyam N authored 8/17/2023 @ 4:52 PM parent: 13cba0

GitHub committed 8/17/2023 @ 4:52 PM

10 modified

Path Tree View all files

Expand All

SRC

- Microsoft.DotNet.Interactive.ApiCompatibility.Tests
 - ApiCompatibilityTests.Document_api_Is_not_changed.approved.txt
 - ApiCompatibilityTests.Journey_api_Is_not_changed.approved.txt
- Microsoft.DotNet.Interactive.Documents
 - Jupyter 1
 - CodeSubmission.cs
 - InputField.cs
 - InteractiveDocument.cs
- Microsoft.DotNet.Interactive.Journey
 - KernelExtensions.cs
 - NotebookLessonParser.cs
- Microsoft.DotNet.Interactive.Journey.Tests
 - ParsingTests.cs
 - TeacherValidationTests.cs

CHALLENGES: DIFFERENT COMMIT PATTERNS

	handle array type in tabular data resource mapping	Diego Colombo	9/1/2023 @ 11:49 AM	44c63b
	Fix encoding problem (#3156) * Fix encoding problem StdioKern...	Shyam N	8/31/2023 @ 10:42 AM	d0e43b
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Stabilize API for Microsoft.DotNet.Interactive.Documents (Part 1) (#3139)

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- Microsoft.DotNet.Interactive.Documents
 - Jupyter 1
 - CodeSubmission.cs
 - InputField.cs
 - InteractiveDocument.cs
- Microsoft.DotNet.Interactive.Journey
 - KernelExtensions.cs
 - NotebookLessonParser.cs
- Microsoft.DotNet.Interactive.Journey.Tests
 - ParsingTests.cs
 - TeacherValidationTests.cs

ETHICAL USE: THIS IS NOT FOR PERFORMANCE EVALUATIONS!



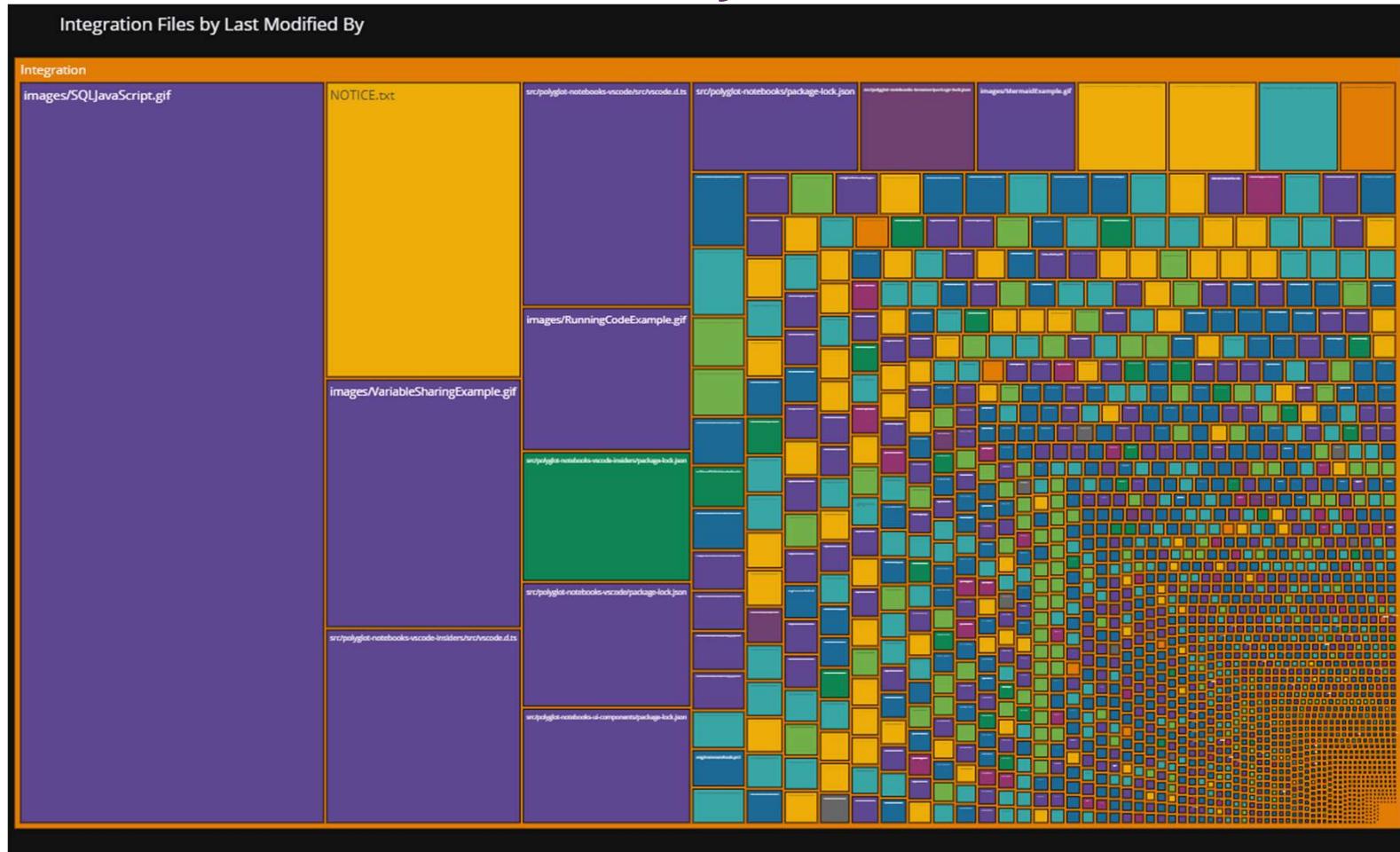
CHALLENGES: DIFFERENT AUTHOR NAMES

AuthorCounts.csv

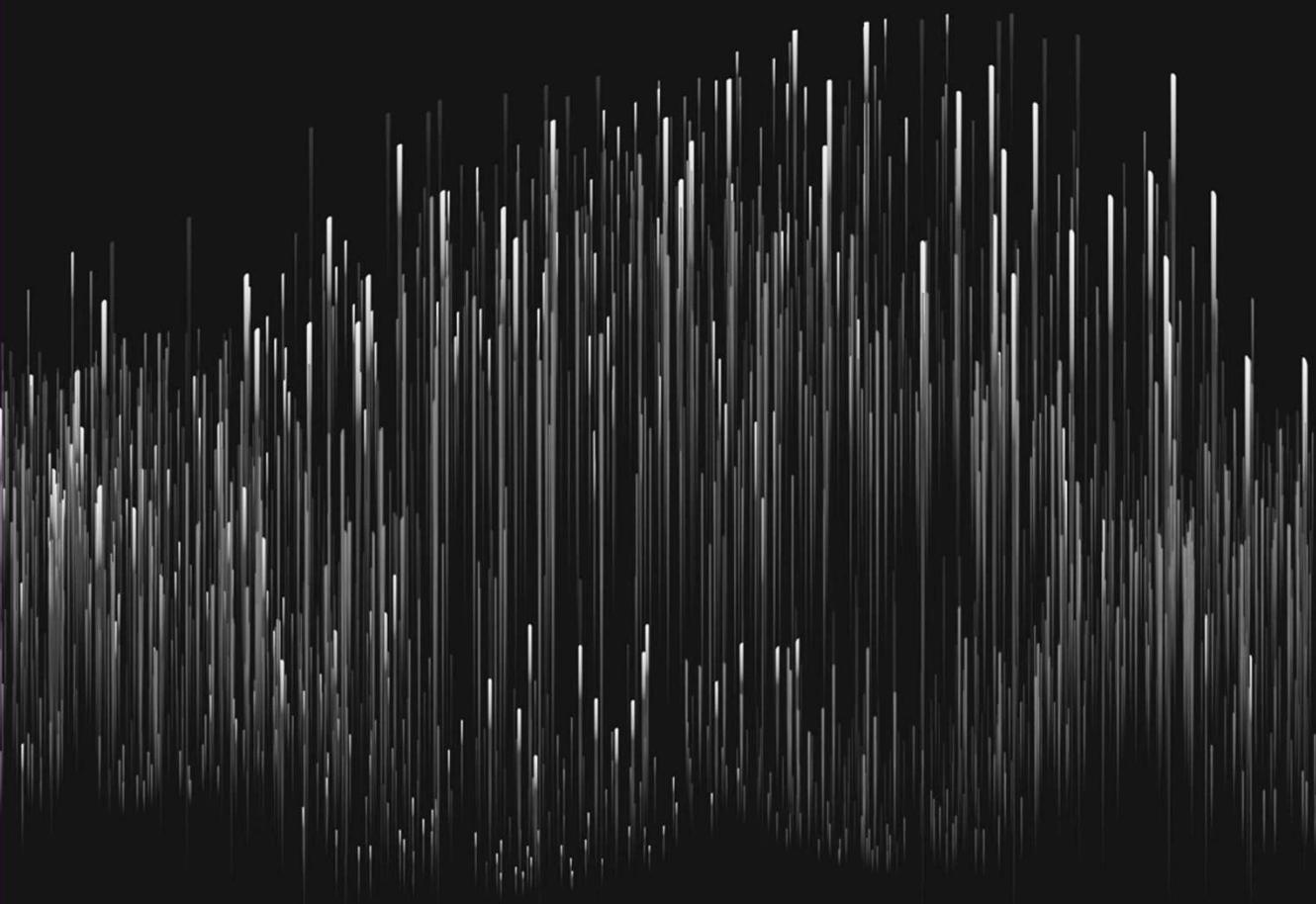
AuthorCounts.csv

1 Author,Commits	36 Jon Fortescue,1
2 Abhitej John,5	37 Jon Sequeira,739
3 Akshita,73	38 Jonathon Marolf,1
4 Aleksandar Nikolić,2	39 Justin Chen,52
5 Alex Stracker,1	40 Justin M,11
6 Alireza Rezaee,1	41 Justin Ormont,1
7 Andrew,1	42 Kevin B,2
8 Andrii Kurniumov,2	43 Kevin Miller,1
9 Angle Qian,1	44 Kevin Ransom,10
10 Arkadiy,1	45 Kevin Ransom (msft),94
11 Benjol,1	46 KevinRansom,1
12 Bill Hiebert,1	47 Kexy Biscuit,1
13 Bill Wagner,2	48 LadyNaggaga,62
14 Blair McBride,1	49 Le Ding,1
15 Brett V. Forsgren,632	50 Loïc Sharma,3
16 Brian O'Neill,1	51 Lucy Zhang,2
17 Cera Samson,1	52 M. Scott Ford,1
18 Christopher Nikkel,1	53 Madhuri Koripalli,3
19 Cory Rivera,22	54 Marc Kruzik,1
20 David Gardiner,1	55 Maria Naggaga Nakanwagi,5
21 Dennis,1	56 Matt Eland,1
22 Diego,2193	57 Matt Galbraith,1
23 Diego Colombo,1	58 Matt Mitchell,3
24 Don Jayamanne,4	59 Matthew Burleigh,2
25 Don Syme,31	60 Mike Morton,1
26 Dongbo Wang,53	61 MikeLarah,1
27 Eric Axel Andersen,1	62 Moaid Hathot,1
28 Eric Erhardt,10	63 Morgan Watson-Morris,2
29 Erik Schierboom,1	64 Olivier Lavoie,1
30 François-David Collin,2	65 Osvaldo Calles,10
31 Georg Haaser,1	66 Paulo Morgado,1
32 Glenn Carr,1	67 Phillip Carter,15
33 Ian Griffiths,11	
34 Jamie Bilinski,1	
35 Jan Zalewski,1	

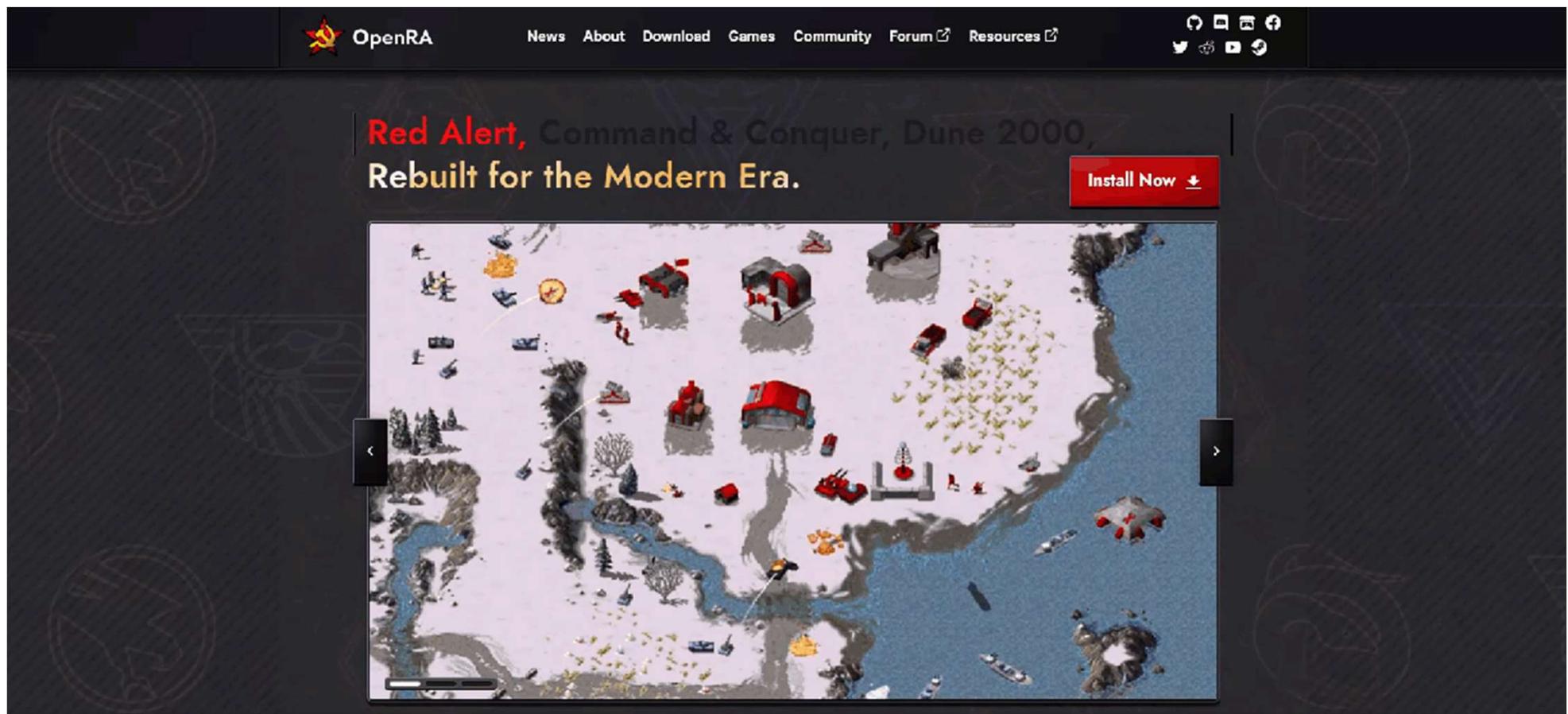
CHALLENGES: IRRELEVANT JUNK FILES



VISUALIZING CODE



THE PROJECT WE'RE ANALYZING...



<https://OpenRA.net>

How Active is the Project? (Click to Filter)

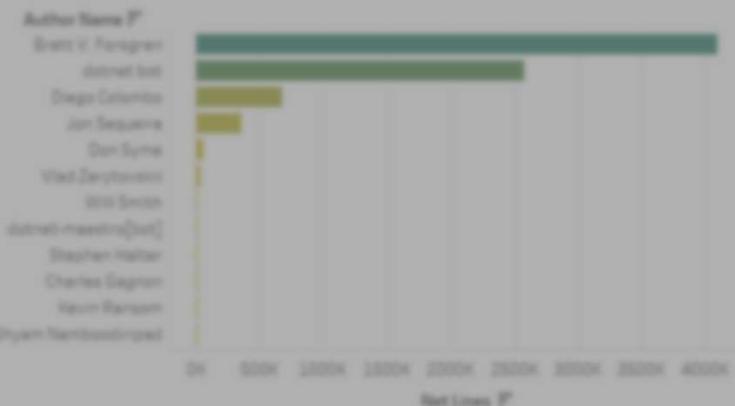
卷之三

379

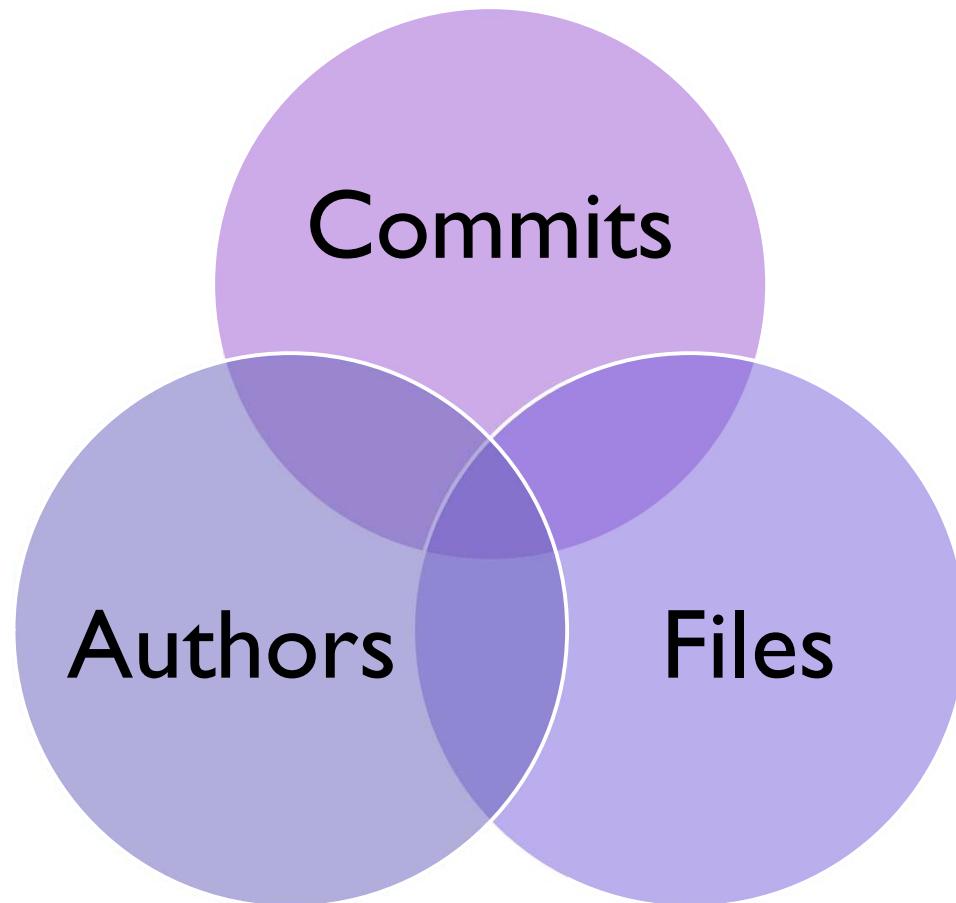


ANALYSIS

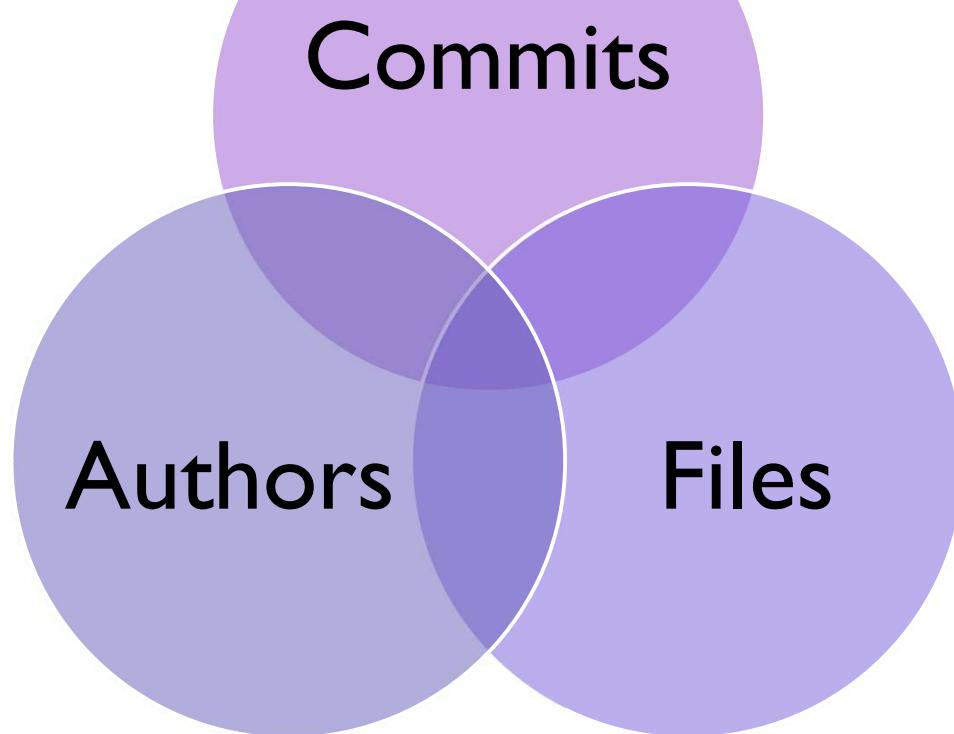
DEMO TIME!



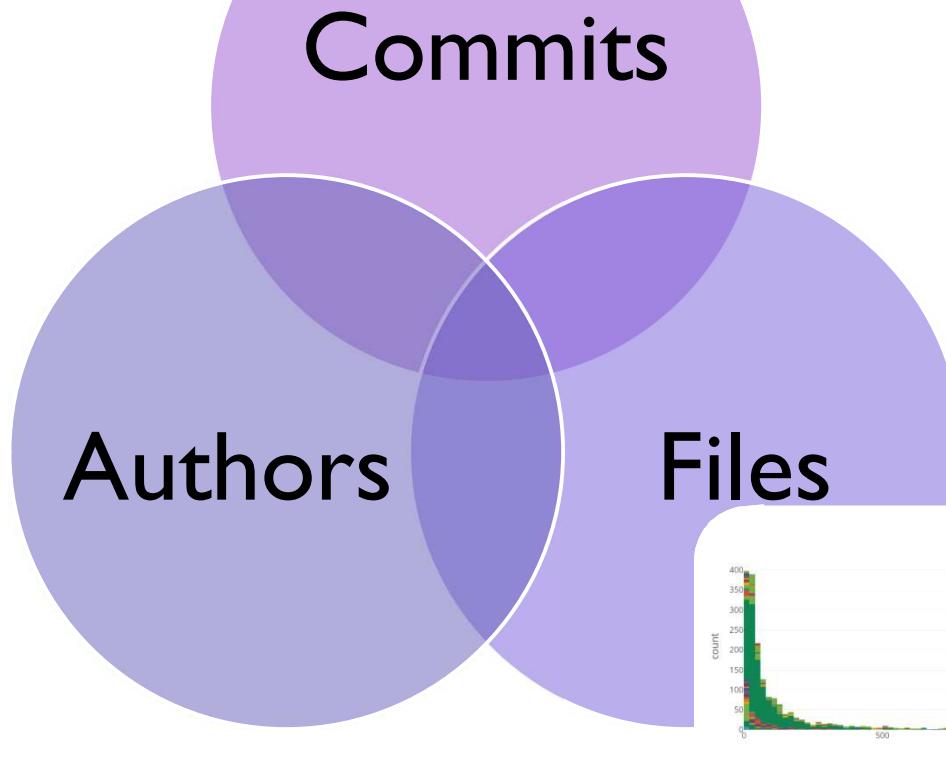
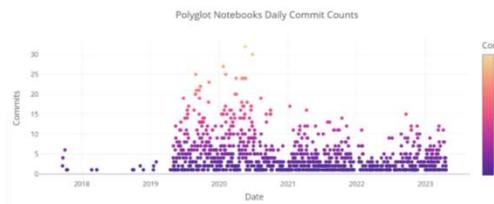
VISUAL RELATIONSHIPS



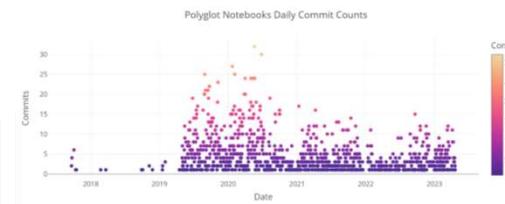
VISUAL RELATIONSHIPS



VISUAL RELATIONSHIPS



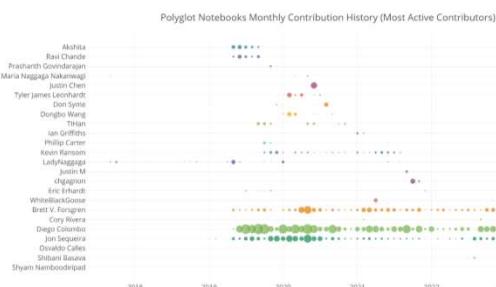
VISUAL RELATIONSHIPS



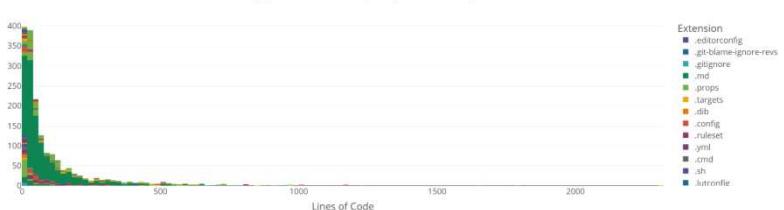
Commits

Authors

Files



Polyglot Notebooks Frequency of File Sizes by Extension



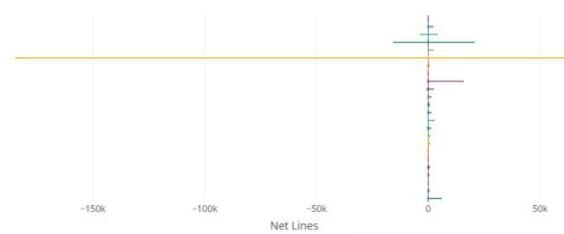
Extension

- .editorconfig
- .git-blame-ignore-revs
- .gitignore
- .md
- .props
- .targets
- .db
- .ruleset
- .yaml
- .cmd
- .sh
- .autonoffile

VISUAL RELATIONSHIPS

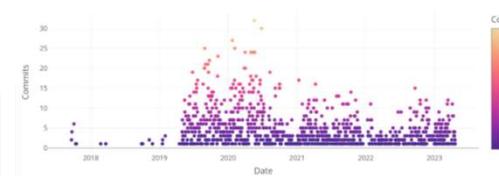
LadyNaggaga
Brett V. Forsgren
Diego Colombo
Eric Erhardt
Kevin Ransom
Prashanth Govindarajan
Dongbo Wang
Justin Chen
Cory Rivera
Justin M
Shibani Basava
Osvaldo Calles

Polyglot Notebooks net lines of code per commit by Author

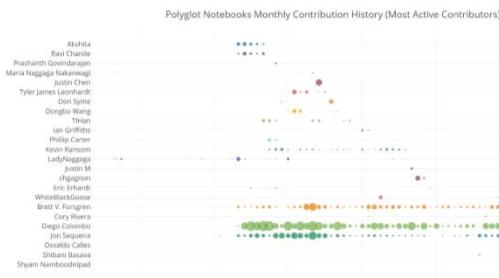


Commits

Polyglot Notebooks Daily Commit Counts

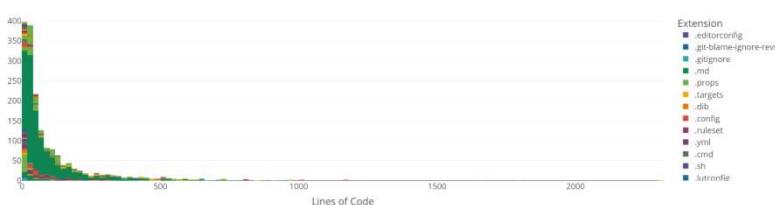


Authors

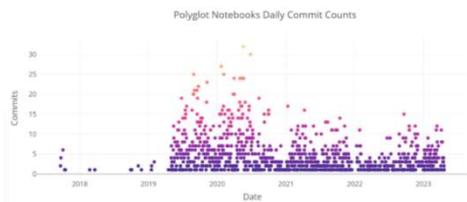


Files

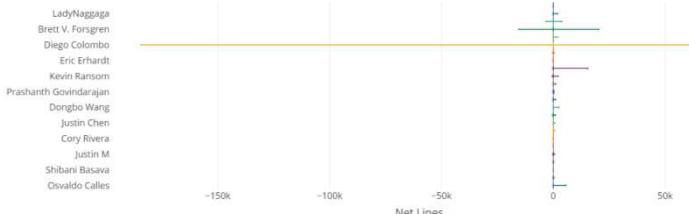
Polyglot Notebooks Frequency of File Sizes by Extension



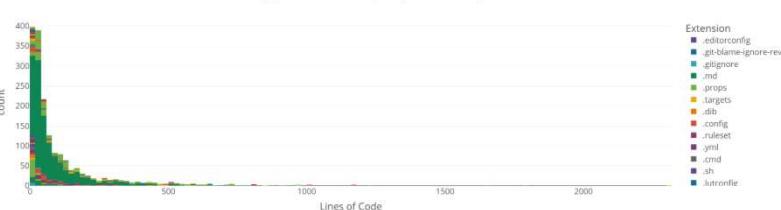
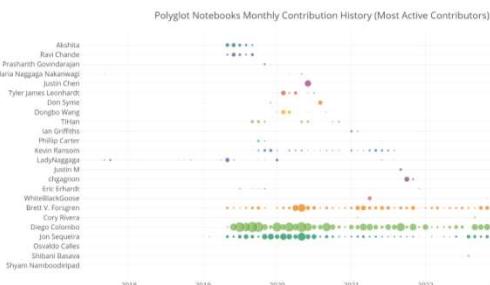
VISUAL RELATIONSHIPS



Commits



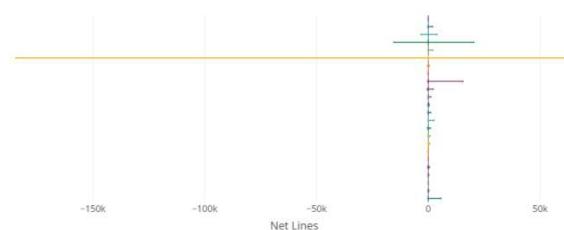
Authors



VISUAL RELATIONSHIPS

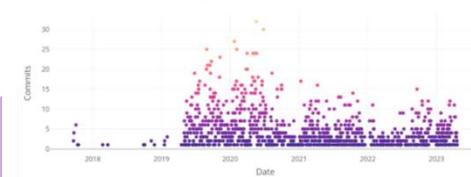
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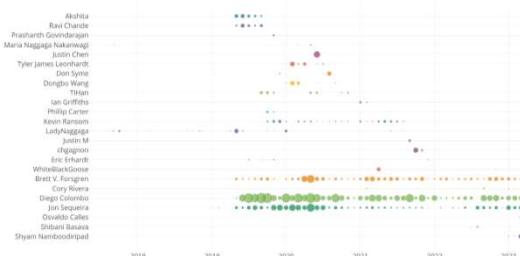


Commits

Polyglot Notebooks Daily Commit Counts



Polyglot Notebooks Monthly Contribution History (Most Active Contributors)



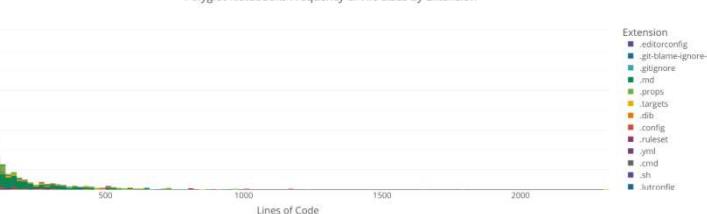
Authors

Polyglot Notebooks Files by Last Modified By



Files

Polyglot Notebooks Frequency of File Sizes by Extension

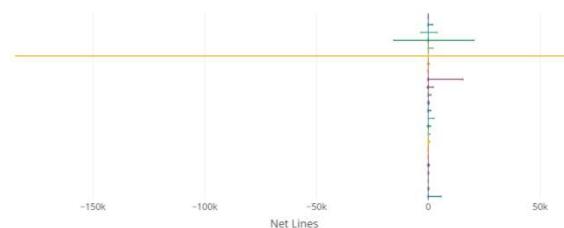


Extension
editorconfig
git-blame-ignore-revs
gitignore
md
props
targets
.db
.ruleset
.yml
cmd
.sh
.autorefile

VISUAL RELATIONSHIPS

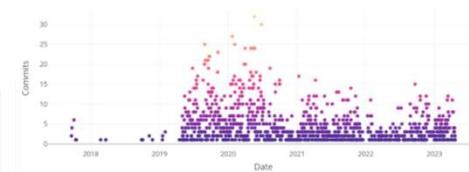
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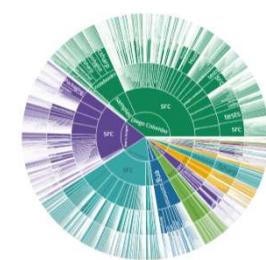


Commits

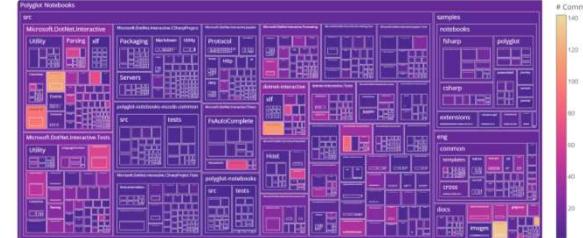
Polyglot Notebooks Daily Commit Counts



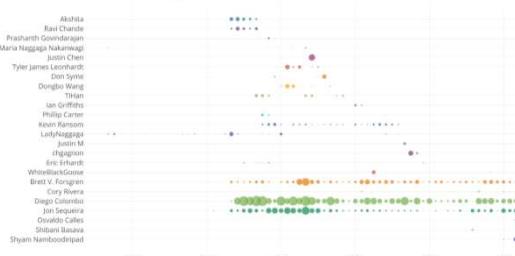
Polyglot Notebooks Files by Most Common Author



Polyglot Notebooks Files by # Commits



Polyglot Notebooks Monthly Contribution History (Most Active Contributors)



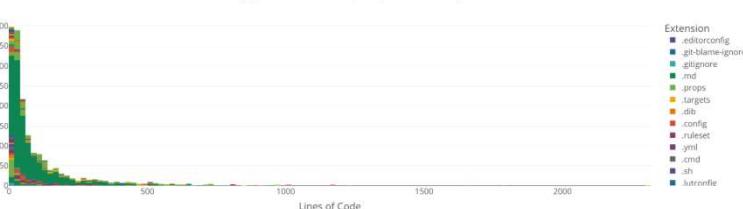
Authors

Polyglot Notebooks Files by Last Modified By



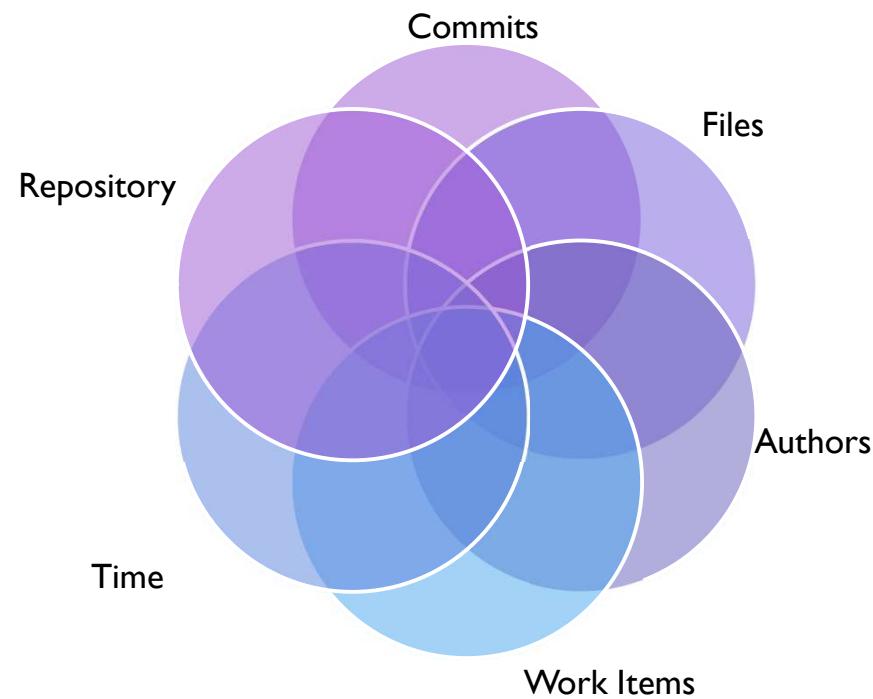
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Polyglot Notebooks Frequency of File Sizes by Extension



Extension
editorconfig
git-blame-ignore-revs
gitignore
git
grps
targets
.db
.ruleset
.yml
cmd
.sh
.autorefile

VISUAL RELATIONSHIPS



NEXT STEPS



FOR YOU: START TRACKING DATA

Recommended Commit Message format:

ItemType #ID: Message

Examples:

- Bug #42: Fixed a NullReferenceException when logging out
- Feature #89: AI now considers diversionary tactics in unit placement
- Issue #0451: Skynet has become self-aware

HOW TO GET STARTED

Start Tracking
Data

Use a Static Code
Analysis Tool

Start Tracking Data

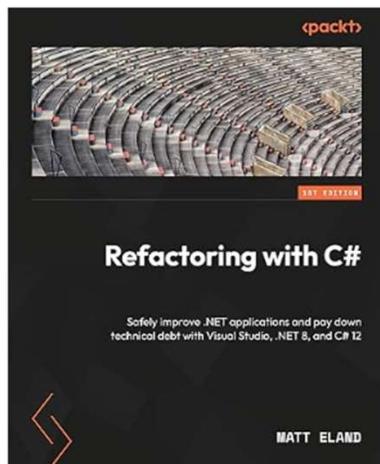
Download GitStractor

Extract Data

Run the Jupyter Notebook
with your CSV data

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GITSTRACTOR.COM

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Code Issues Pull requests Actions Projects Security Insights

main 1 branch 0 tags Go to file Code

IntegerMan Fixed build issues 8b1c4e6 6 minutes ago 3 commits

.vscode Fixed build issues 6 minutes ago

PythonPrototype Fixed build issues 6 minutes ago

.gitignore Ported over code 22 minutes ago

LICENSE Initial commit 3 hours ago

README.md Fixed build issues 6 minutes ago

README.md

GitStractor - Git Repository Analysis Tool

Project by Matt Eland (@IntegerMan)

This project is built for Extracting data from local git repositories and their file trees in order to visualize repository information to provide insight to teams.

Known Issues

This project is a rough prototype at present and may have blatant bugs and performance issues.

Current known bugs:

- Performance is very slow to analyze repositories and ranges from 0.2 to 0.8 seconds per commit

About

Git data extraction and visualization tooling

GitStractor.com

git utilities static-code-analysis
code-analysis data-visualization
repository-management

Readme MIT license

0 stars 1 watching 0 forks

Languages

Python 67.5% Jupyter Notebook 32.5%

PYTHON ENVIRONMENT: ANACONDA

The screenshot shows the Anaconda Distribution homepage. At the top, there's a navigation bar with links for 'Enterprise', 'Pricing', 'Resources', and 'About'. On the right side of the nav bar are 'Sign In' and 'Contact Sales' buttons. Below the nav bar, the text 'Anaconda Distribution' is displayed in green, followed by a large 'Free Download' button in white text on a dark background. A subtext below it reads 'Everything you need to get started in data science on your workstation.' To the left of the main content area, there's a bulleted list of features: 'Free distribution install', 'Thousands of the most fundamental DS, AI, and ML packages', 'Manage packages and environments from desktop application', and 'Deploy across hardware and software platforms'. At the bottom of the page, there are two green buttons: 'Code in the Cloud' and 'Download'. Below these buttons is a link 'Get Additional Installers' followed by icons for Windows, Mac, and Linux.



Open Source

Access the open-source software you need for projects in any field, from data visualization to robotics.



User-friendly

With our intuitive platform, you can easily search and install packages and create, load, and switch between environments.



Trusted

Our securely hosted packages and artifacts are methodically tested and regularly updated.

WHAT'S NEXT FOR GITSTRACTOR?

Spring 2024

- Auto-Gen Jupyter Notebook
- Polyglot Notebook Support
- Power BI Templates

Summer 2024

- Classify Commit Messages
- GitStractor Desktop
- Rigorous Testing
- Drill-into Files / Authors

Long-Term

- Generate PDFs
- GitStractor Cloud
- Work Item System Integrations
 - GitHub
 - Azure DevOps
 - Jira
- Integrate into IDEs
 - VS Code
 - Visual Studio
 - JetBrains IDEs



MATT ELAND | @INTEGERMAN

AI SPECIALIST @  **Leading EDJE**



THANK YOU!

[HTTPS://MATTELAND.DEV/](https://matteland.dev/)

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QUESTIONS?

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