



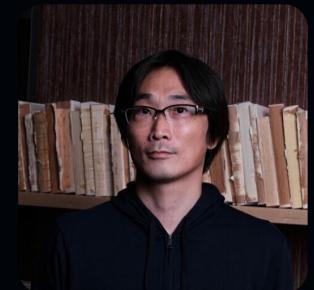
GitHub Copilot ディープダイブ

@parrot

Kenta Nakase / 中瀬 健太

シニアソリューションズエンジニア

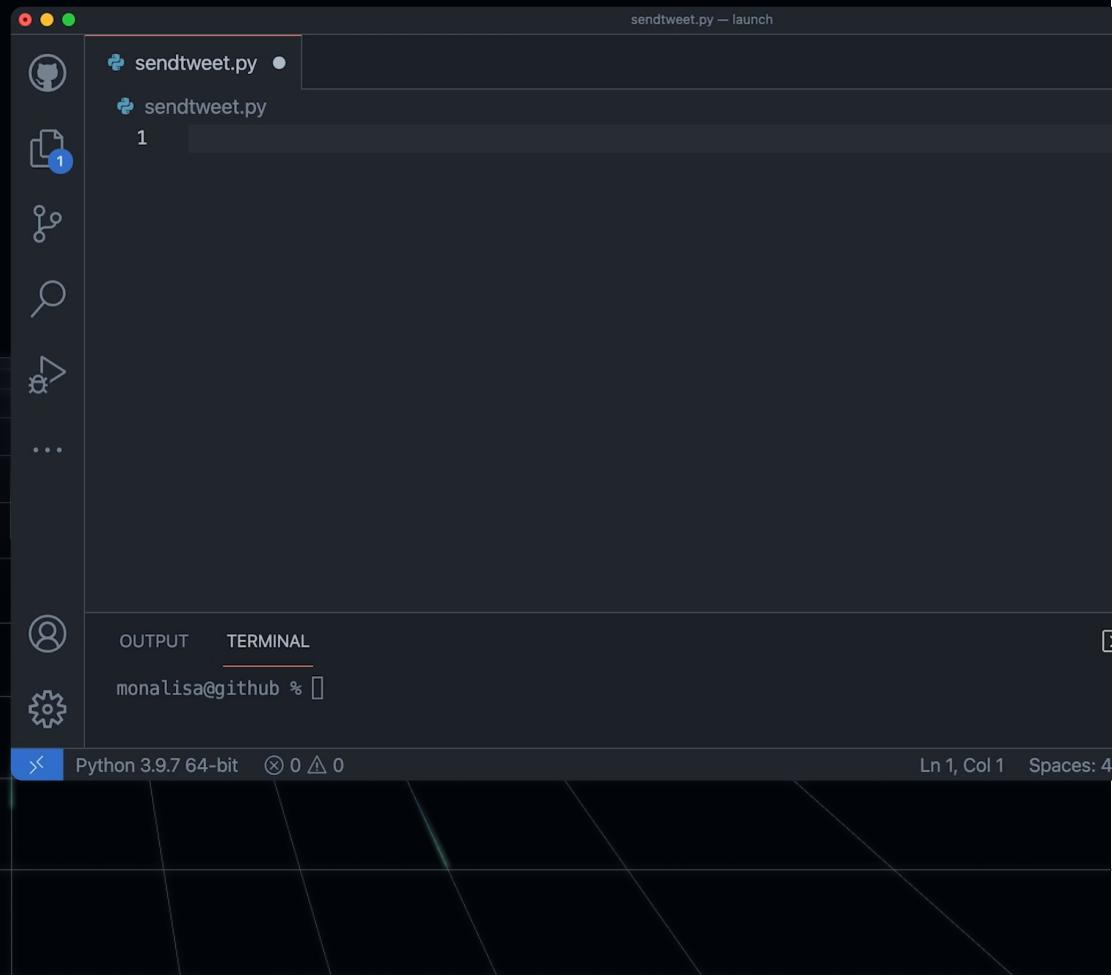
GitHub Japan



Copilotの概要

GITHUB COPILOT

Your AI Pair Programmer



A screenshot of a GitHub Copilot interface. The interface features a dark-themed code editor and terminal window. The code editor shows a file named 'sendtweet.py' with a single line of code: '1'. The terminal window below it is titled 'sendtweet.py — launch' and shows the command 'monalisa@github %'. The GitHub Copilot logo is visible in the top left corner of the code editor area. The overall theme is dark with light text and icons.



55%

⌚ Faster Coding



75%

❤️ More fulfilled

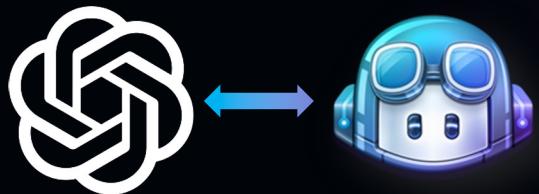


46%

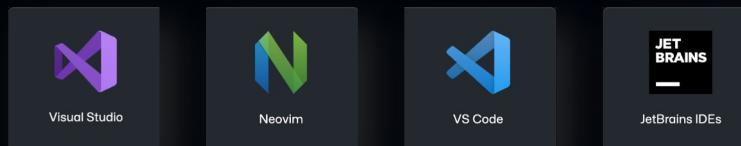
<> Code written



機能を有効化すると…



OpenAI
Model



```
1 package main
2
3 type Run struct {
4     Time int // in milliseconds
5     Results string
6     Failed bool
7 }
8
9 // Get average runtime of successful runs in seconds
10 func averageRuntimeInSeconds(runs []Run) float64 {
11     var totalTime int
12     var failedRuns int
13     for _, run := range runs {
14         if run.Failed {
15             failedRuns++
16         } else {
17             totalTime += run.Time
18         }
19     }
20
21     averageRuntime := float64(totalTime) / float64(len(runs) - failedRuns) / 1000
22     return averageRuntime
23 }
```

提案

文脈

開発者向け ガイダンス



文脈（プロンプト）

- 概要レベルの情報の後に
詳細な指示を追加
- 具体的な説明やサンプル
を提示
- 小さな改善の繰り返し



コーディング

- 予測可能なパターン記述
- 一貫性のある命名規則
(目的が明確な変数・関数名)
- 適切なコーディング手法
(レビューやテストとの併用)

Rizel Scarlett for GitHub
Posted on Apr 4 • Updated on Apr 7

81 6 3 5 5

A Beginner's Guide to Prompt Engineering with GitHub Copilot

#github #githubcopilot #ai #programming

GitHub Copilot for Developer Productivity (6 Part Series)

- 1 Use Copilot to Write and Translate a Binary Search Algorithm
- 2 Why Use GitHub Copilot And Copilot Labs: Practical Use Cases ...
- ... 2 more parts...
- 5 How to build a rock, paper, scissors game with GitHub Copilot
- 6 **A Beginner's Guide to Prompt Engineering with GitHub Cop...**

管理者向け ガイダンス



ライセンス管理

- チーム / ユーザに対してライセンスを割り当てる
- リポジトリとの連動なし(エディタ上で開いたファイルに対して動作)



ポリシー制御

- 公開コードに一致する提案のブロック設定(150文字以上の一致)
- 取り扱う文脈・提案の情報は永続化なし(設定項目はなく一律適用)

Enterprise Search or jump to... Pull requests Issues

copilot-sample-organization1 Organization account Switch to another account ▾

General Features

Access

- Billing and plans
- Repository roles
- Member privileges
- Team discussions
- Import/Export
- Moderation

Code, planning, and automation

- Repository
- Codespaces
- Copilot

Access

Policies

Actions

GitHub Copilot

Use GitHub Copilot to suggest code and entire functions

Assign which users will have access to GitHub Copilot with approved access will receive an email with setup instructions. Identity provider with GitHub Copilot [check the seat assignment](#)

Each purchased seat is \$19/month. You will be billed monthly for your organization. Seats added in the middle of a billing cycle will be prorated. [more information](#) [read the billing documentation](#).

User permissions

Disabled
Do not enable GitHub Copilot for my organization

Purchase for all members (1 seat)
Allow access to GitHub Copilot for all current and future organization members

Purchase for selected teams/users
Allow access to GitHub Copilot for only specific teams and users

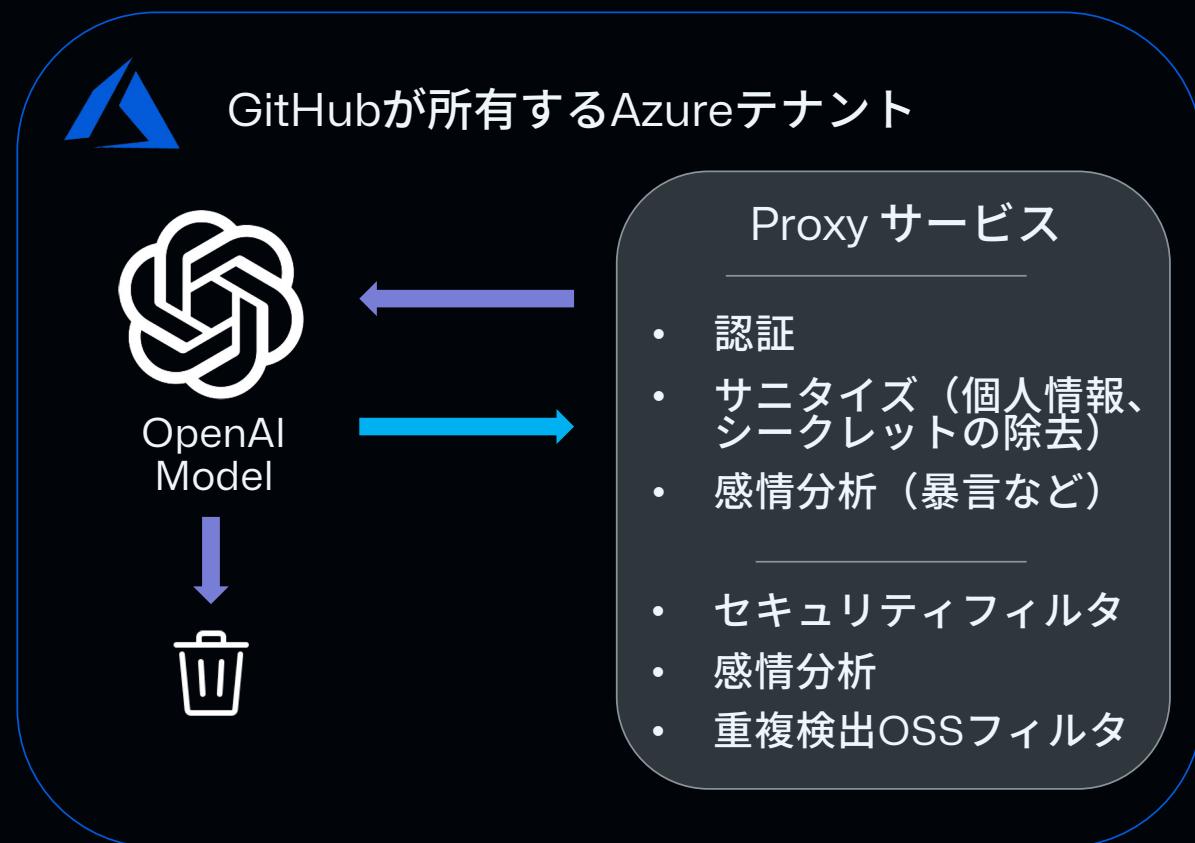
Your enterprise's use of GitHub Copilot is governed by the [GitHub Copilot License](#)

Save

Copilotの仕組み



データフロー



```
1 package main
2
3 type Run struct {
4     Time int // in milliseconds
5     Results string
6     Failed bool
7 }
8
9 // Get average runtime of successful runs
10 func averageRuntimeInSeconds(runs []Run) float64 {
11     var totalTime int
12     var failedRuns int
13     for _, run := range runs {
14         if run.Failed {
15             failedRuns++
16         } else {
17             totalTime += run.Time
18         }
19     }
20
21     averageRuntime := float64(totalTime) / float64(len(runs) - failedRuns)
22     return averageRuntime
23 }
```

Copilot



A screenshot of a dark-themed web browser window. The address bar shows the GitHub logo and the word "Blog". The menu bar includes "Menu" and a search icon. Below the header, there are two categories: "Engineering" and "Product". The main title is "How GitHub Copilot is getting better at understanding your code". The text below the title discusses improvements in the Fill-in-the-Middle paradigm. At the bottom is a large, circular, glowing icon of a GitHub Copilot logo (a stylized brain with a gear) set against concentric circles of light.



A screenshot of a dark-themed web browser window, identical in layout to the first one. The address bar shows the GitHub logo and the word "Blog". The menu bar includes "Menu" and a search icon. Below the header, there are two categories: "Engineering" and "Product". The main title is "Inside GitHub: Working with the LLMs behind GitHub Copilot". The text below the title discusses the work of OpenAI developers. At the bottom is a large, circular, glowing icon of a GitHub Copilot logo (a stylized brain with a gear) set against concentric circles of light.

Behind Copilot



Model Improvements

- 特定のプログラミング言語に依存しない形への進化
- 継続的なモデルの改善 (quality, performance)



Prompt Crafting

- ファイルのメタデータによる文脈の補完 (ファイルパスや隣接タブ)
- FIM (Fill-In-the-Middle)による精度の改善

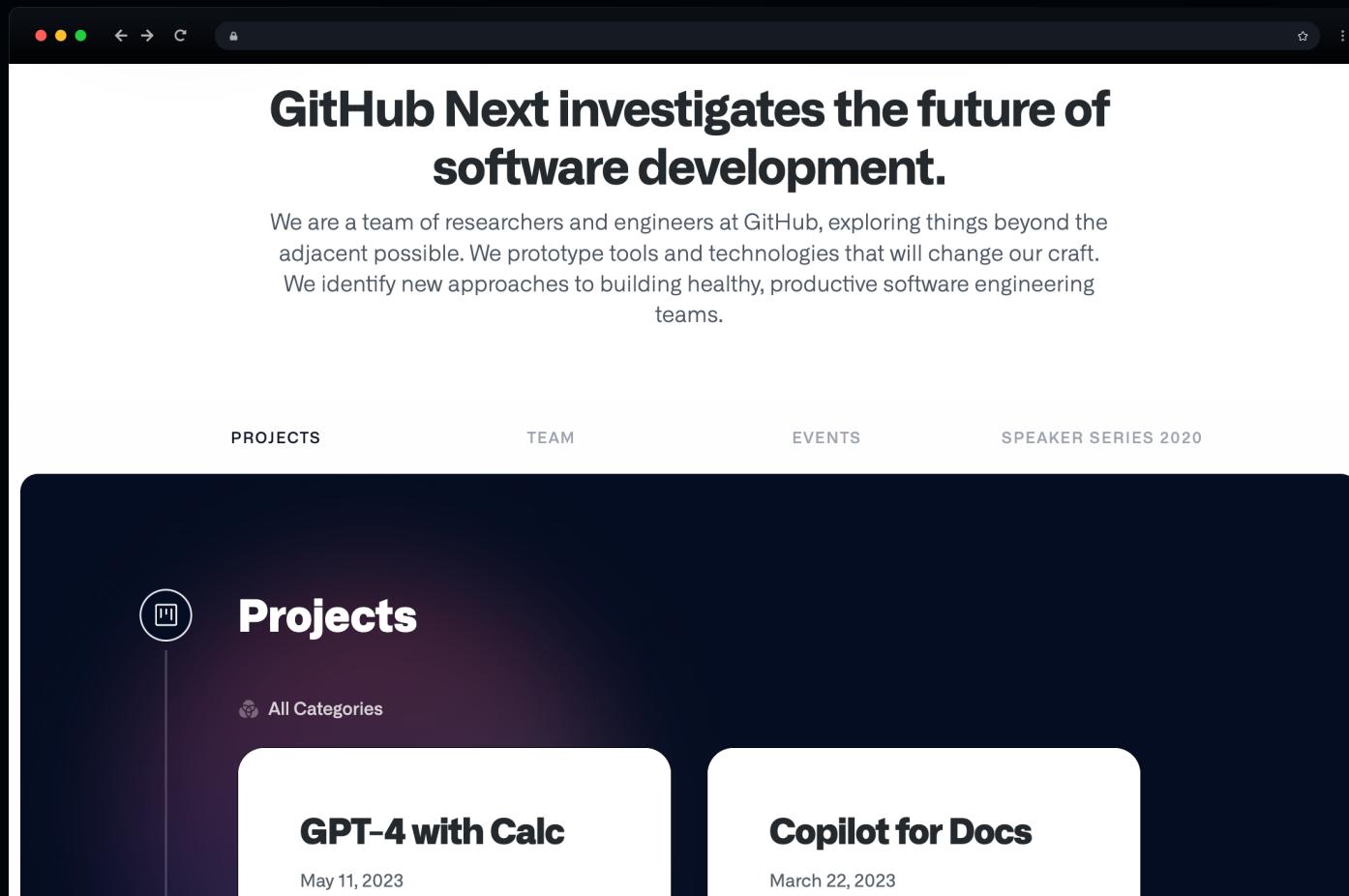


Fine Tuning (Future)

- コードベースにカスタマイズした提案
- 意味理解の向上 (vector database, embedding)

GitHub Next

(<https://githubnext.com>)



The image is a screenshot of a website titled "GitHub Next". The header features the text "GitHub Next investigates the future of software development." Below this, a paragraph explains the team's mission: "We are a team of researchers and engineers at GitHub, exploring things beyond the adjacent possible. We prototype tools and technologies that will change our craft. We identify new approaches to building healthy, productive software engineering teams." At the bottom, there are four navigation links: "PROJECTS", "TEAM", "EVENTS", and "SPEAKER SERIES 2020". A large dark box titled "Projects" contains a "GPT-4 with Calc" card (May 11, 2023) and a "Copilot for Docs" card (March 22, 2023).

GitHub Next investigates the future of software development.

We are a team of researchers and engineers at GitHub, exploring things beyond the adjacent possible. We prototype tools and technologies that will change our craft. We identify new approaches to building healthy, productive software engineering teams.

PROJECTS TEAM EVENTS SPEAKER SERIES 2020

Projects

All Categories

GPT-4 with Calc
May 11, 2023

Copilot for Docs
March 22, 2023

