

Perspectives of AI Coding Assistants in the ATS

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Acknowledgements to Marcin Sobieszek

Introduction

- Generative AI
 - Quickly generate new content based on a variety of inputs. Inputs and outputs to these models can include text, images, sounds, animation, 3D models, or other types of data.
- Coding Assistants
 - Speed up the daily tasks of software developers
- Can the Accelerator & Technology Sector use it and profit from it?


Outline

- Coding assistants, advantages and shortcomings
- State in the ATS Software Engineer community
- Next steps

How

- Inputs
 - Instructions as code comments or in specific tools
 - Context : code, project configuration, etc.
- Outputs
 - Code: classes, methods, tests
 - Documentation
 - Explanations

```
/explain _is_in_validate_state
```

 Codeium 2:42 pm, Sep 2, 2024

This function checks if a magnet is in a valid state for testing. It does this by:

1. Verifying that the user permit status is True for the BIS input connected to the magnet (if any).
2. Ensuring that all connected PCs are in a normal state.
3. Confirming that the magnet itself is in a normal state (not overheated).

If any of these conditions are not met, the function logs an error and returns False. Otherwise, it returns True.

What assistance?

- Code Completion and Generation
- Code Explanation, Reviews, Security Scanning
- Code Debugging
- Code Modernization, Refactoring

Concerns

- **Input Data, sent to the cloud solutions**
 - Data Privacy
 - What happens to them? What is their retention policy? Are they used for e.g. training?
 - It is not compliant with the current CERN Cloud policy
- **On Output Data**
 - Are they subject to copyrights?
 - Could CERN have issues with Licence of AI generated source code?
 - Can it be published as open-source in CERN's open-source projects?
 - Is it correct? Did the AI hallucinate?
- **Training**
 - What is the quality of public repositories? What quality can we expect out of them?
 - Can we train our product with our organization's code base?

Available Products and Considerations

Product	Cloud	On-Premise	Public Repositories	Private Repositories
GitHub Copilot	Yes	No	Yes	No
replit	Yes	No	Yes	No
Codeium	Yes	Yes*	Yes	No
CodiumAI	Yes	Yes*	Yes	No
GitLab Duo	Yes	Yes*	Yes	No
Refact.ai	Yes	Yes*	Yes	Yes
Amazon Q Developer	Yes	No	Yes	Yes
JetBrains Cody	Yes	No	Yes	No
Tabnine	Yes	Yes	Yes	Yes
Continue	Yes	Yes	Yes	Yes
Tabby	Yes	Yes	Yes	Yes

* The model is in the cloud

- AccGPT
 - Not aiming at competing with these tools
- Ideal solution
 - Train with our own repositories
 - On-premise service and model
 - Configurability
- Cost efficiency
 - Licences
 - Infrastructure

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CTTB Application Software Forum on AI

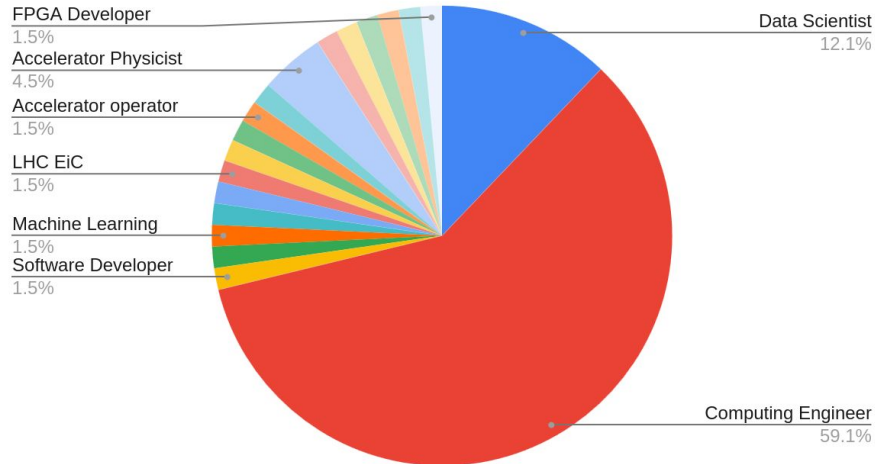
- Forum held end of May <https://indico.cern.ch/event/1397765/>
 - 3 talks focused on CERN's studies of LLMs for chatbots
 - Discussions covering both chatbots and coding assistants
- Preparation of the forum
 - Numerous discussions to identify contributions
 - **Survey** to understand the current use of AI in our community
- Outcomes
 - [Executive summary](#)
 - [Survey results](#)

Survey Overview

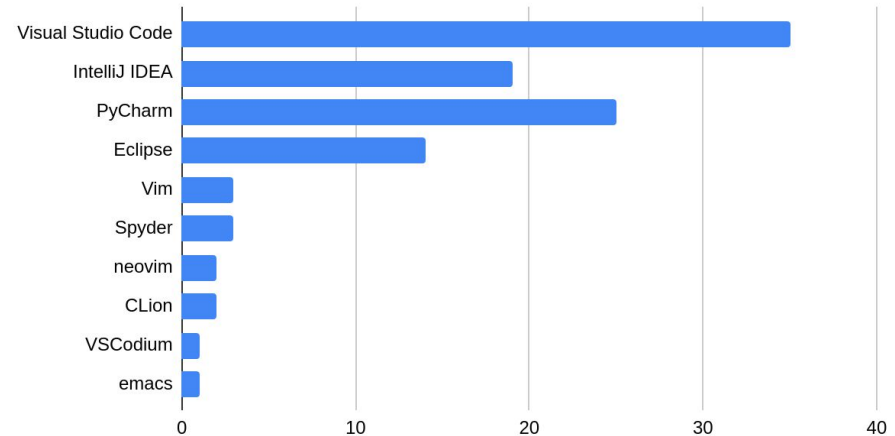
- 15 questions in 4 categories
 - Personal Info and IDE Usage
 - AI Assistance Tools in IDEs
 - LLMs Usage (Chatbots)
 - Impact, Benefits, Future Trends
- Survey sent to 490 unique user accounts on ASF e-group, Java and Python Mattermost channels
 - How many are actually active users?
- 56 answers = 11% of total users

Survey: Personal Info and IDE Usage

Count of Personal Information: What is your position/role?

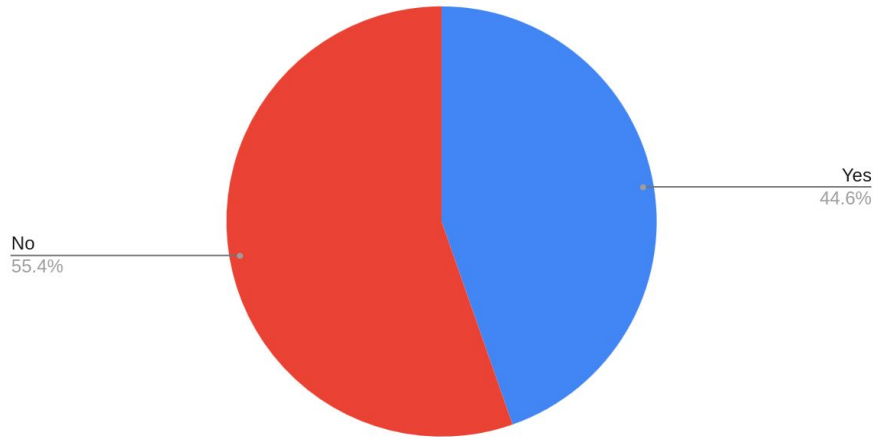


Count of IDE Usage: Which IDE(s) do you primarily use for software development?

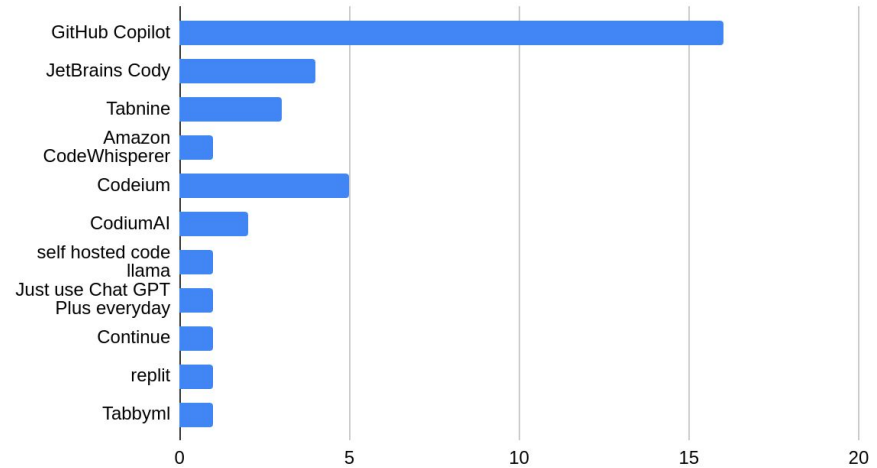


AI Coding Assistants

Count of AI Assistance Tools in IDEs: Have you used AI-powered code assistance tools (e.g., code completion, ref...)

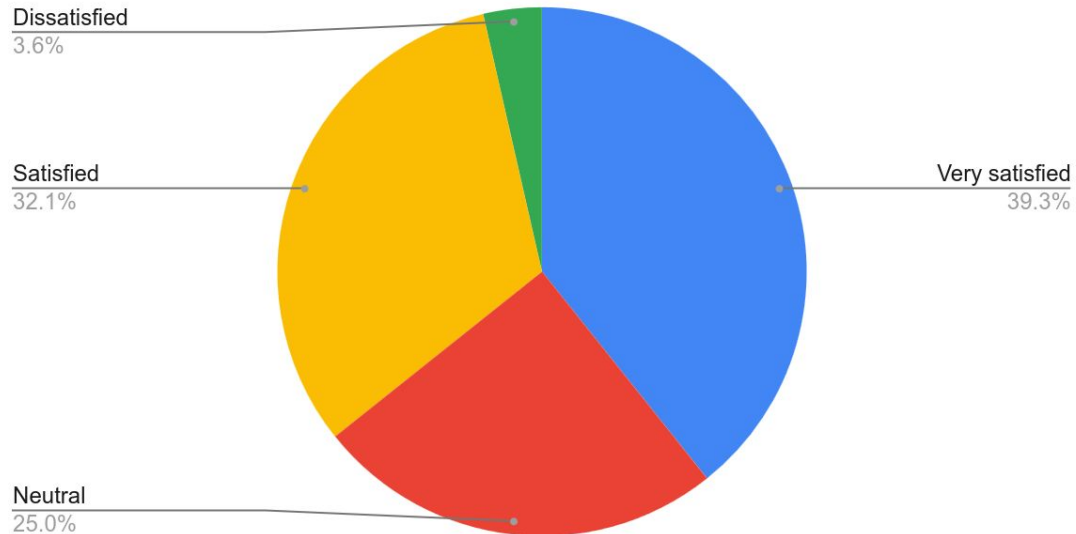


Count of AI Assistance Tools in IDEs



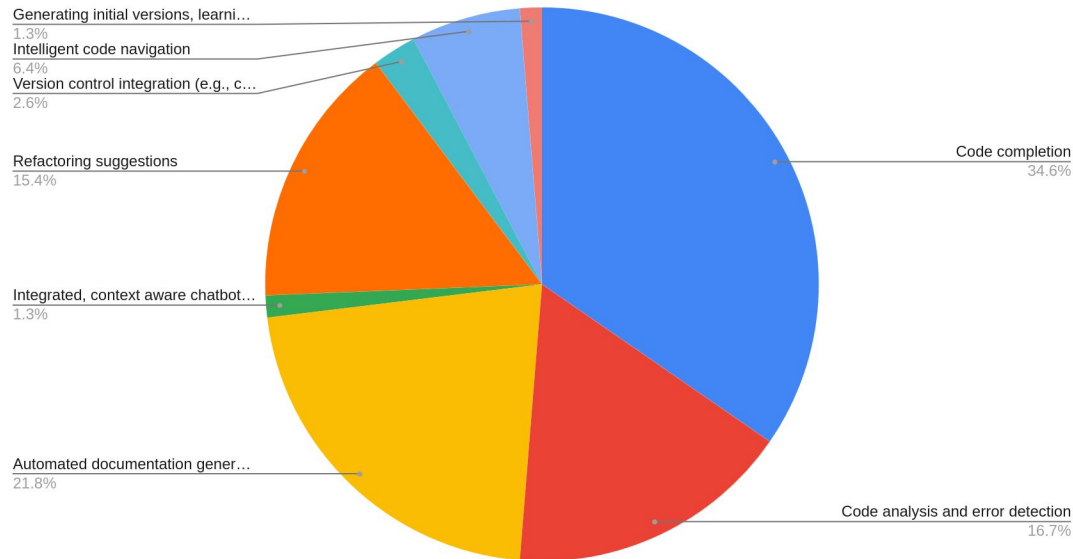
AI Coding Assistants

Count of AI Assistance Tools in IDEs: If yes, how satisfied are you with the AI assistance tools available in your IDE?



AI Coding Assistants Use Cases

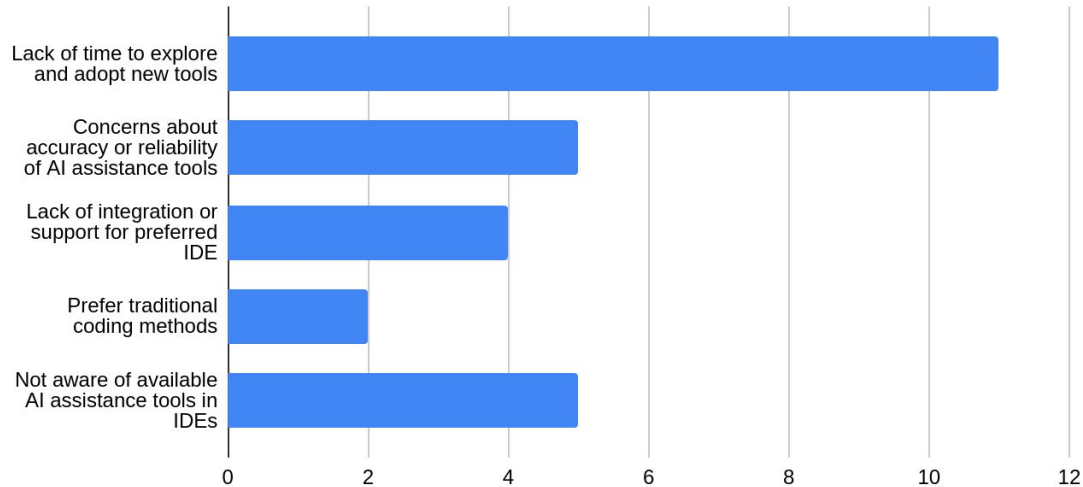
Count of AI Assistance Tools in IDEs: If yes, please select the typical tasks for which you use AI assistance tools (select all that apply):



- Noted that
 - AI is not yet performant for designing and architecting
 - Output must be reviewed as quality can range from good to worse

AI Coding Assistants

Count of AI Assistance Tools in IDEs: If no, please select the reason(s) why you have not used AI assistance tools:



Summary of survey

- Clear interest of the community for AI coding assistants
 - Self initiatives, private licences, source code leaks
- Stress the lack of policy around copyrights, licences, data privacy in respect to AI tools at CERN
- Need for clear guidelines, training when applicable, and a CERN licence
- Train the model with our CERN source code, APIs and documentation

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GitLab Duo opportunity with IT pilot

- GitLab Duo integrated within our on-premise GitLab instance
 - Requires communication with GitLab's Cloud to access the AI model
- LLMs: Google Vertex AI Models and Anthropic Claude
- Data Retention
 - Model input and output data discarded immediately after output is provided
 - Data not used for training models
 - https://docs.gitlab.com/ee/user/gitlab_duo/data_usage.html#data-retention
- Training data
 - Only on public data
 - https://docs.gitlab.com/ee/user/gitlab_duo/data_usage.html#training-data
- Tradeoff
 - Our data do not leak
 - AI not aware of our own API and libraries
 - AI learns from external data, and may not consider our own standards
 - Up to the developers to provide directives to the AI
 - Quite new on the market, how does it compare with GitHub Copilot?

Next step

- Evaluation of AI Coding Assistant with GitLab Duo
 - 100 complete GitLab Duo Pro licences with Chatbot and Coding assistant for 60 days beginning of September
 - Registration based on first come, first served
 - Distribute a survey to evaluate the experience of using of GitLab Duo, comparable with previous ASF survey
 - Provide feedback to IT and to CTTB
- ATS-IT committee will be working with IT and legal service to focus on clarifying issues currently limiting the adoption of AI
 - Data privacy
 - Licenses and author rights of generated source code
- If experience a success
 - Evaluate AI Coding Assistant solutions and select one for CERN
 - Provide training on the endorsed AI technologies

Conclusion

- ATS Software Engineers want to use AI assistant tools
 - And are currently doing it
 - There are some reserves and concerns about licences and data privacy, and correctness of the outputs
- Trial proposed from beginning of September with GitLab Duo
 - Comparable experience of ATS software engineers with same AI tool
- Legal aspects of AI code generation must be clarified with ATS-IT committee