Non-Research Tips for Information Science Researchers (Summer 2026)

Apr 15, 2026
Week 1: Introduction and Review of Fundamental Concepts

Yusuke Matsui
(UTokyo)

Koya Narumi
(Keio Univ.)

Yuki Koyama
(UTokyo)

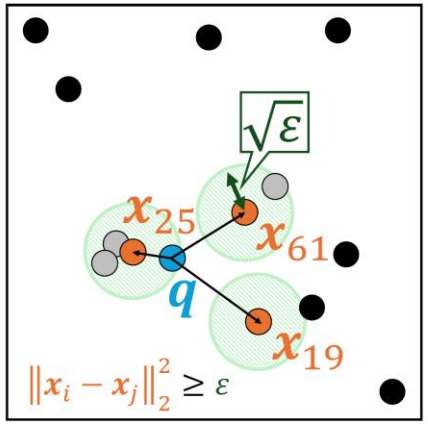
Jun Kato
(AIST)

Yusuke Matsui

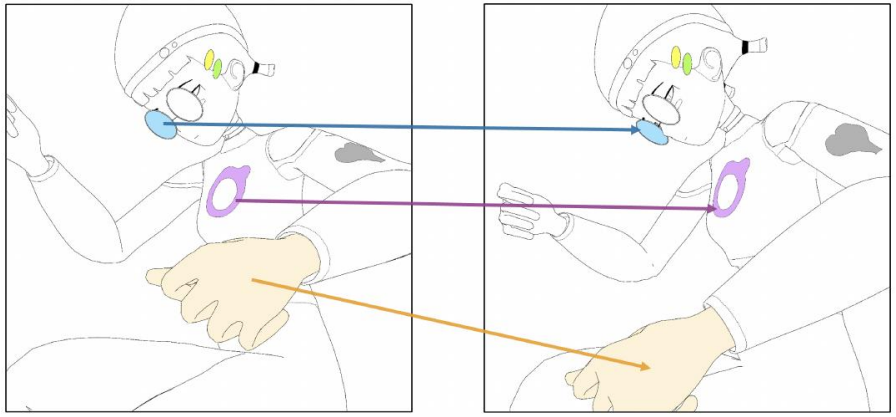
Senior Assistant Professor, the University of Tokyo, Japan

http://yusukematsui.me @utokyo_bunny @matsui528

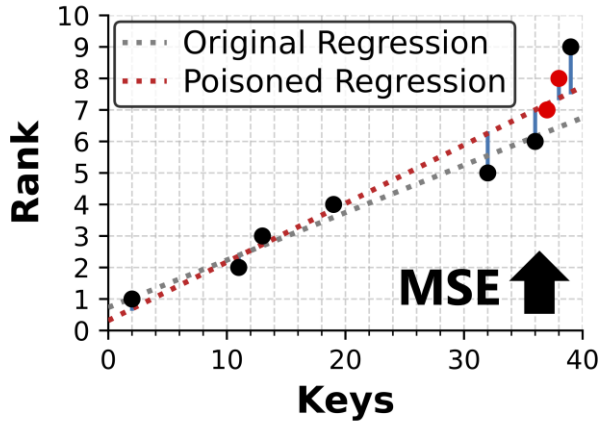
- ✓ Computer vision, database, machine learning
- ✓ RAG, vector databases, learned data structures



Diverse search
[Matsui, CVPR 25]



Correspondence for manga regions
[Li+, CVPR 26]



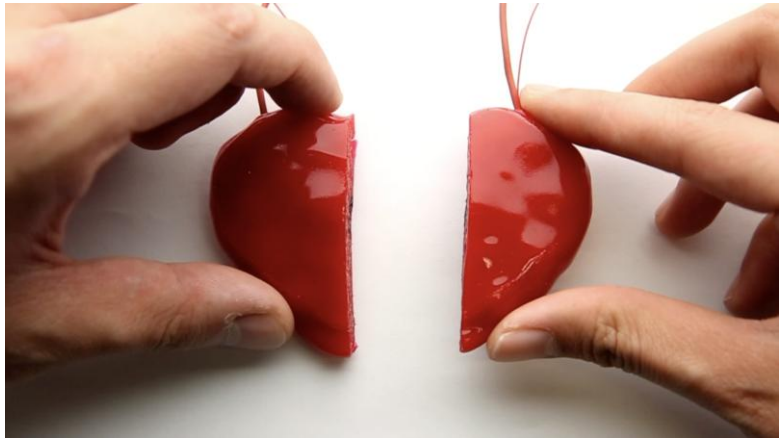
Poisoning attack to learned index
[Sato+, SIGMOD 26]

Koya Narumi

Currently in Barcelona, Spain

Associate Professor, Keio University, Japan
https://narumi.me/ @koya_narumi

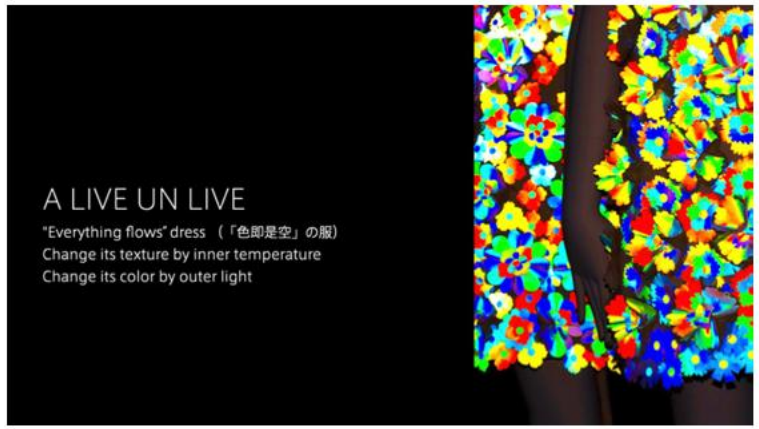
- ✓ Digital Fabrication
- ✓ Shape-changing Interfaces
- ✓ Human-Computer Interaction



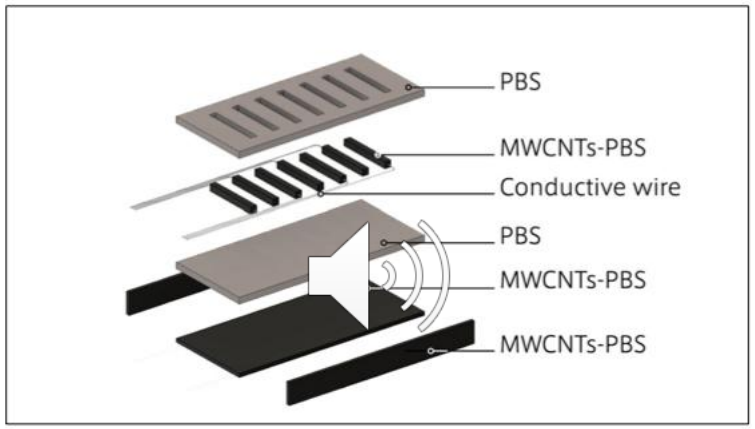
Self-healing UI
[Narumi+, UIST 18]

Inkjet 4D Print
[Narumi & Koyama+, SIGGRAPH 23]

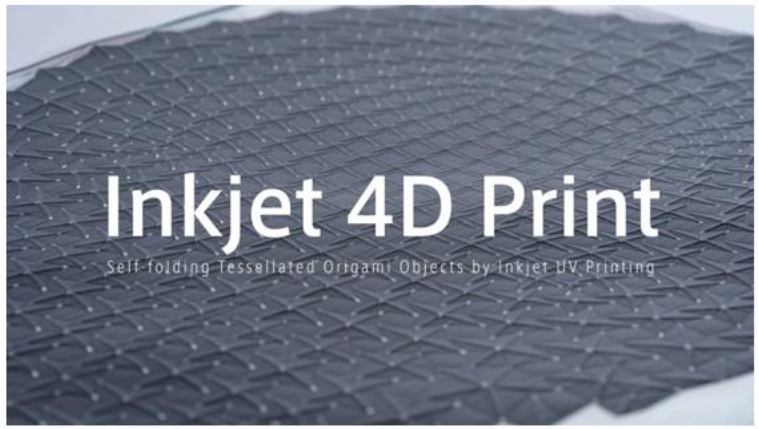
TYPE-X
[A-POC ABLE ISSEY MIYAKE]



Slides



Figures



Videos

Koya will cover core visual components for research: **Slides, Figures, and Videos.**

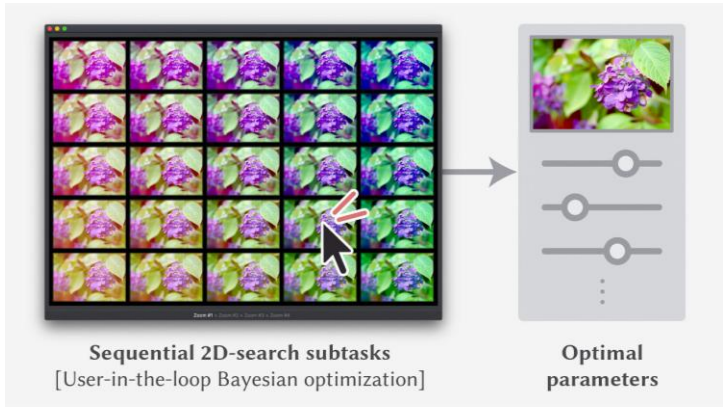
Yuki Koyama

Associate Professor, Precision Engineering, UTokyo, Japan

https://koyama.xyz @bravery_ @yuki-koyama

- ✓ Computer graphics (and anime production)
- ✓ Human-computer interaction
- ✓ Human-in-the-loop design optimization

Design suggestion
[Koyama+, UIST 2022]

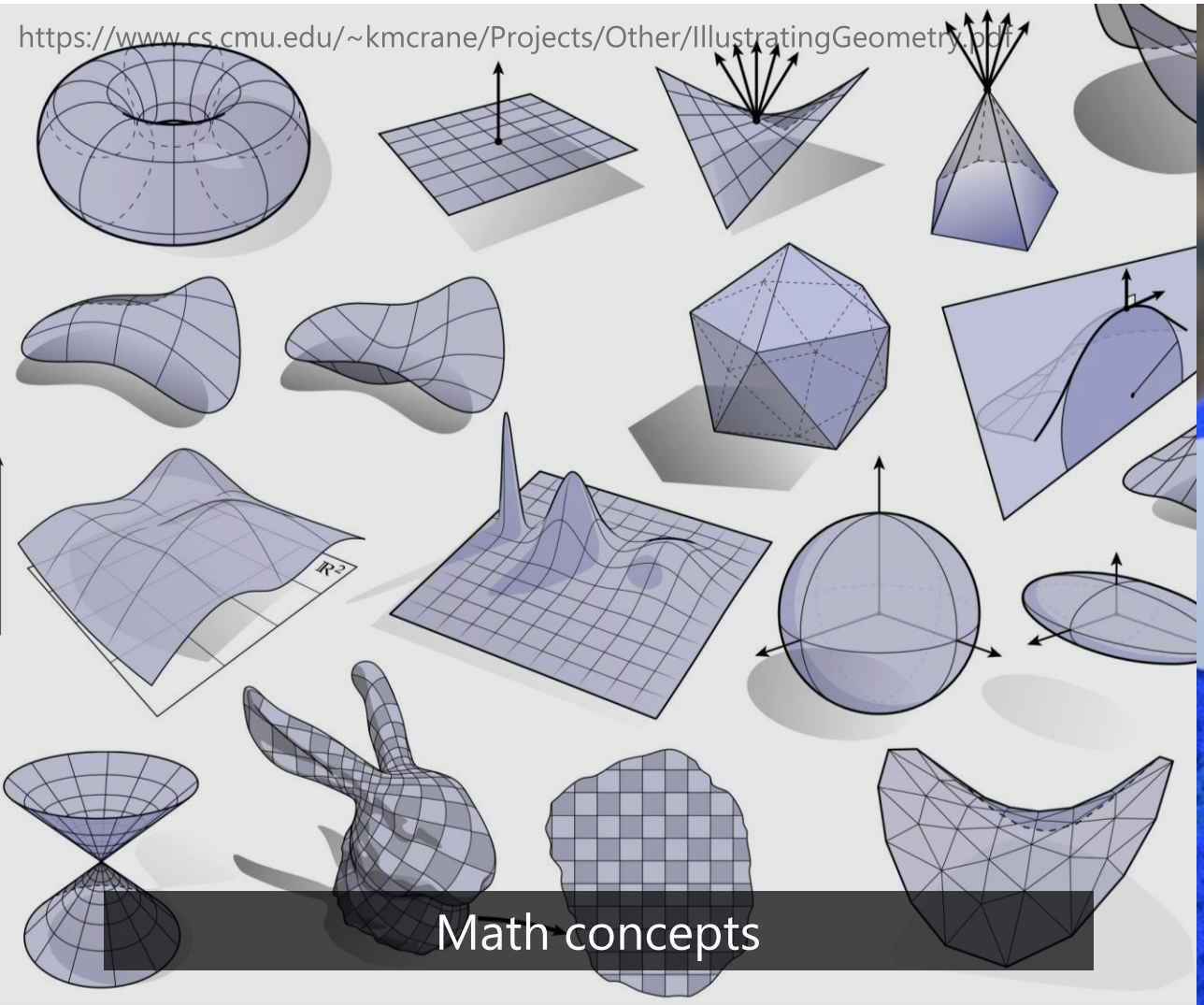


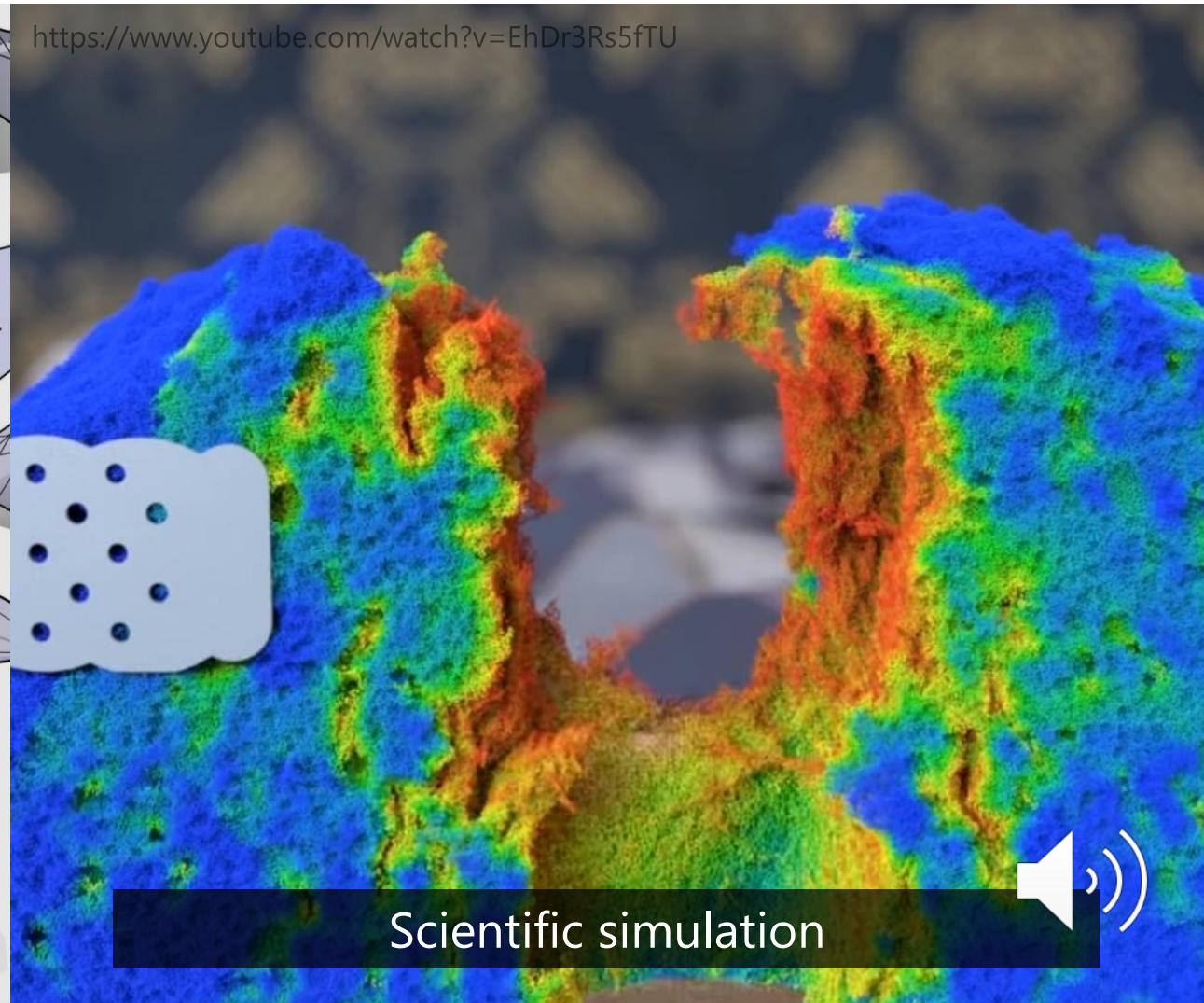
Interactive design optimization
[Koyama+, SIGGRAPH 2020]

Stylized 3D animation
[Todo+, SA 2024 TComm.]

The topic that I will cover in this course: 3DCG illustrations

Good illustrations help people better understand your research!!
3DCG is sometimes an effective technique for this purpose.





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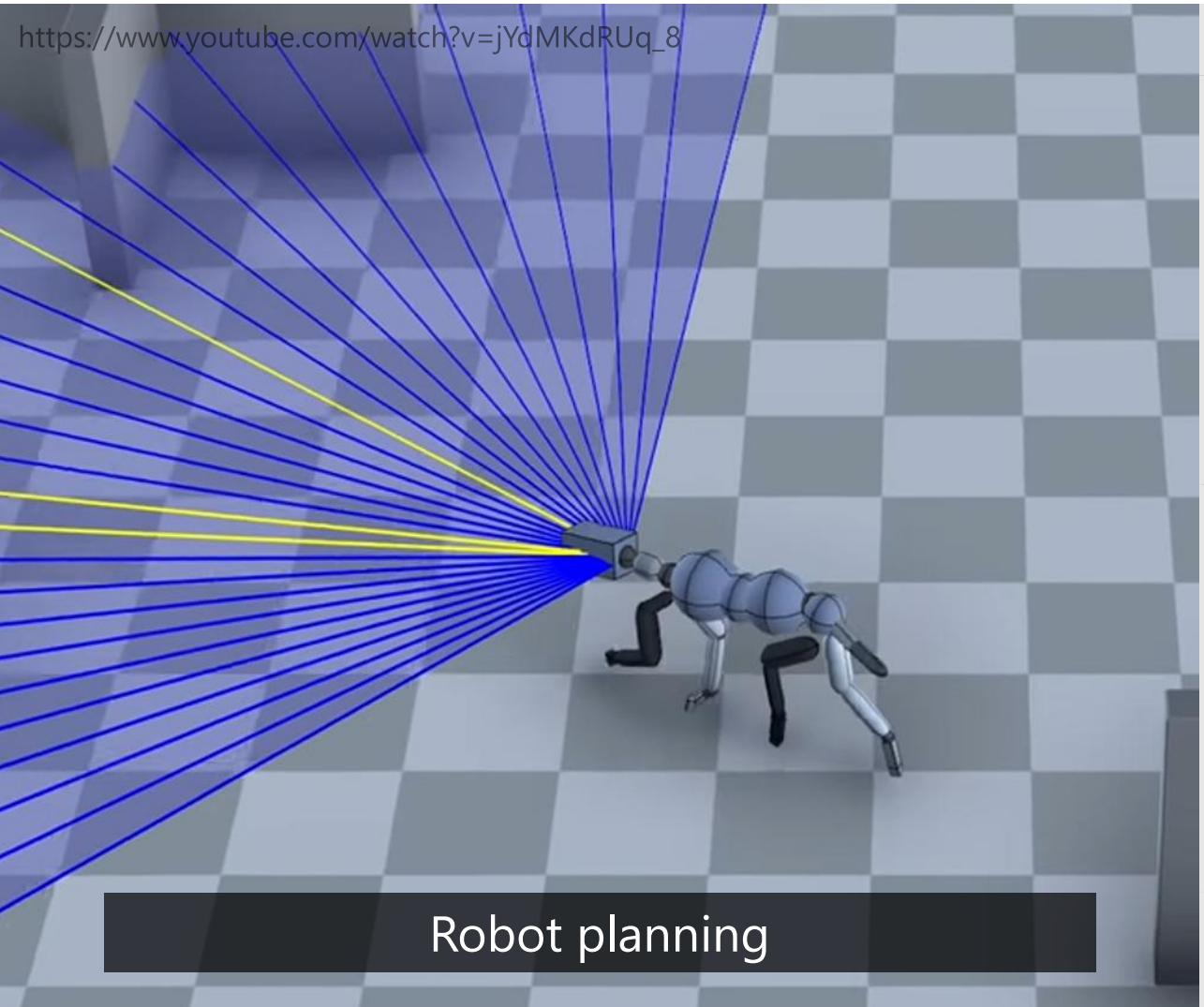
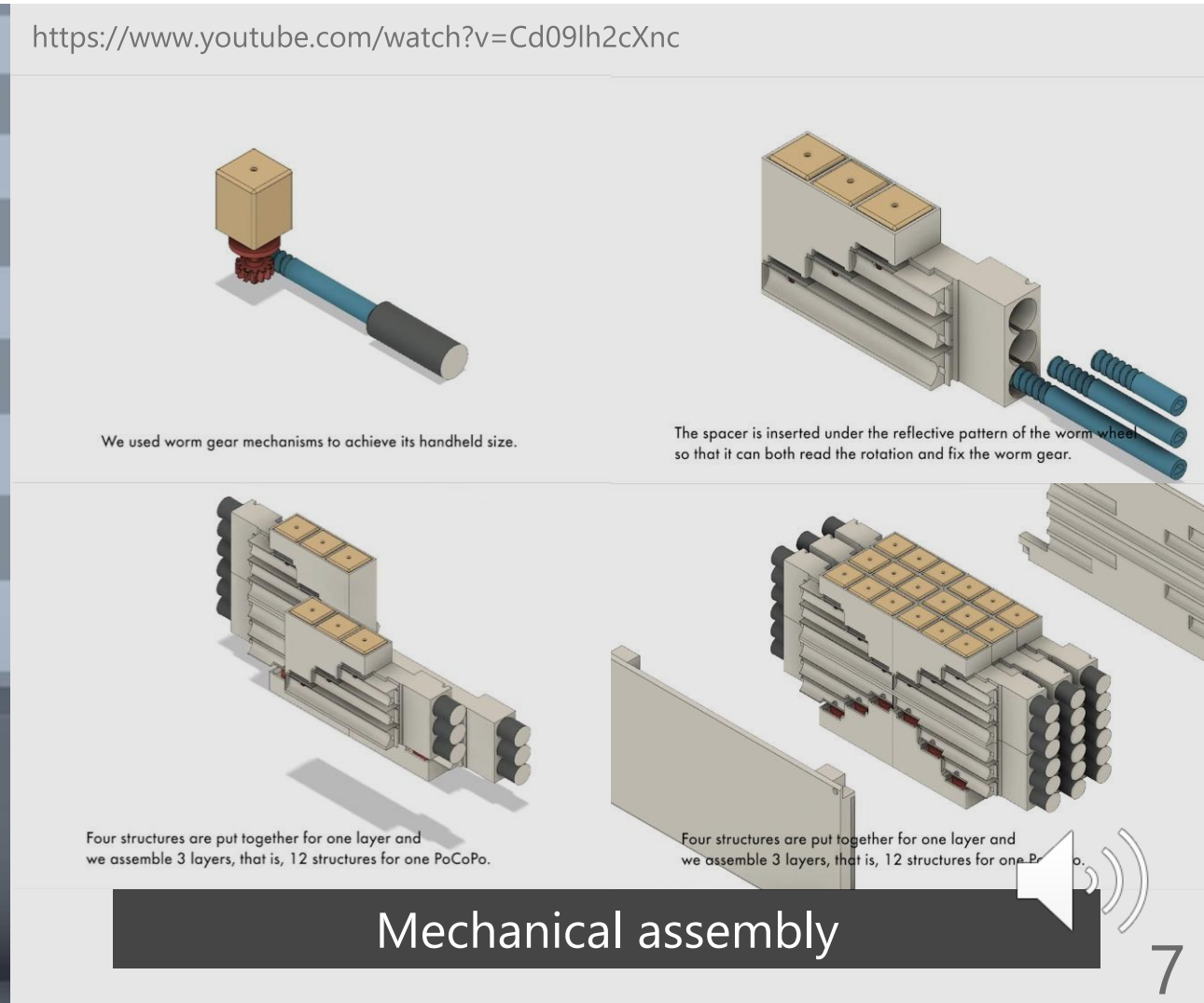


Robot planning



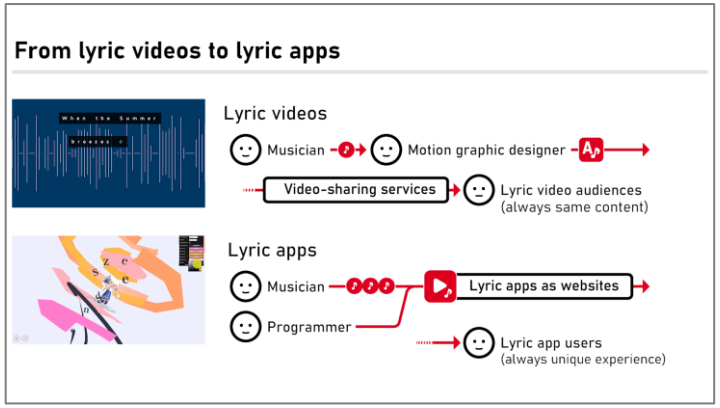
Mechanical assembly

Jun Kato

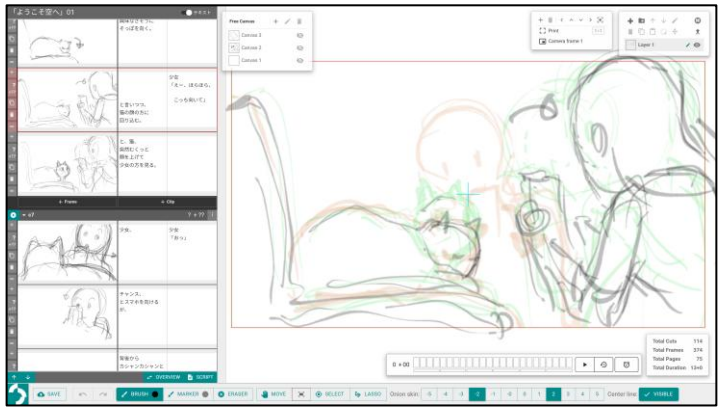
Chief Senior Researcher, AIST / Technical Advisor, Arch Inc, Japan

https://junkato.jp @junkato @arcatdmz

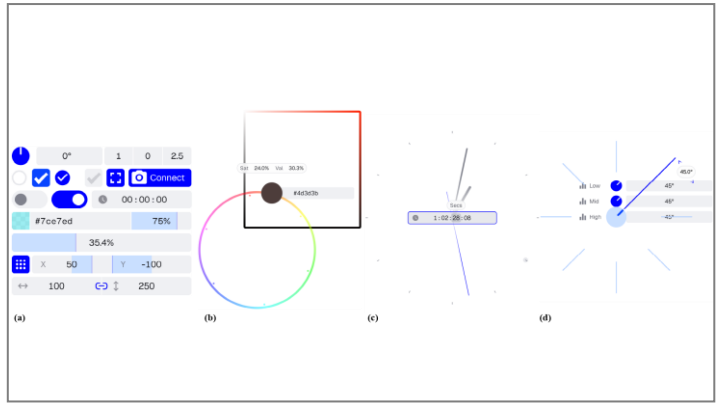
- ✓ Human-Computer Interaction
- ✓ Creativity Support (“Toolsmith researcher” for programmers, musicians, anime creators, etc.)



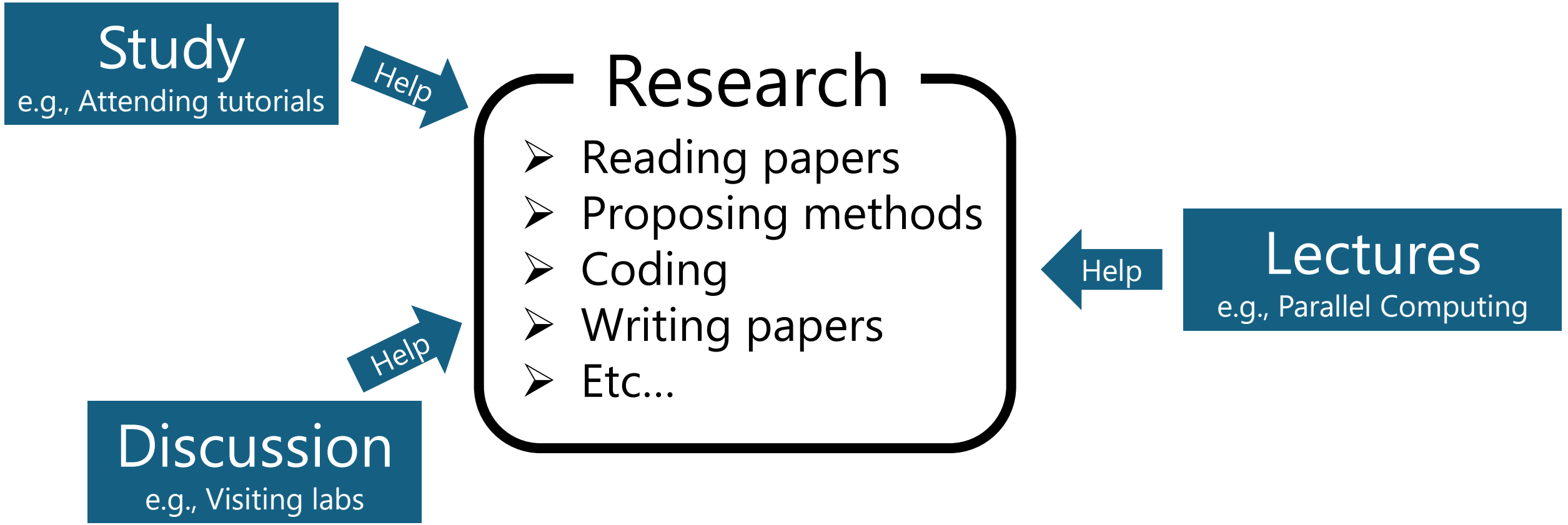
“Lyric app” dev framework
[Kato+, ACM CHI '23]

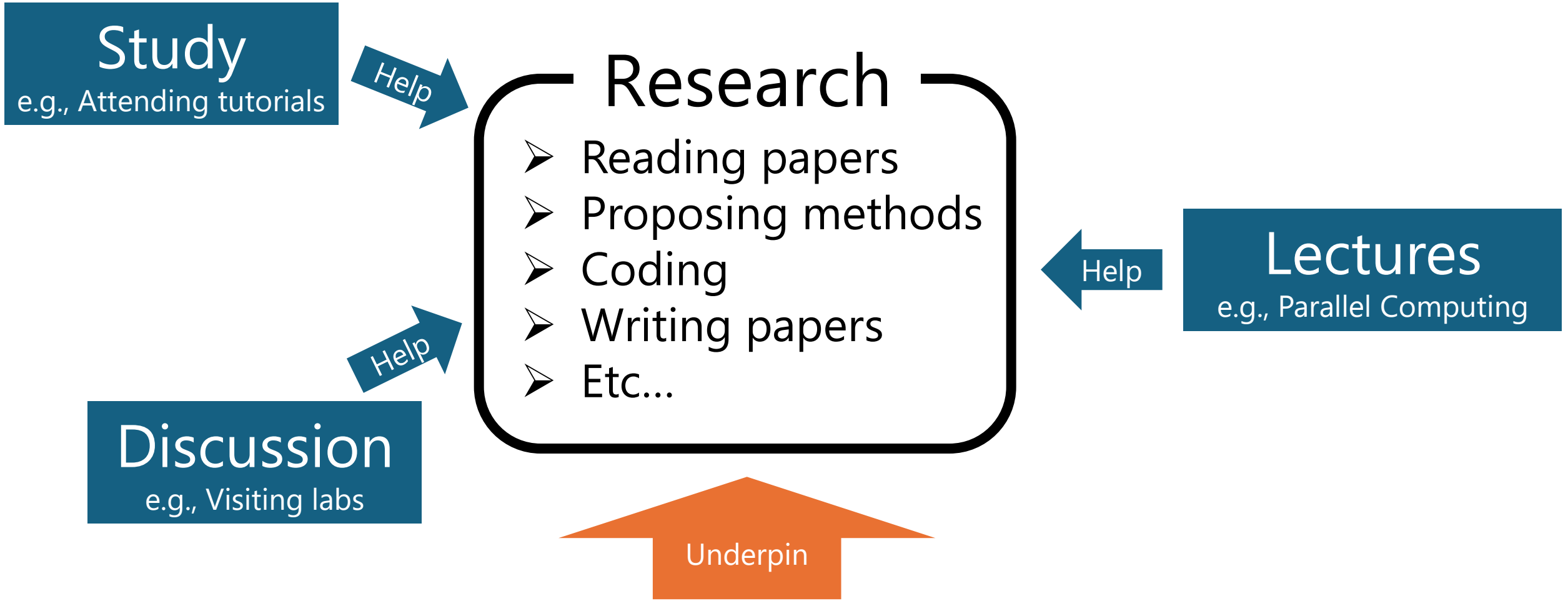


Storyboarding tool “Griffith”
[Kato+, ACM CHI '24]



GUI widgets “Tweeq”
[Hashimoto & Kato, ACM UIST '25]


Study
e.g., Attending tutorials
Help
Research
Reading papers
Proposing methods
Coding
Writing papers
Etc…
Help
Lectures
e.g., Parallel Computing
Help
Discussion
e.g., Visiting labs



- Our target! "**Non-research tips**"
- By mastering these skills, you can focus more on your research itself

Information

- Dates: Wednesday, 2nd period (10:25 - 12:10)
- Location: Faculty of Engineering Bldg. 2 #241 (This room)
- Style: The lecture will be held in-person. No streaming is available.
- (Japanese materials may also be distributed.)

Assessment

- Final presentations

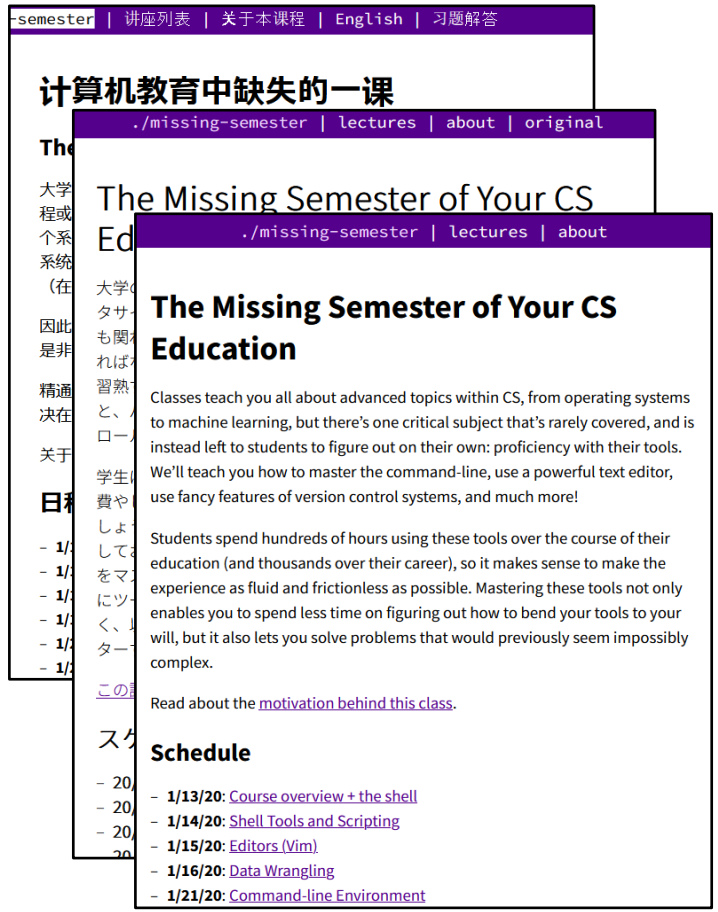
Schedule

Date (2026)	Contents	Presented by
Week 1, Apr 15	Introduction. Review of fundamental concepts	Yusuke, Koya, Yuki, Jun
Week 2, Apr 22	Equations and pseudo-codes	Yusuke Matsui
Week 3, May 13	Slides	Koya Narumi
Week 4, May 20	Research community	Jun Kato
Week 5, May 27	Figures	Koya Narumi
Week 6, June 1	3DCG illustrations	Yuki Koyama
Week 7, June 10	Invited Talk 1: Research tips in the private sector: From topic selection to social implementation (temp.)	Dr. Antonio Tejero de Pablos (CyberAgent)
Week 8, June 17	Tables and plots	Yusuke Matsui
Week 9, June 24	Invited Talk 2: Portable and Reproducible Research Environments in the Age of AI Agents	Dr. Mai Nishimura (OSX)
Week 10, July 1	DevOps for research	Jun Kato
Week 11, July 8	Videos	Koya Narumi
Week 12, July 15	Final presentations	YOU

Prerequisites

The Missing Semester of Your CS Education

- Short lecture series at MIT
  - ✓ https://missing.csail.mit.edu/
- Similar concept to us
  - ✓ Fundamental technical tools
  - ✓ Shell, command-line, git, …
- Translated into several languages
  - ✓ Matsui's team translated into Japanese
- Be sure to read it in advance



Website

- https://non-research-tips.github.io/2026.html
- We'll upload all materials
- Cancellations, administrative notices, etc., will be announced here

Agenda

- Git / GitHub (basic usage)
- Make
- Docker / Singularity
- uv/pixi
- Markdown (and structured text description)
- Notebook environment
- LaTeX / Overleaf
- Mental model for computation
- SSH + server coding
- UTokyo services

- You should be familiar with them
- If you don’t know any of them, study on your own. There are several online resources available
- I will not cover them in detail in class.

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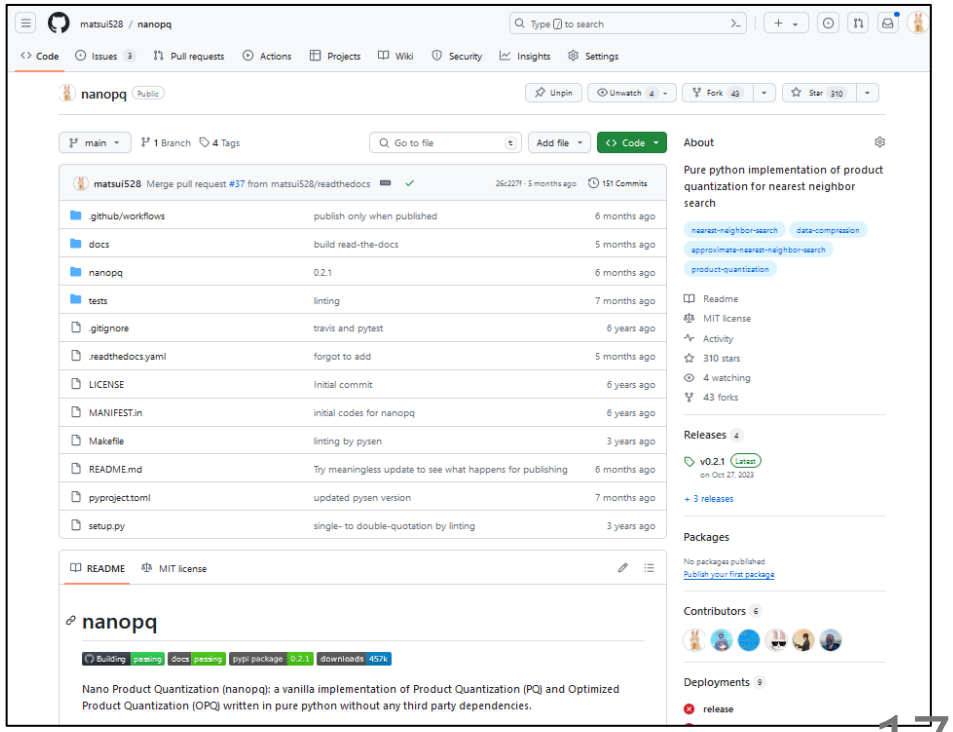
Git / GitHub

- Git
  - ✓ Command for version control: `$ git add xxx.py`

- GitHub
  - ✓ Narrow sense: Webservice to host repositories
  - ✓ Similar services: Bitbucket, GitLab, …

- What you need to know
  - ✓ Backup your code
    - ☐ git add & commit & push
    - ☐ You **MUST** backup your codes!
  - ✓ Collaborations
    - ☐ fork & pull requests & review



Git / GitHub

- Resources (English)
  - ✓ Pro Git: https://git-scm.com/book/en/v2
  - ✓ Learn Git @GitKraken: https://www.gitkraken.com/learn/git

- Resources (Japanese)
  - ✓ GitHub Lecture by Prof. Hiroshi Watanabe https://github.com/kaityo256/github
  - ✓ 渡辺 宙志, “ゼロから学ぶGit／GitHub　現代的なソフトウェア開発のために”, 講談社, 2024 https://www.kspub.co.jp/book/detail/5352199.html

- The easiest way: Ask your friends!

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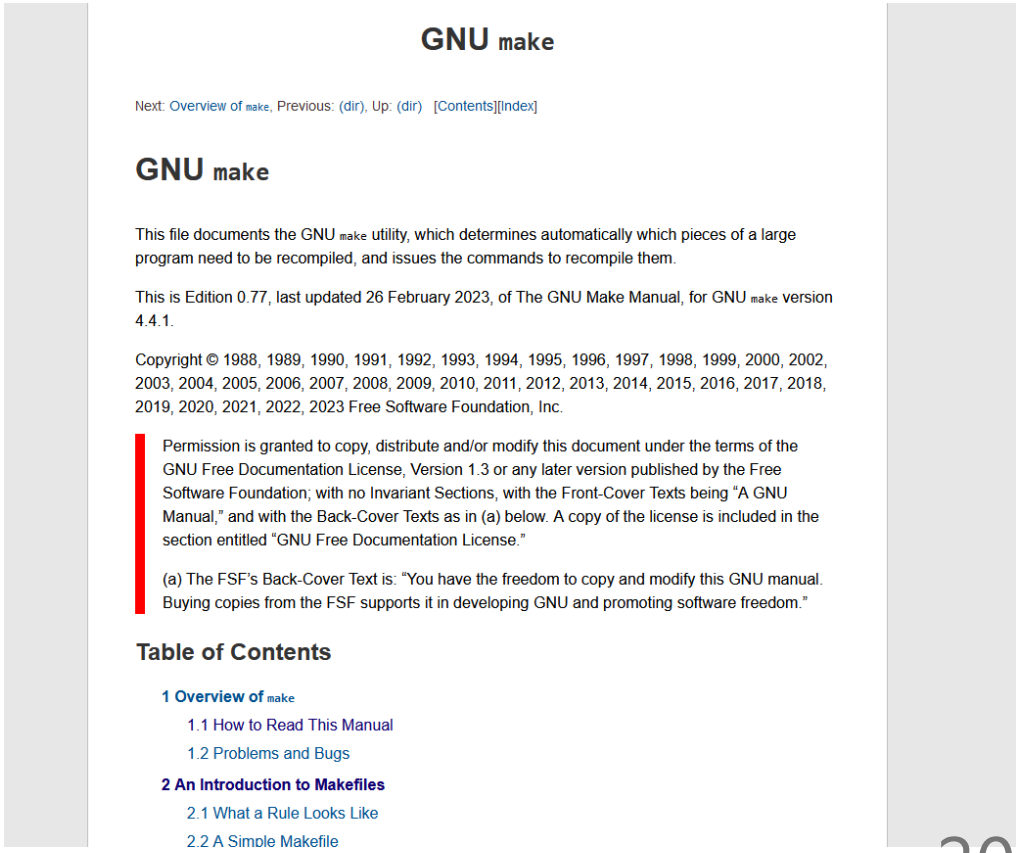
Make

- General purpose workflow description (not just compiling c/c++)
- Manual: https://www.gnu.org/software/make/manual/make.html
- Makefile highlights:
  - ✓ What users can (should) do
  - ✓ The order of operations
- The only tool everyone can understand
  - ✓ 🤔 cmake? Bazel? Meson?
- Can be used for **general** purposes



GNU make

Next: Overview of make, Previous: (dir), Up: (dir) [Contents][Index]

GNU make

This file documents the GNU make utility, which determines automatically which pieces of a large program need to be recompiled, and issues the commands to recompile them.

This is Edition 0.77, last updated 26 February 2023, of The GNU Make Manual, for GNU make version 4.4.1.

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(a) The FSF's Back-Cover Text is: "You have the freedom to copy and modify this GNU manual. Buying copies from the FSF supports it in developing GNU and promoting software freedom."

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Docker / Singularity

https://www.docker.com/ja-jp/company/newsroom/media-resources/

- A de facto standard tool for virtualization (container)

- In modern software engineering
  - ✓ One would like to perfectly use the same runtime environment even 1 month later, on a different OS, on different hardware
  - ✓ Virtualization is the only option; Docker won the *VM war*

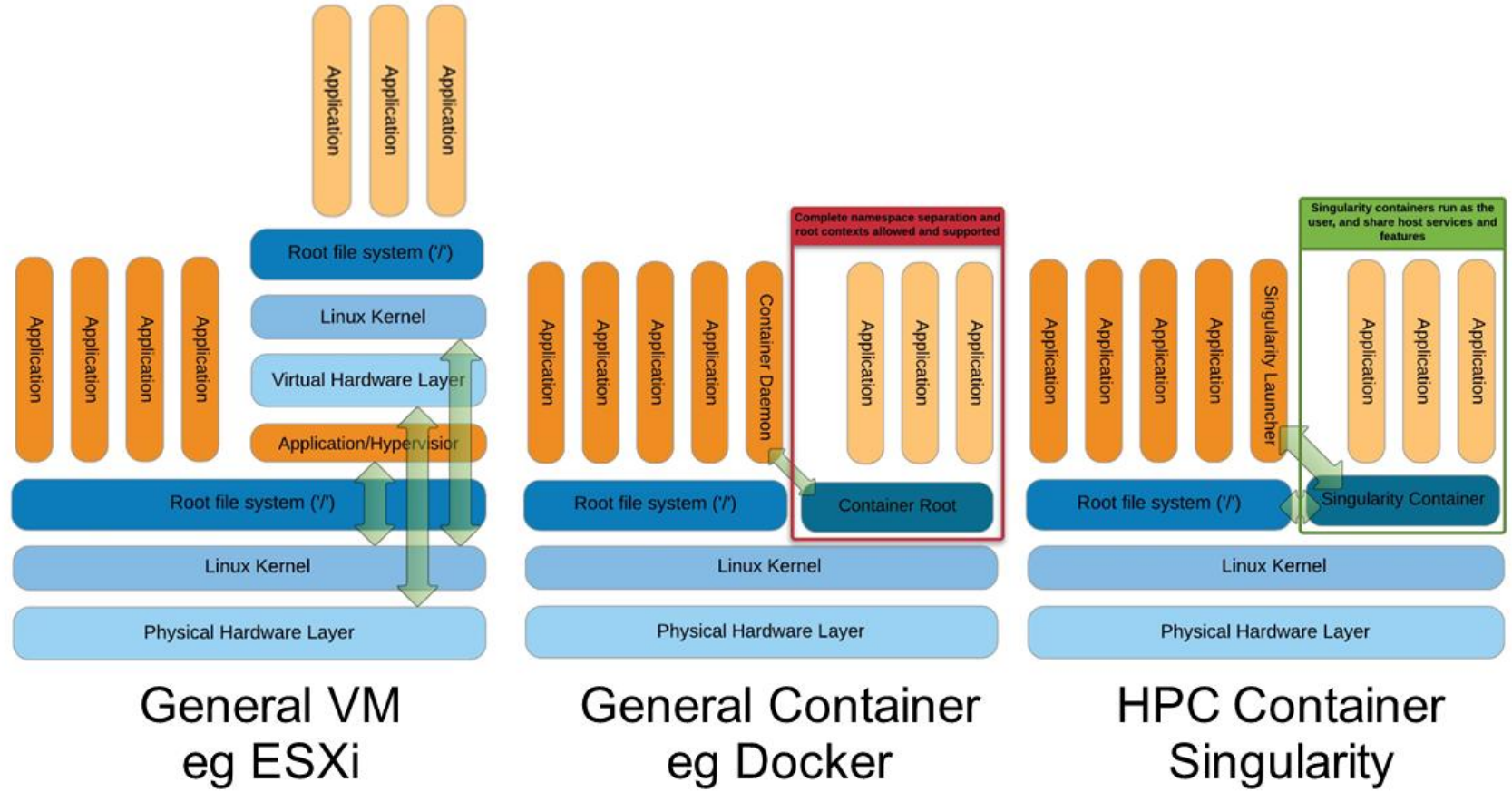
- In research
  - ✓ Reproducibility is the key
  - ✓ Docker provides the easiest way to reproduce your results

- Docker Desktop is freely available for students for research purposes
  - ✓ Not free for a big company. Be careful!

Docker / Singularity

- tldr; Docker for HPC
- The default option for ABCI is Singularity

https://sylabs.io/docs/



Source: Greg Kurtzer keynote at HPC Advisory Council 2017 @ Stanford

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uv / pixi

- Fast python package & project manager
- The Python environment setup war is ***over***

- If you need just standard Python stuff
  - ✓ Use uv

https://github.com/astral-sh/uv

- If you need more (e.g., c++)
  - ✓ Use pixi

https://prefix.dev/

- That's it!

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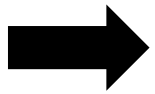
Markdown (and structured text description)

```
# This is H1 title

## This is H2 title
usual text

- list item 1
- list item 2
- list item 3

this is [link](https://www.google.com)
```

README.md

Render



This is H1 title

This is H2 title

usual text

- list item 1
- list item 2
- list item 3

this is link

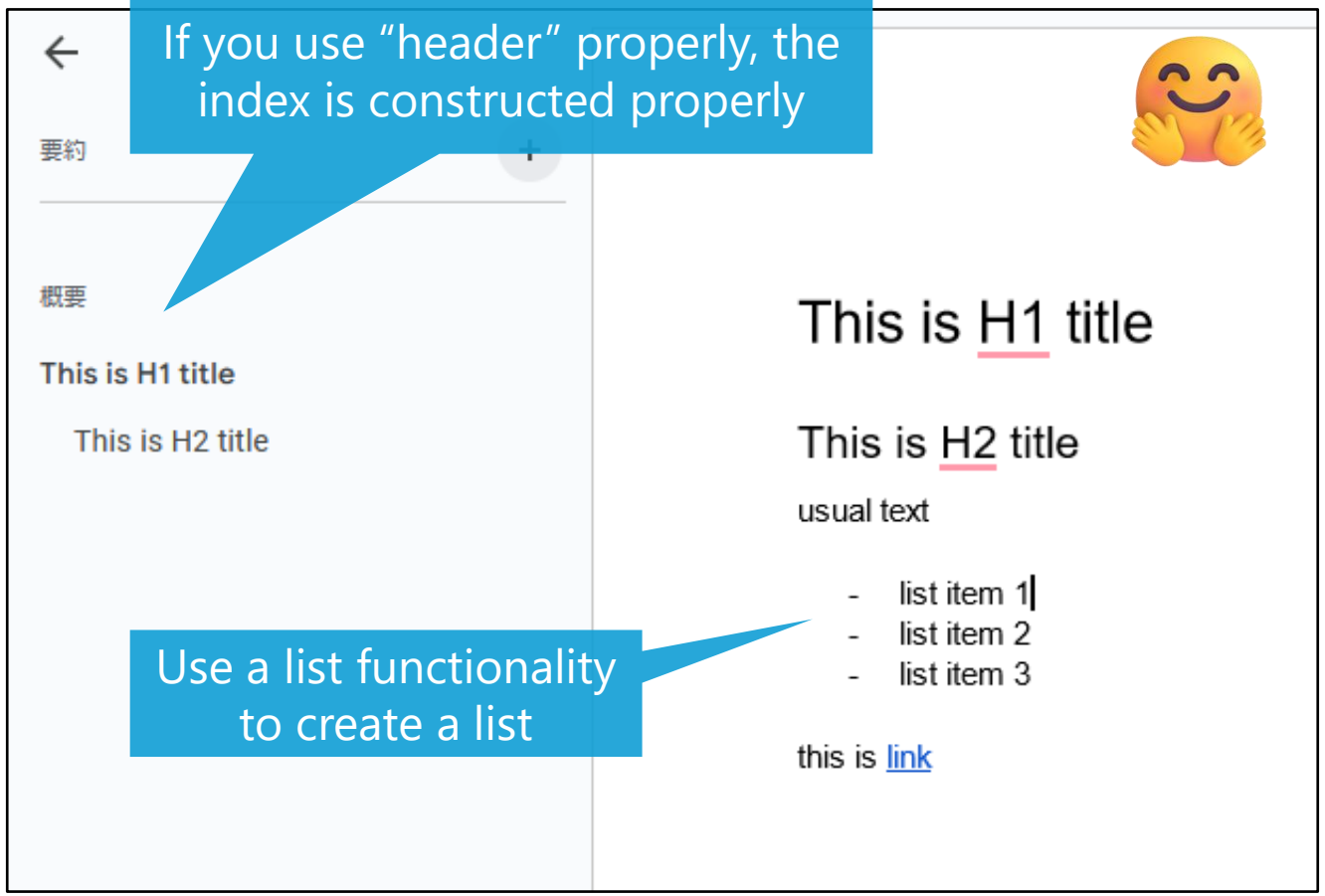
- Programmable (version-controllable), structured text
- Computers like Markdown; easily reusable for later purposes
  - ✓ e.g., convert to tex, pdf, html, etc…
- Structured texts are important to communicate with others

Markdown (and structured text description)

- Advanced usage for GitHub markdown
  - ✓ Copy & paste images
  - ✓ Diagrams
  - ✓ Equations
  - ✓ Alerts

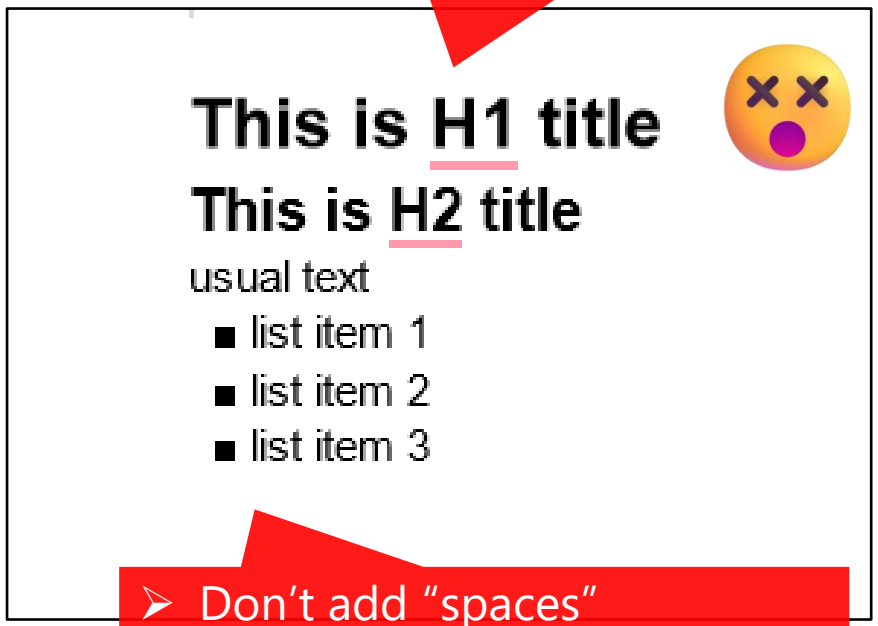
Markdown (and structured text description)

- Recommend: write google-doc and MS word as if it's markdown



Don't change the "visual" thing.
The text should be structured.

Don't make a header by changing the font size!



- Don't add "spaces"
- Don't create your own bullets

Why bad? It's hard to maintain by others!

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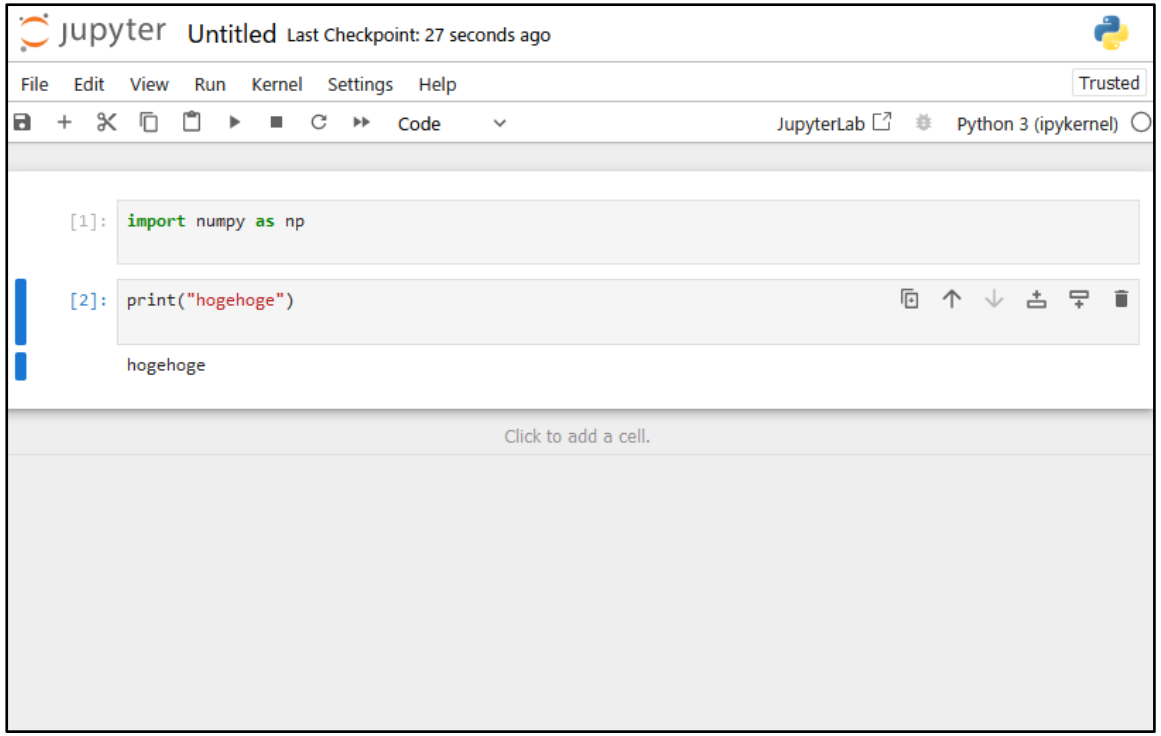
Notebook environment

Google Colaboratory

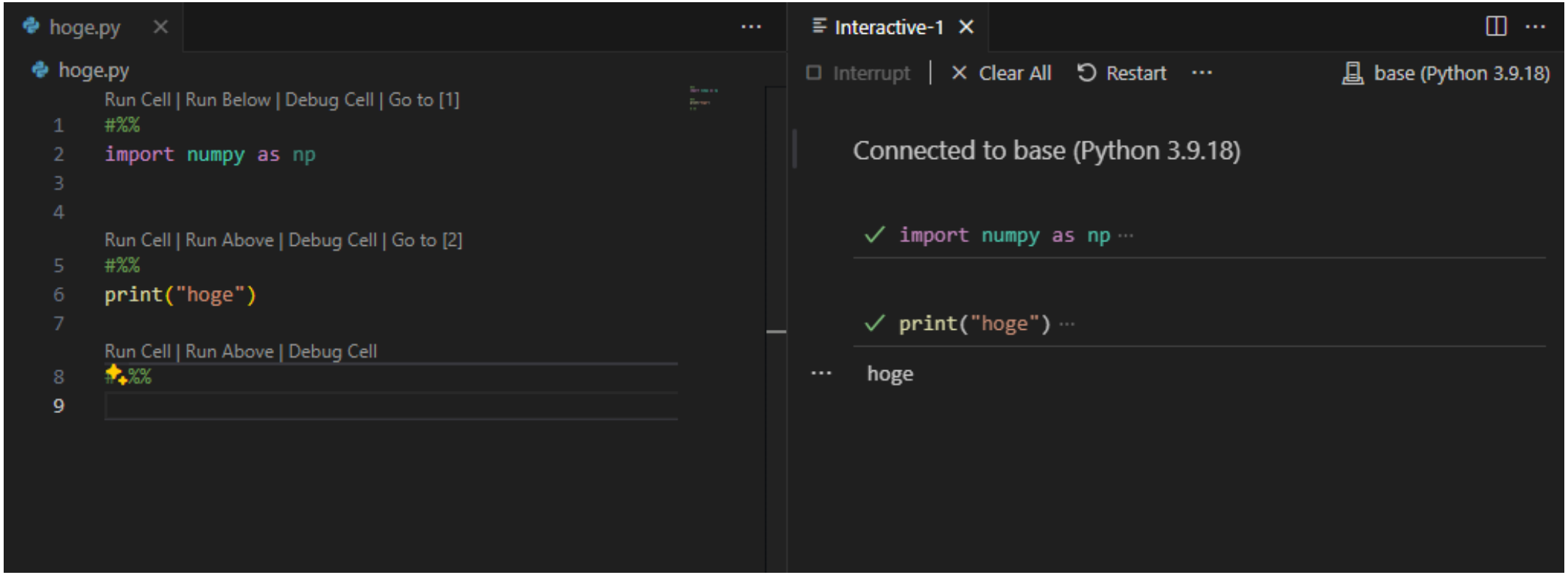


Jupyter notebook

- Some people may argue that notebooks are not useful
- However, it's beneficial to at least understand what a notebook is

Notebook environment

- Python interactive mode: sometimes useful (not .ipynb, but .py)
- Version-controllable (for source codes only)



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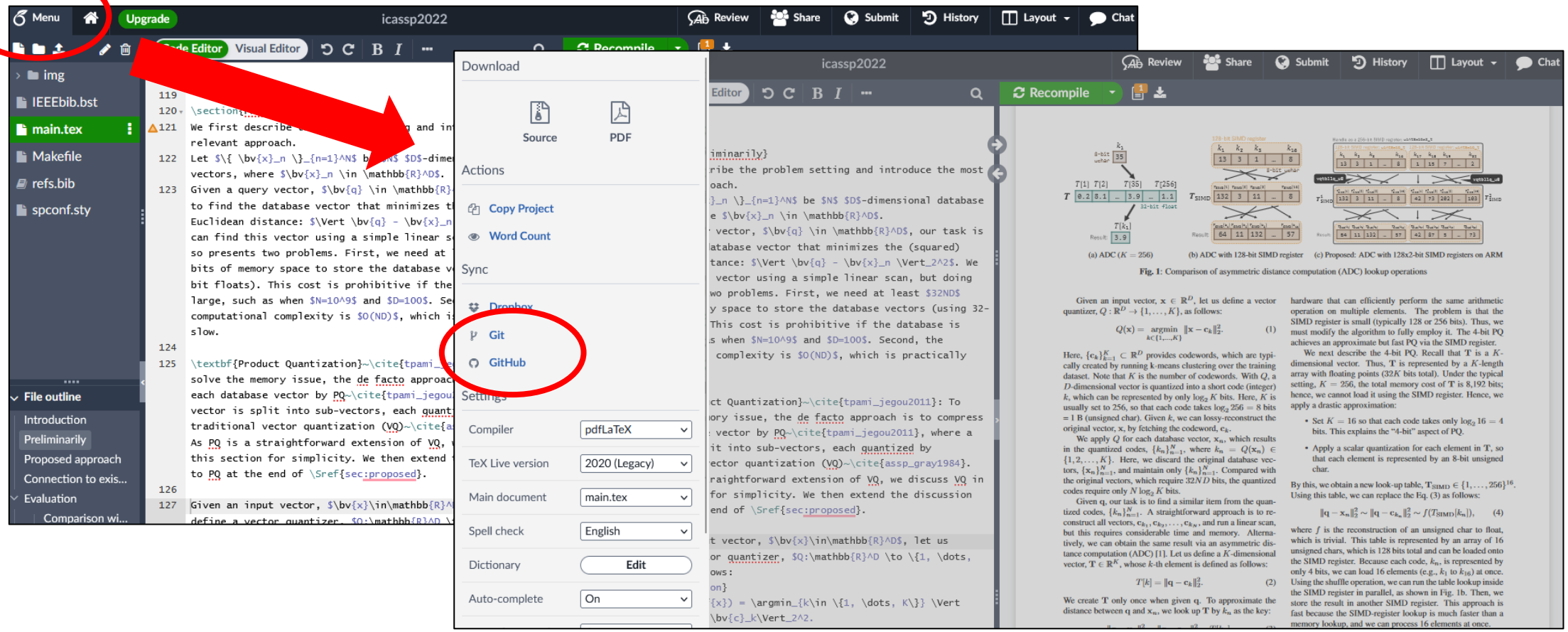
LaTeX / Overleaf

- You must use LaTeX. Overleaf is a popular tool for collaborative writing
- You can back up data by git or GitHub. You must do it!



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Mental model for computation

- Various mental models for computation
- It's important to carefully consider
  - ✓ which model to use
  - ✓ what tools to employ

My PC

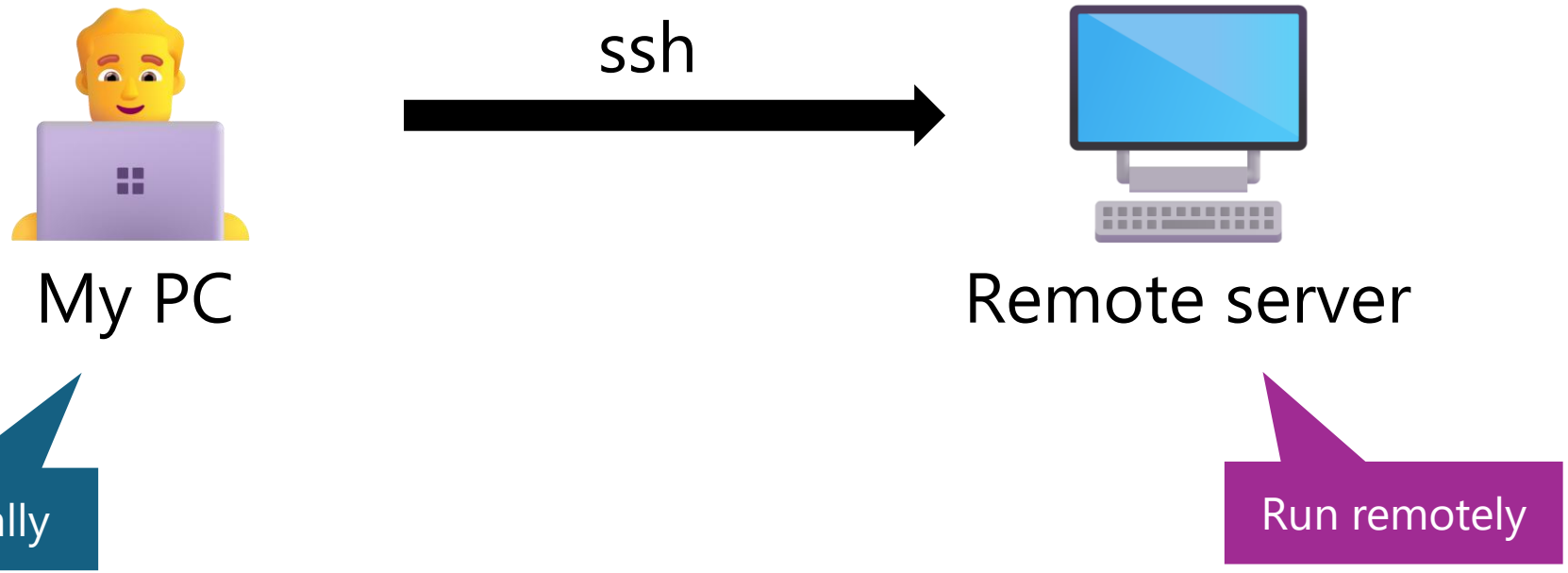
Remote server

Code locally

Run locally

Mental model for computation

- Various mental models for computation
- It's important to carefully consider
  - ✓ which model to use
  - ✓ what tools to employ



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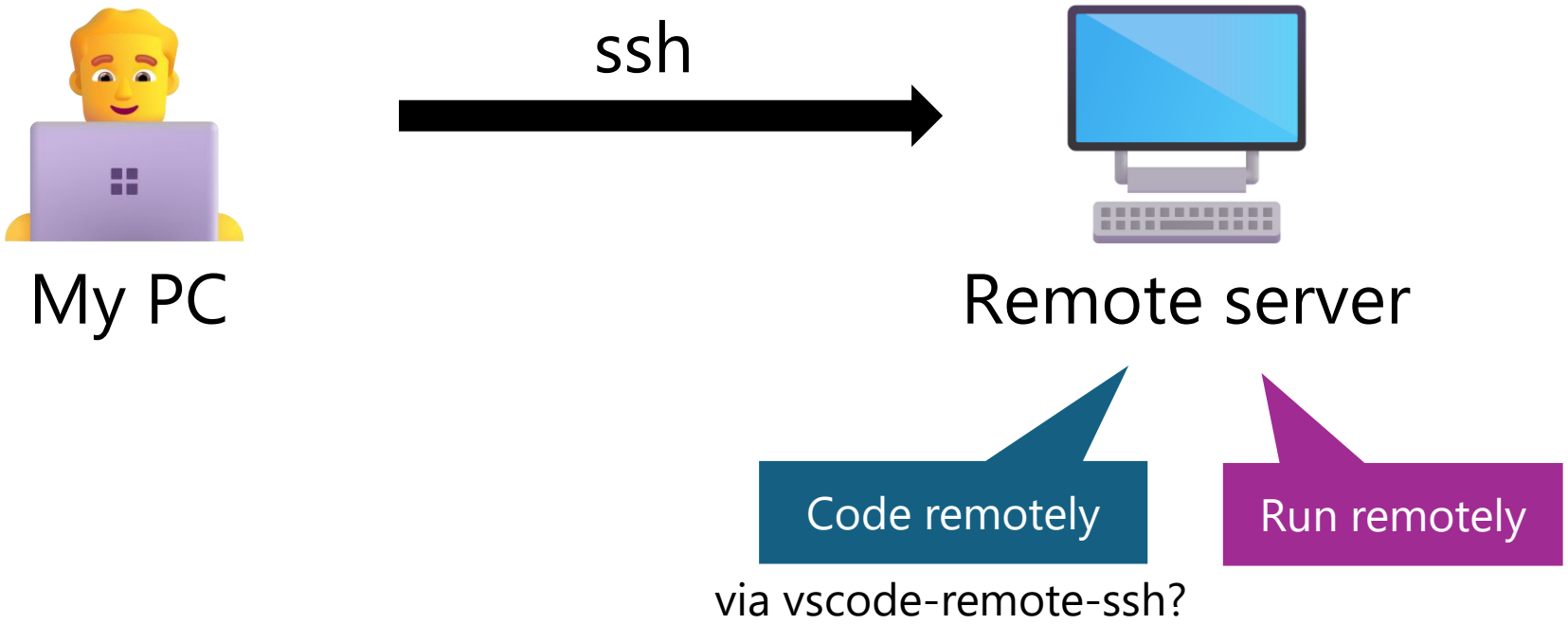

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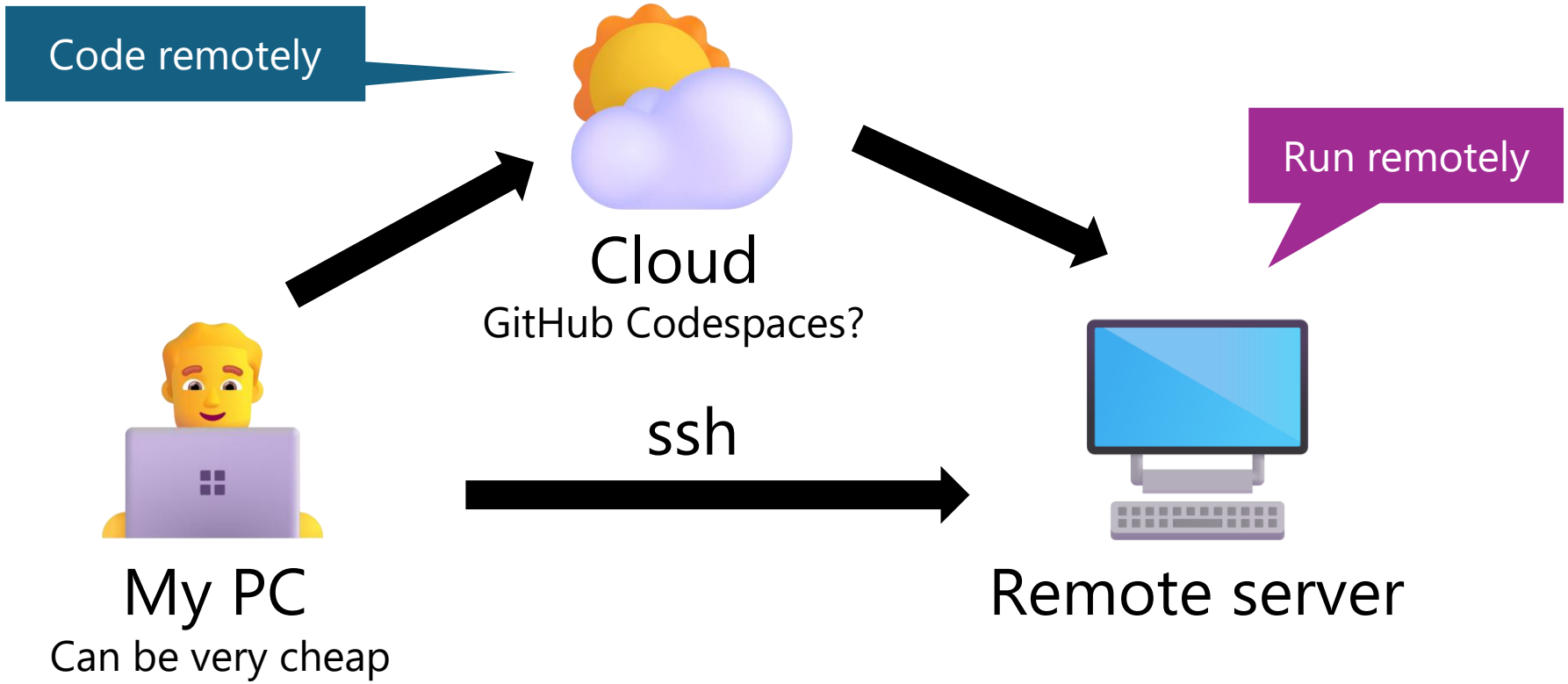

Mental model for computation

- Various mental models for computation
- It's important to carefully consider
  - ✓ which model to use
  - ✓ what tools to employ

My PC

ssh

Remote server

submit jobs

HPC Clusters

Code remotely

via vscode-remote-ssh?

Run remotely

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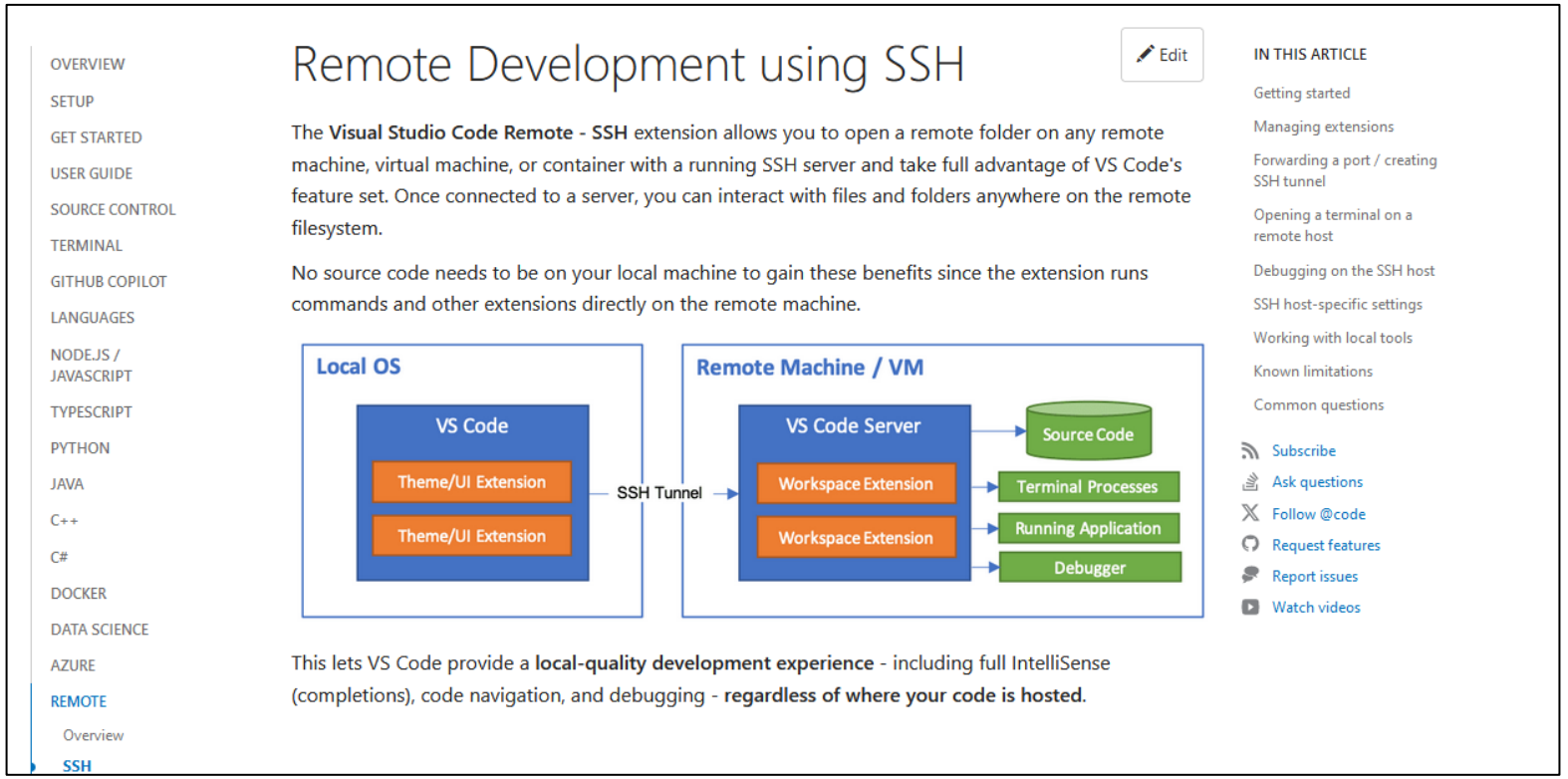
- LaTeX / Overleaf
- Mental model for computation
- **SSH + server coding**
- UTokyo services

- You should be familiar with them
- If you don’t know any of them, study on your own. There are several online resources available
- I will not cover them in detail in class.

SSH + server coding

- You should be able to
  - ✓ code via GUI over ssh (vscode-remote-ssh, etc)
  - ✓ ssh, then code on terminal (😎 emacs, vim, nano, etc)



https://code.visualstudio.com/docs/remote/ssh

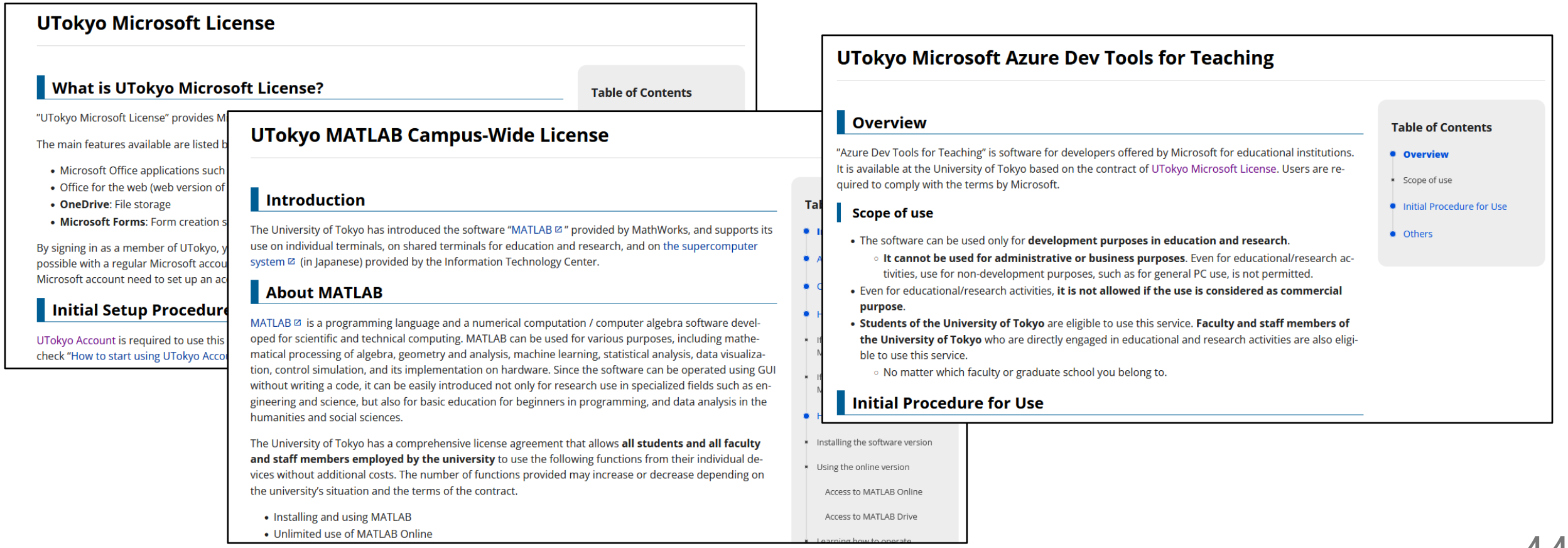
Agenda

- Git / GitHub (basic usage)
- Make
- Docker / Singularity
- uv/pixi
- Markdown (and structured text description)
- Notebook environment
- LaTeX / Overleaf
- Mental model for computation
- SSH + server coding
- **UTokyo services**

- You should be familiar with them
- If you don't know any of them, study on your own. There are several online resources available
- I will not cover them in detail in class.

UTokyo services

- Several services are available. Check them!
  - utelecon: https://utelecon.adm.u-tokyo.ac.jp/



UTokyo Microsoft License

What is UTokyo Microsoft License?

"UTokyo Microsoft License" provides M

The main features available are listed b

- Microsoft Office applications such
- Office for the web (web version of
- **OneDrive**: File storage
- **Microsoft Forms**: Form creation s

By signing in as a member of UTokyo, y
possible with a regular Microsoft accou
Microsoft account need to set up an ac

Initial Setup Procedur

UTokyo Account is required to use this
check "How to start using UTokyo Acco

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UTokyo MATLAB Campus-Wide License

Introduction

The University of Tokyo has introduced the software "MATLAB" provided by MathWorks, and supports its use on individual terminals, on shared terminals for education and research, and on the supercomputer system (in Japanese) provided by the Information Technology Center.

About MATLAB

MATLAB is a programming language and a numerical computation / computer algebra software developed for scientific and technical computing. MATLAB can be used for various purposes, including mathematical processing of algebra, geometry and analysis, machine learning, statistical analysis, data visualization, control simulation, and its implementation on hardware. Since the software can be operated using GUI without writing a code, it can be easily introduced not only for research use in specialized fields such as engineering and science, but also for basic education for beginners in programming, and data analysis in the humanities and social sciences.

The University of Tokyo has a comprehensive license agreement that allows **all students and all faculty and staff members employed by the university** to use the following functions from their individual devices without additional costs. The number of functions provided may increase or decrease depending on the university's situation and the terms of the contract.

- Installing and using MATLAB
- Unlimited use of MATLAB Online

Tab

- Installing the software version
- Using the online version
  - Access to MATLAB Online
  - Access to MATLAB Drive
- Learning how to operate

UTokyo Microsoft Azure Dev Tools for Teaching

Overview

"Azure Dev Tools for Teaching" is software for developers offered by Microsoft for educational institutions. It is available at the University of Tokyo based on the contract of UTokyo Microsoft License. Users are required to comply with the terms by Microsoft.

Scope of use

- The software can be used only for **development purposes in education and research**.
  - **It cannot be used for administrative or business purposes**. Even for educational/research activities, use for non-development purposes, such as for general PC use, is not permitted.
- Even for educational/research activities, **it is not allowed if the use is considered as commercial purpose**.
- **Students of the University of Tokyo** are eligible to use this service. **Faculty and staff members of the University of Tokyo** who are directly engaged in educational and research activities are also eligible to use this service.
  - No matter which faculty or graduate school you belong to.

Initial Procedure for Use

Table of Contents

- **Overview**
- Scope of use
- Initial Procedure for Use
- Others

Schedule

Date (2026)	Contents	Presented by
Week 1, Apr 15	Introduction. Review of fundamental concepts	Yusuke, Koya, Yuki, Jun
Week 2, Apr 22	Equations and pseudo-codes	Yusuke Matsui
Week 3, May 13	Slides	Koya Narumi
Week 4, May 20	Research community	Jun Kato
Week 5, May 27	Figures	Koya Narumi
Week 6, June 1	3DCG illustrations	Yuki Koyama
Week 7, June 10	Invited Talk 1: Research tips in the private sector: From topic selection to social implementation (temp.)	Dr. Antonio Tejero de Pablos (CyberAgent)
Week 8, June 17	Tables and plots	Yusuke Matsui
Week 9, June 24	Invited Talk 2: Portable and Reproducible Research Environments in the Age of AI Agents	Dr. Mai Nishimura (OSX)
Week 10, July 1	DevOps for research	Jun Kato
Week 11, July 8	Videos	Koya Narumi
Week 12, July 15	Final presentations	YOU