Multimodal Learning for Medicine & Healthcare: The Challenges and Opportunities (IN2107)

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Chair for Computational Imaging and AI in Medicine
SS2026

Who are we?

Chair for Computational Imaging and AI in Medicine
Prof. Dr. Julia Schnabel

Who are we?

Dr. Laura Daza

- Medical image segmentation
- Foundation models
- Multimodal learning

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Marta Hasny

- Foundation models
- Multimodal learning
- Cardiology

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1) Organization

Preliminary schedule

Week	Session
1	Introduction to the Seminar
2	How to read a paper and do poster presentations
3	Introduction to Multimodal Learning
4	Invited Talk
5	Student Presentations
6	Free
7	Student Presentations
8	Challenges of Multimodal Learning in Medicine
9	Student Presentations
10	Invited Talk
11	Student Presentations
12	Multimodal Medical Foundation Models
13	Student Presentations
14	**Poster Session**

Subject to change!

Deliverables & grading

Oral presentations
- 30 minutes presentation + 10 minutes questions
- Presentation date depends on the topic

Poster presentations
- Scientific poster
  - About the paper from the oral presentation + small review of the topic
- 5 minutes presentation

Paper selection
- We will provide a list of papers
- We will assign the papers based on your submitted selections
- Papers on both multimodal methodologies and medical applications

Grading
Oral + poster presentations + attendance + participation

Poster session at end of semester

Goals of the seminar

Theoretical skills

- Learn about state-of-the-art methods for multimodal learning
- Understand how multimodal learning can be used in clinical setting
- Understand practical challenges of deploying multimodal learning in clinical settings and learn strategies to overcome them

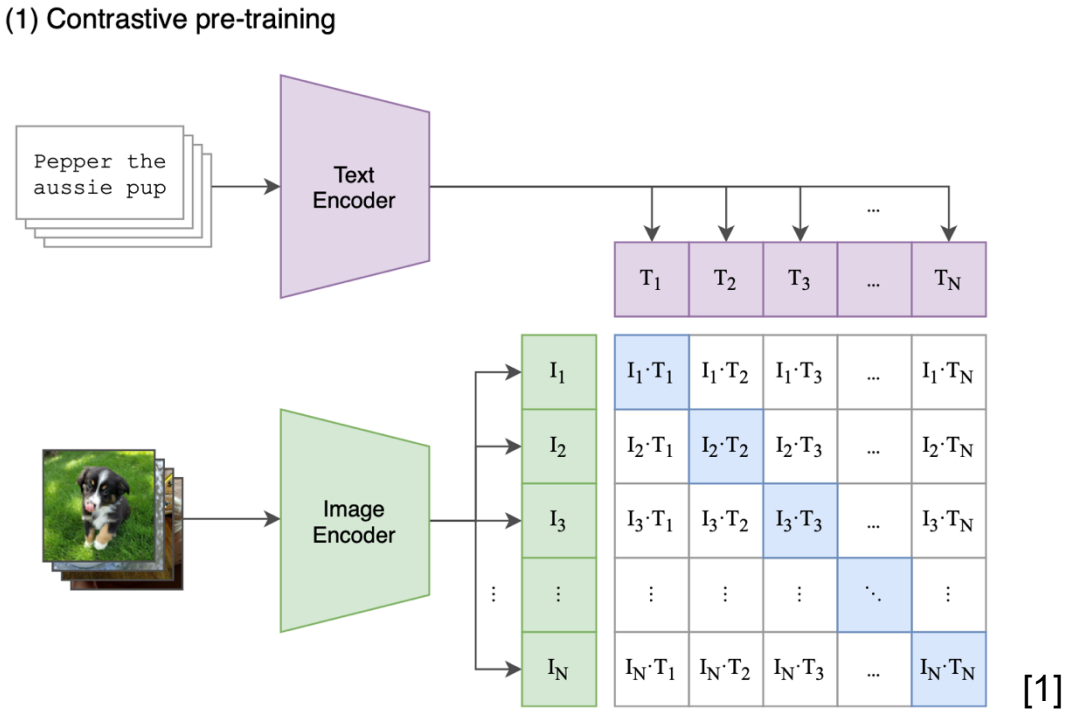
Research skills

- How to critically read, analyze, and present a research paper
- How to design and present a scientific poster

2) Multimodal learning
What will the seminar be about?

Multimodal Learning

Vision-Language Models



[1]

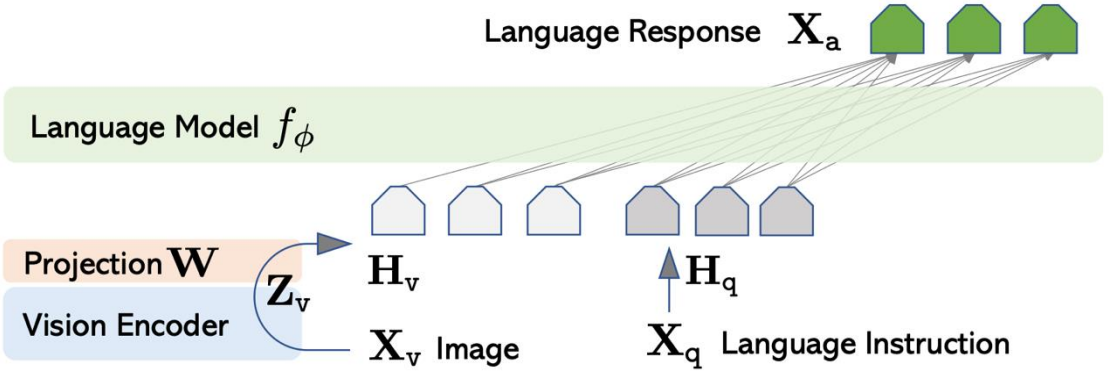
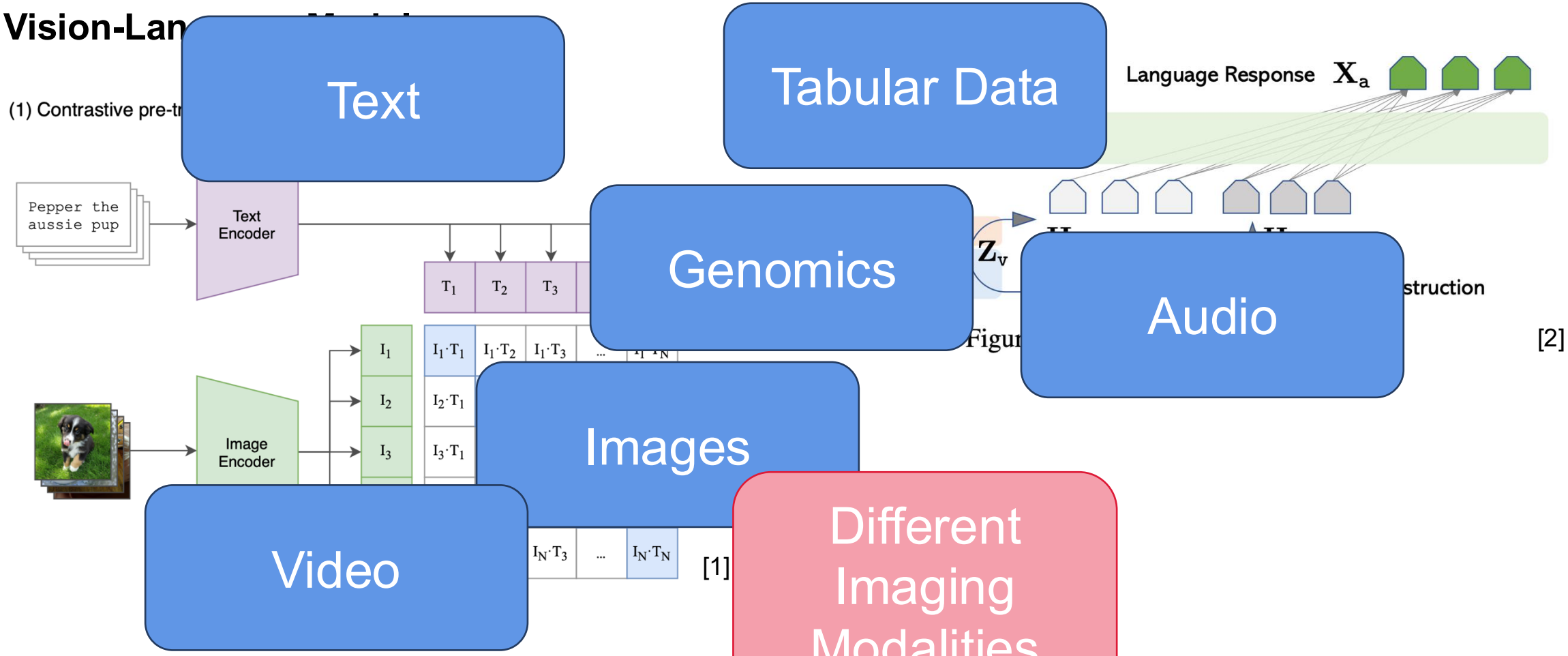


Figure 1: LLaVA network architecture. [2]

[1] Radford, Alec, et al. "Learning transferable visual models from natural language supervision." *International conference on machine learning*. PmLR, 2021.
[2] Liu, Haotian, et al. "Visual instruction tuning." *Advances in neural information processing systems* 36 (2023): 34892-34916.

Multimodal Learning



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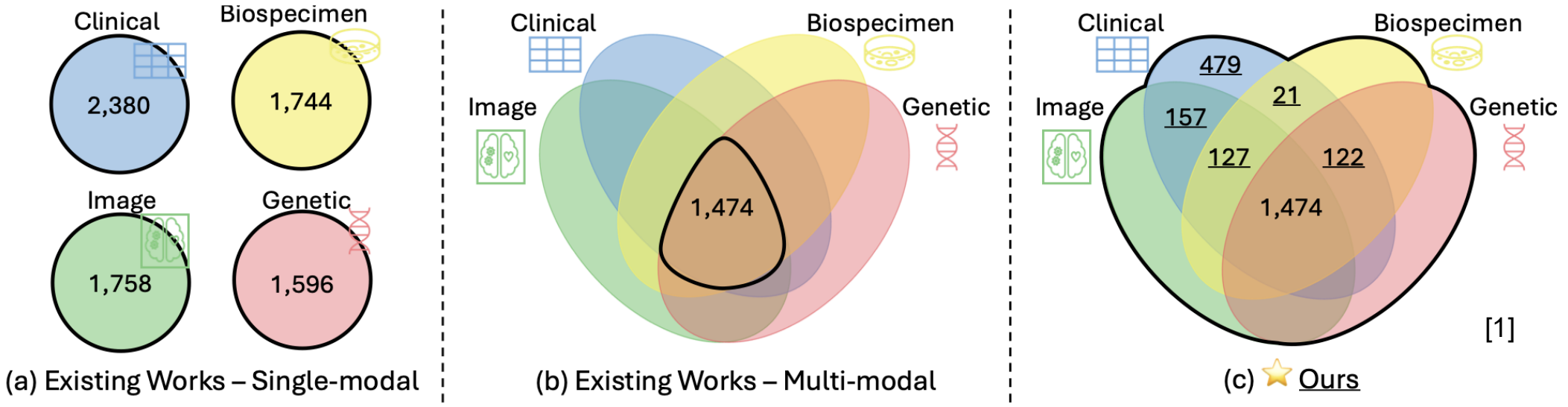
Multimodal Learning



Multimodal methods often assume that all modalities are available

But in clinical practice that's not the case…

[1] Yun, Sukwon, et al. "Flex-moe: Modeling arbitrary modality combination via the flexible mixture-of-experts." Advances in Neural Information Processing Systems 37 (2024): 98782-98805.

In this seminar…

- Methods for multimodal learning
- Multimodal learning with more than two modalities
- Multimodal learning with missing modalities
- Multimodal foundation models
- And more… ☺

If you are interested, make sure to register through the matching system!

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