AI-powered Dataset Curation, Processing, and Rehearsal Interfaces for A Cappella

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March 31, 2026

UNIVERSITY OF MICHIGAN

Team

Ting-Yu Pan

Electrical & Computer Engineering

Kexin "Phyllis" Ju

Information

Yuna Lee

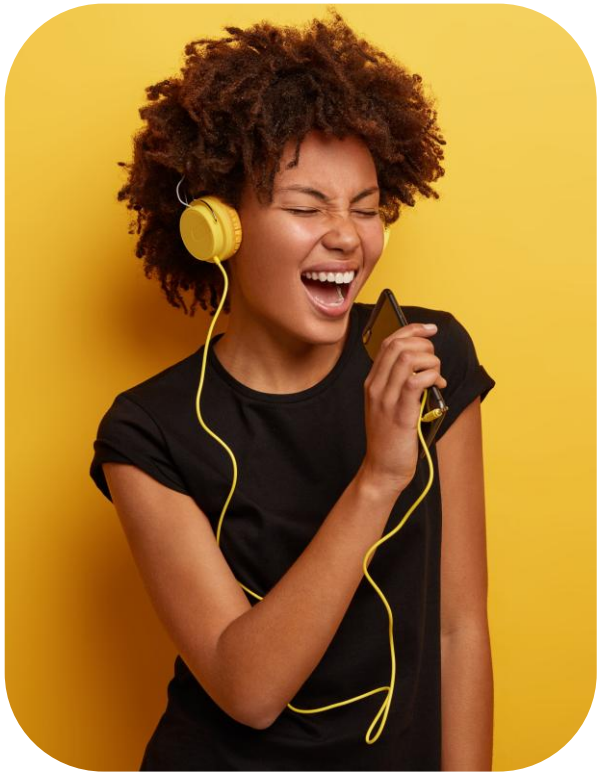
Information

Christian Li

Sound Engineering

How can AI Support A Cappella Singers?

Annapella
(A cappella group at U-M, since 2016)

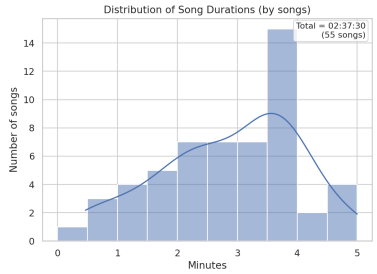


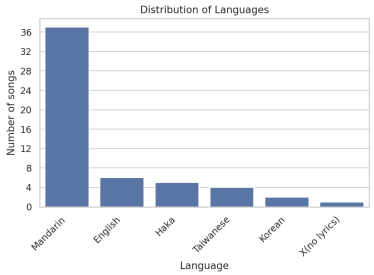
How can we best support a novice a cappella singer in practicing their singing skills?

Goals

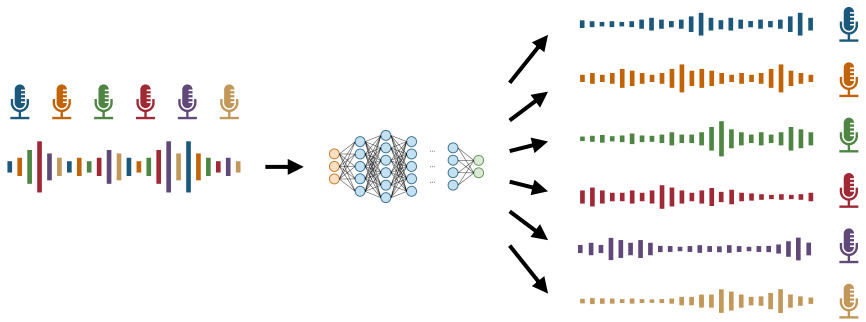
Establishing the AI infrastructure for a cappella music

Dataset



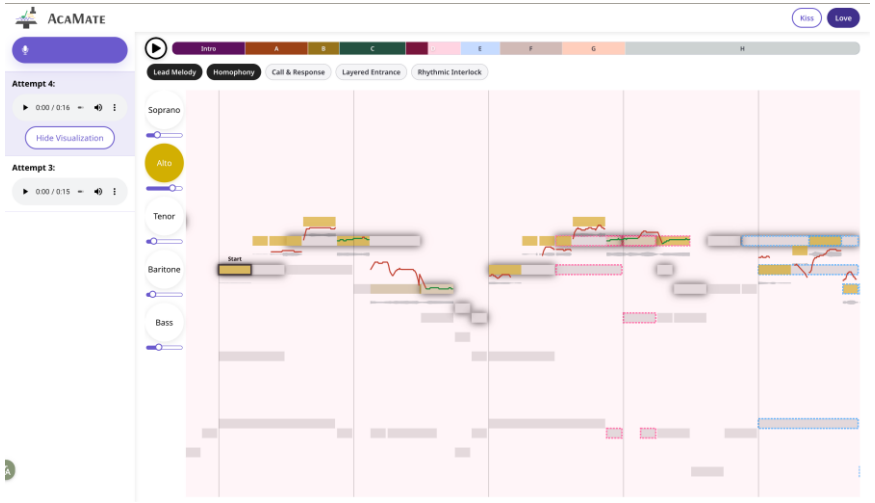


Source separation model



Building an AI-powered a cappella practice interface

Interface



Our AI Journey

Started as a **course project**

Winter 2025

Summer 2025

Collected **ACappellaSet**
Developed **AcaSep v1**

Built **AcaMate v1**
Conducted a **formative study**

Fall 2025

Winter 2026

Building **AcaMate v2**
Developing **AcaSep v2**

Goals

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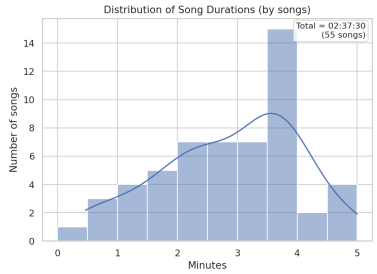

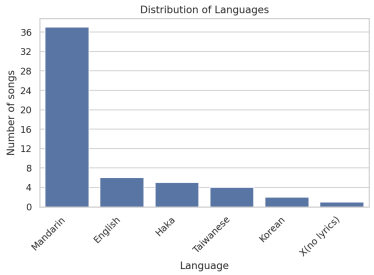

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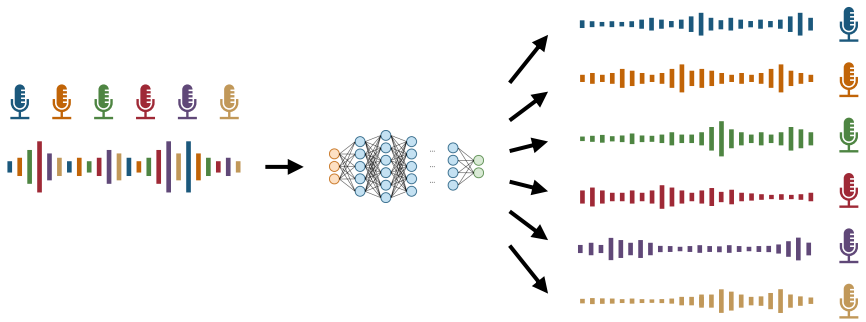

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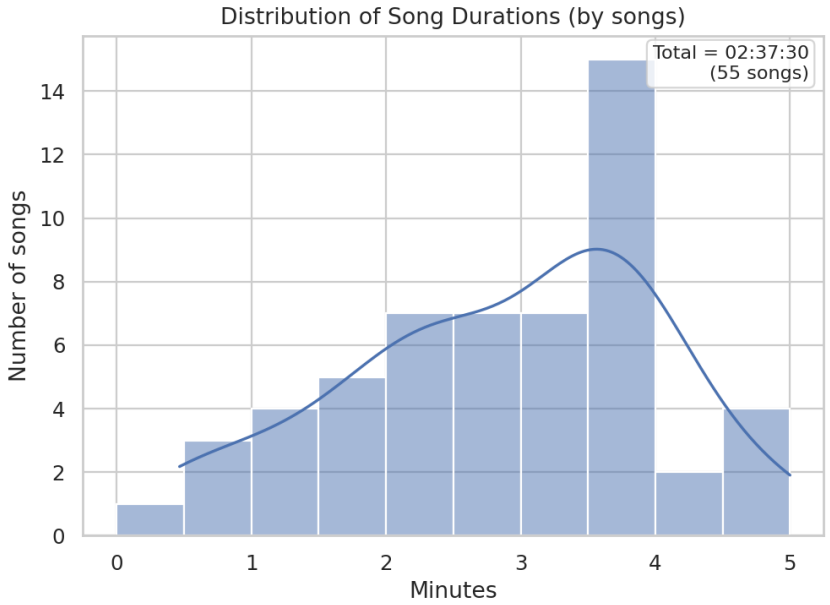
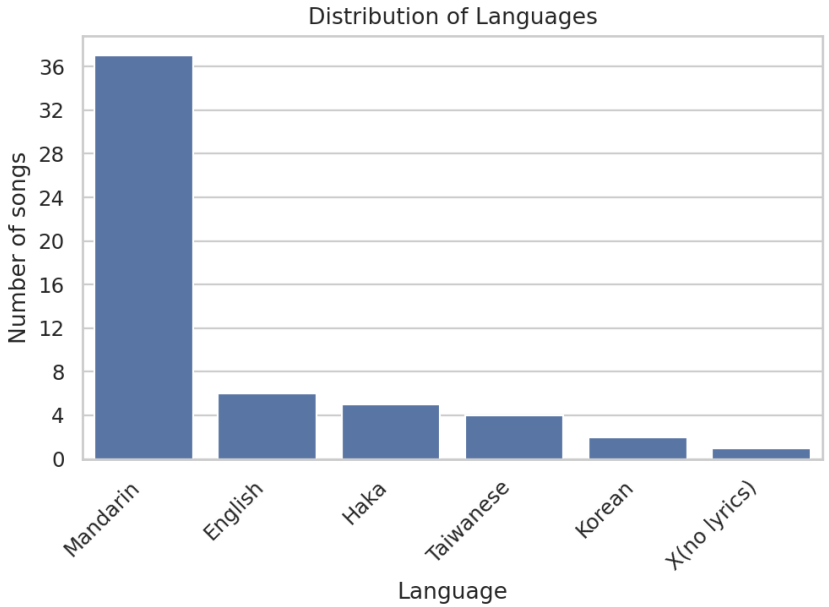
ACappellaSet: Studio Recordings with Stems

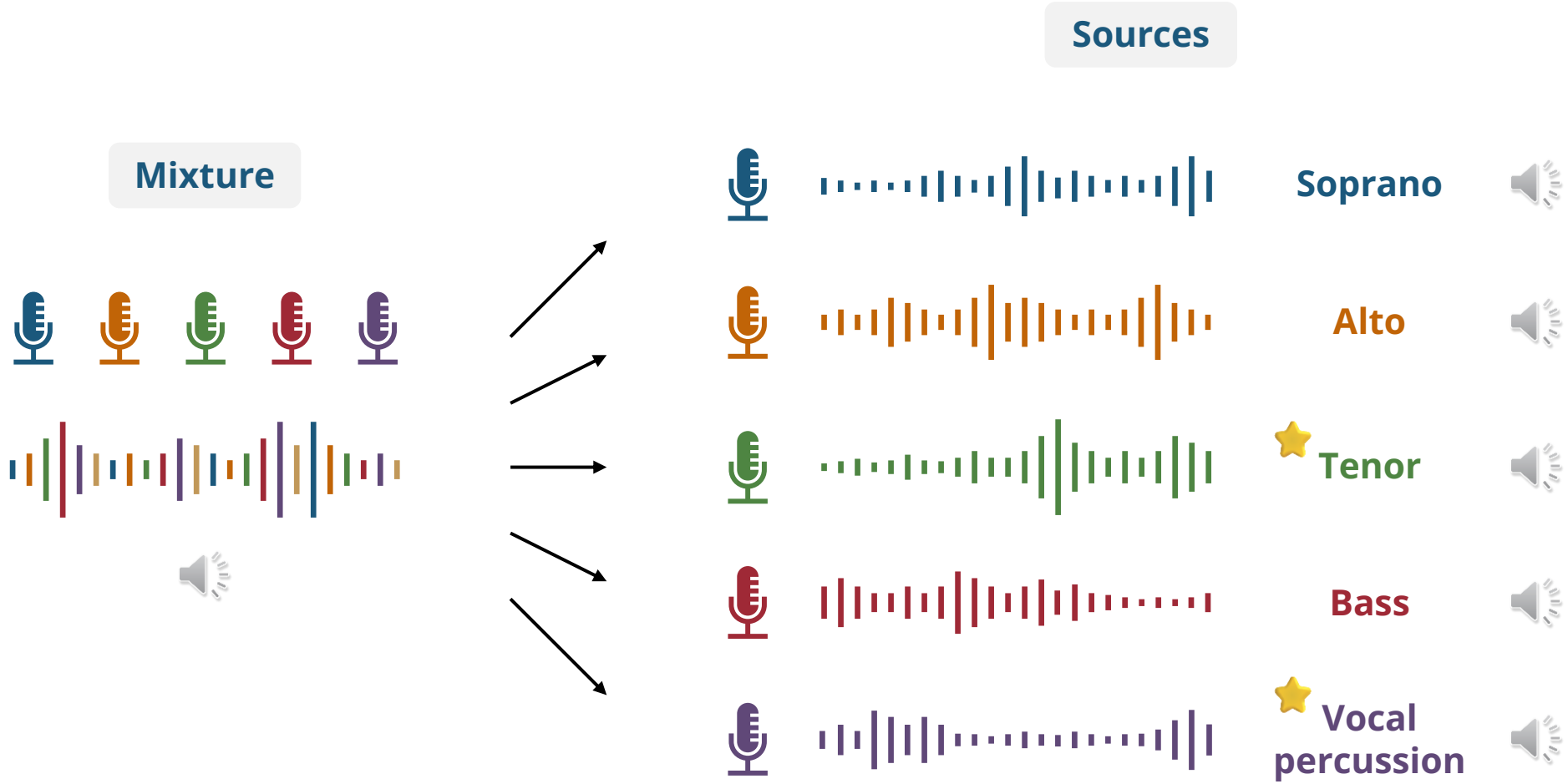
- **55** studio-quality a cappella songs **with stems** performed by 3 groups
- **2.6 hours** in total
- **Five languages**: Mandarin, English, Hakka, Taiwanese, and Korean

Separate SATB+VP tracks

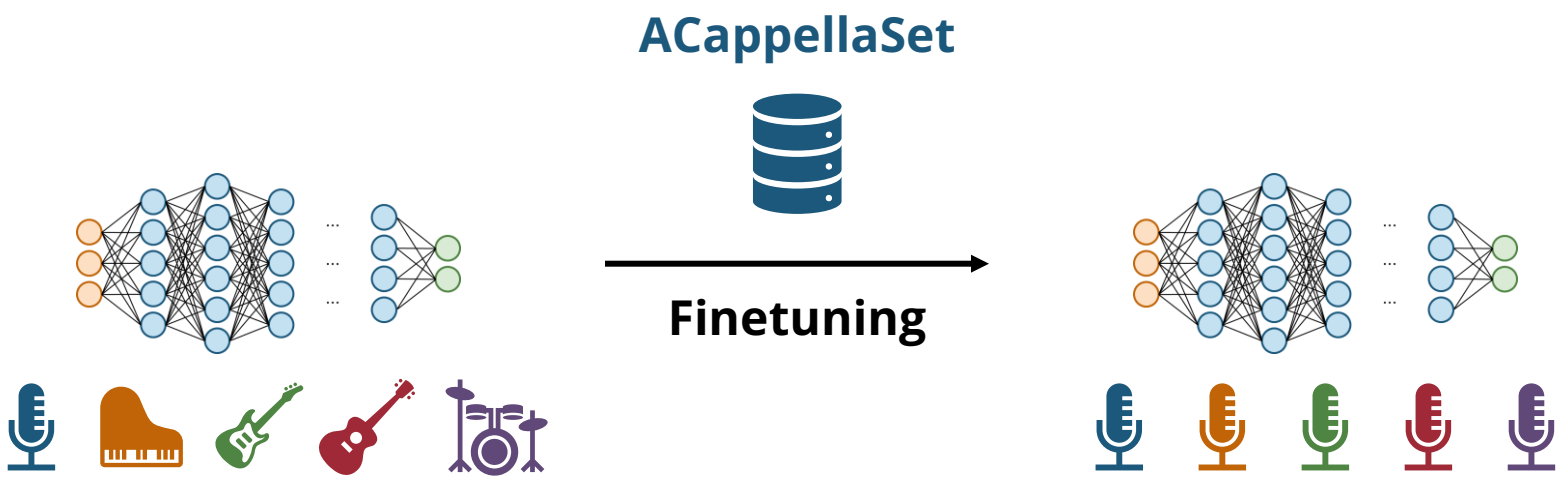




AcaSep: Source Separation for A Cappella



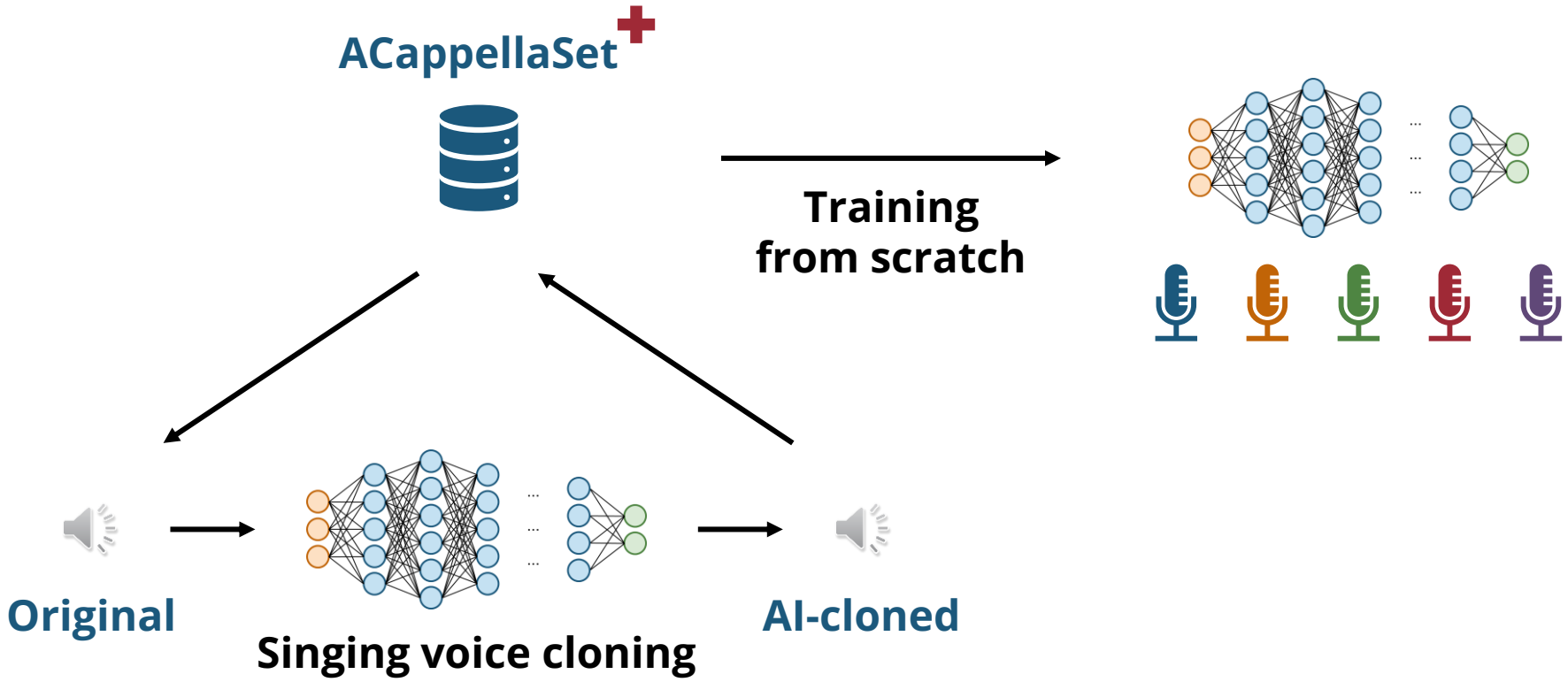
AcaSep: First Trial (Summer-Fall 2025)



Model	VP	Other	All
Pretrained (official)	5.22	10.66	7.94
Pretrained (drum)	3.66	9.24	6.45
Fine-tuned (ours)	**7.62**	**11.63**	**9.62**
	+2.4 dB	**+1 dB**	

Ting-Yu Pan*, Kexin Phyllis Ju*, and Hao-Wen Dong, "Curating an A Cappella Dataset for Source Separation," *ISMIR Late-Breaking Demos*, 2025. (*equal contribution)

AcaSep: Ongoing Development (Winter 2026)



Generative AI-powered data augmentation improves the model's generalizability

Goals

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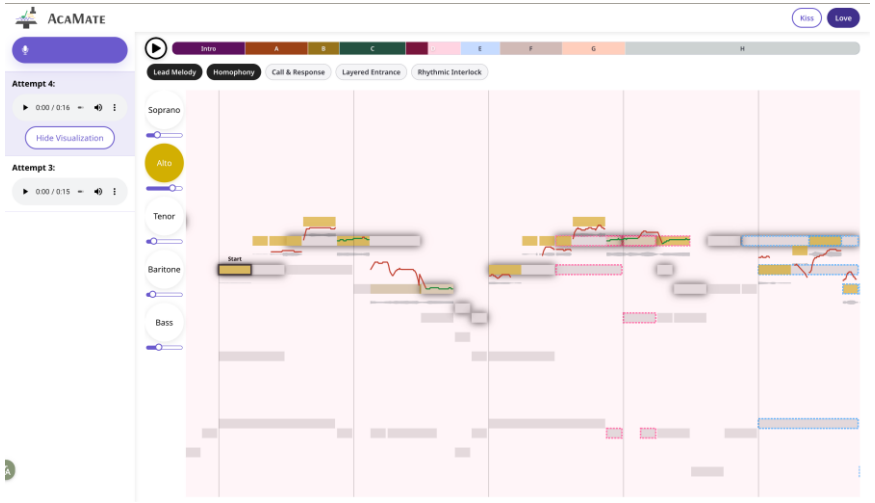
Building an AI-powered a cappella practice interface

Dataset

Source separation model

Interface

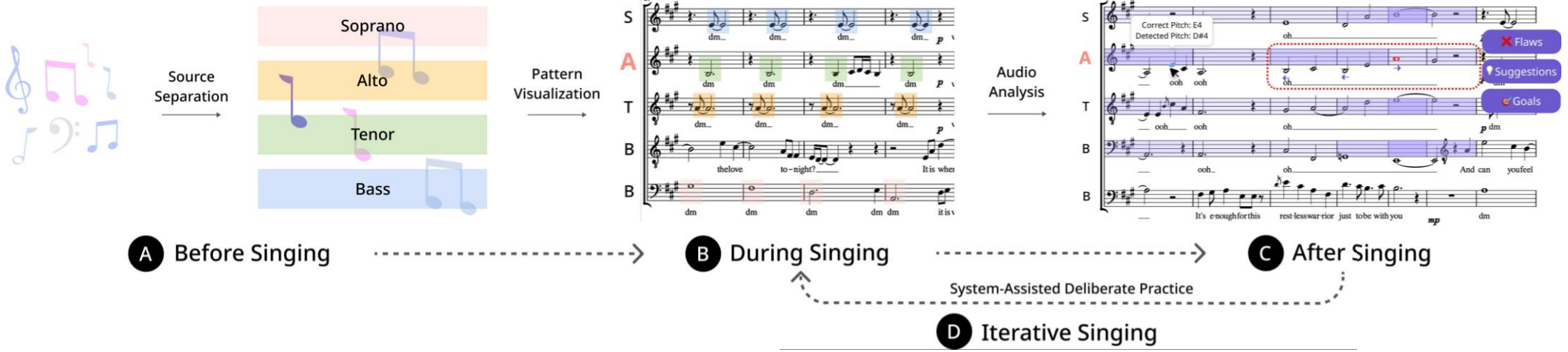


AcaMate: Practice Interface for A Cappella

Separating voice parts

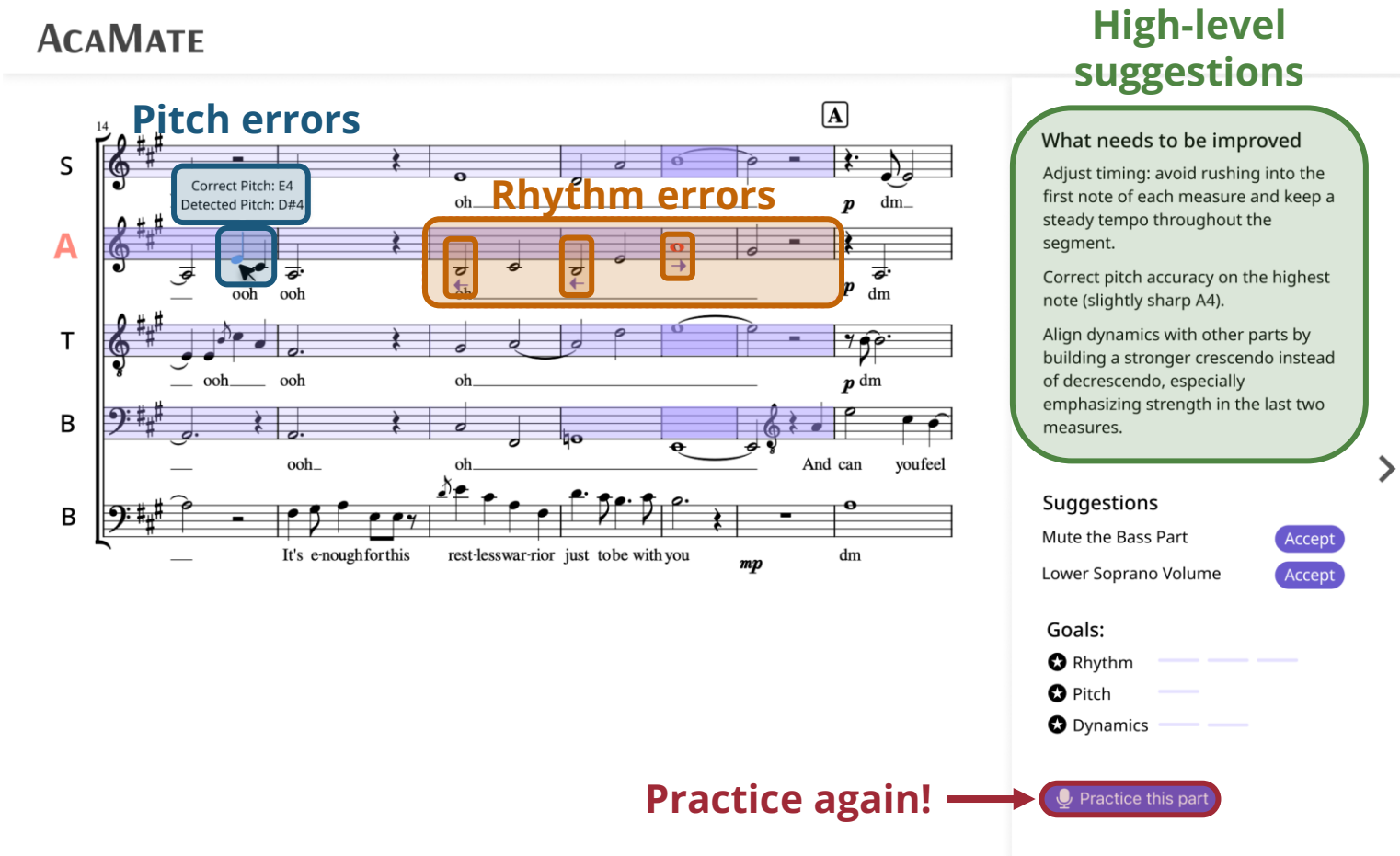
Highlighting musical patterns

Providing visual feedback
(on pitch, rhythm, dynamics)



Kexin Phyllis Ju, Ting-Yu Pan, and Hao-Wen Dong, "AcaMate: Supporting Novice A Cappella Singers in Iterative Individual Practice," *UIST Posters*, 2025.

AcaMate: Initial Design (Winter 2025)



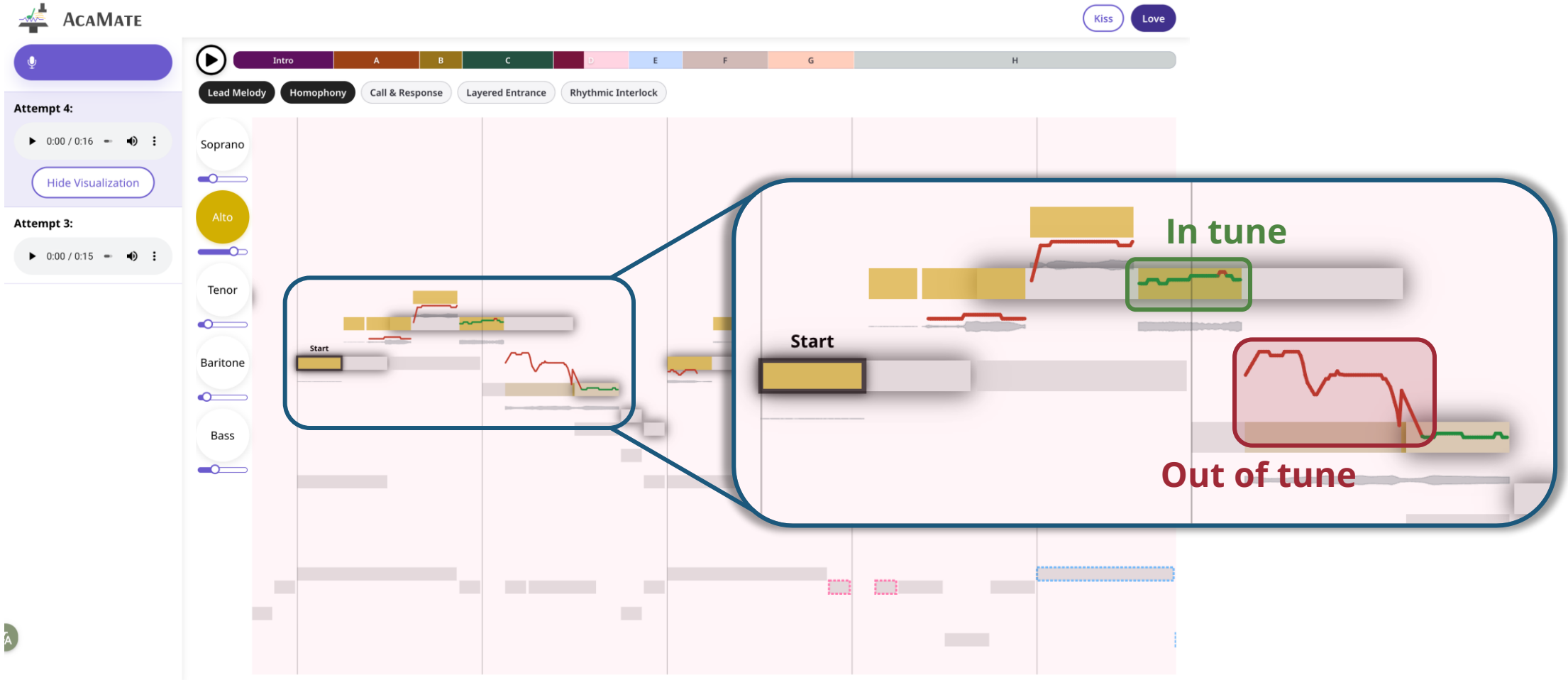
AcaMate: 1st Prototype (Fall 2025)

Formative Study (Fall 2025)

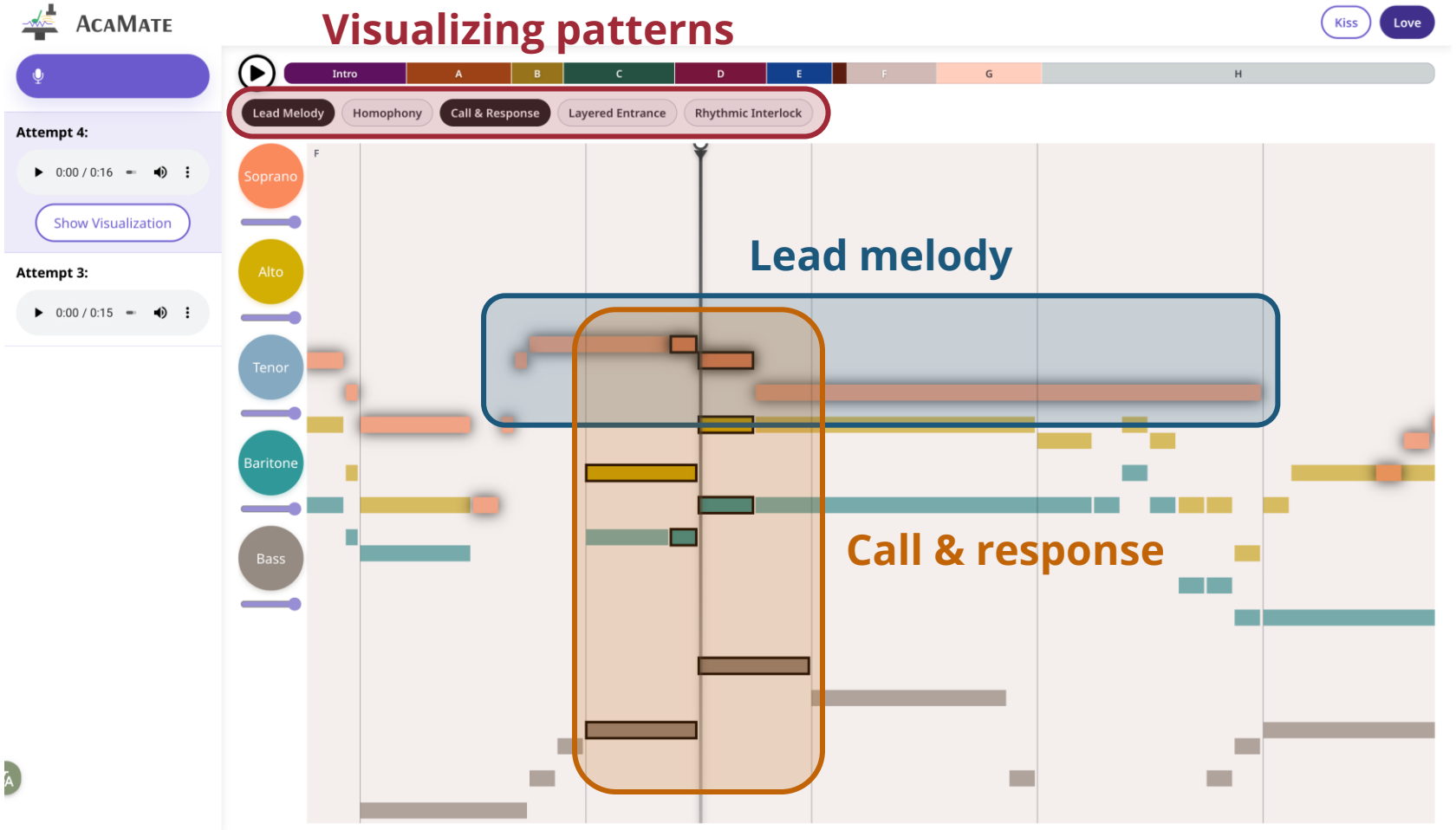
- Interviewed **12 a cappella singers** (including beginners & professionals)

- **Four design goals** identified
  - **Simulating an authentic group singing context** during individual practice
  - **Offering intuitive, context-aware feedback** on the users' recordings
  - **Assisting a sensemaking of the "big picture"** (patterns & links between parts)
  - **Placing human creativity at the center** as an assistive tool

AcaMate: 2nd Prototype (Winter 2026)



AcaMate: 2nd Prototype (Winter 2026)



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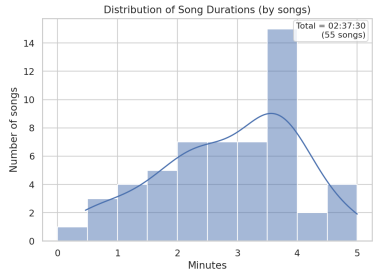
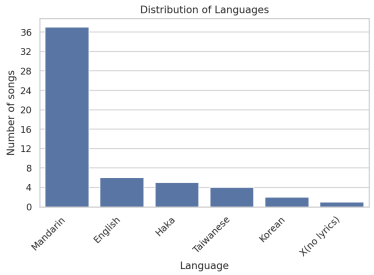
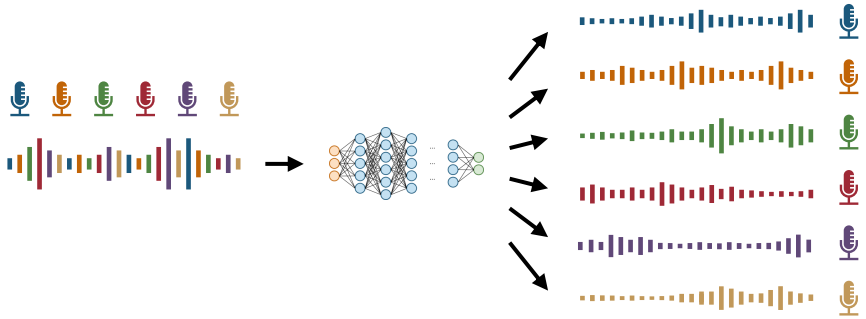




Source separation model



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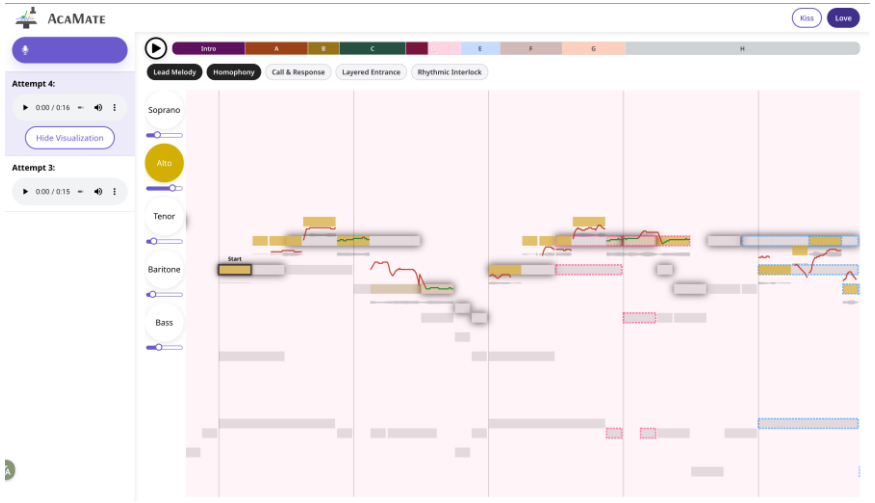

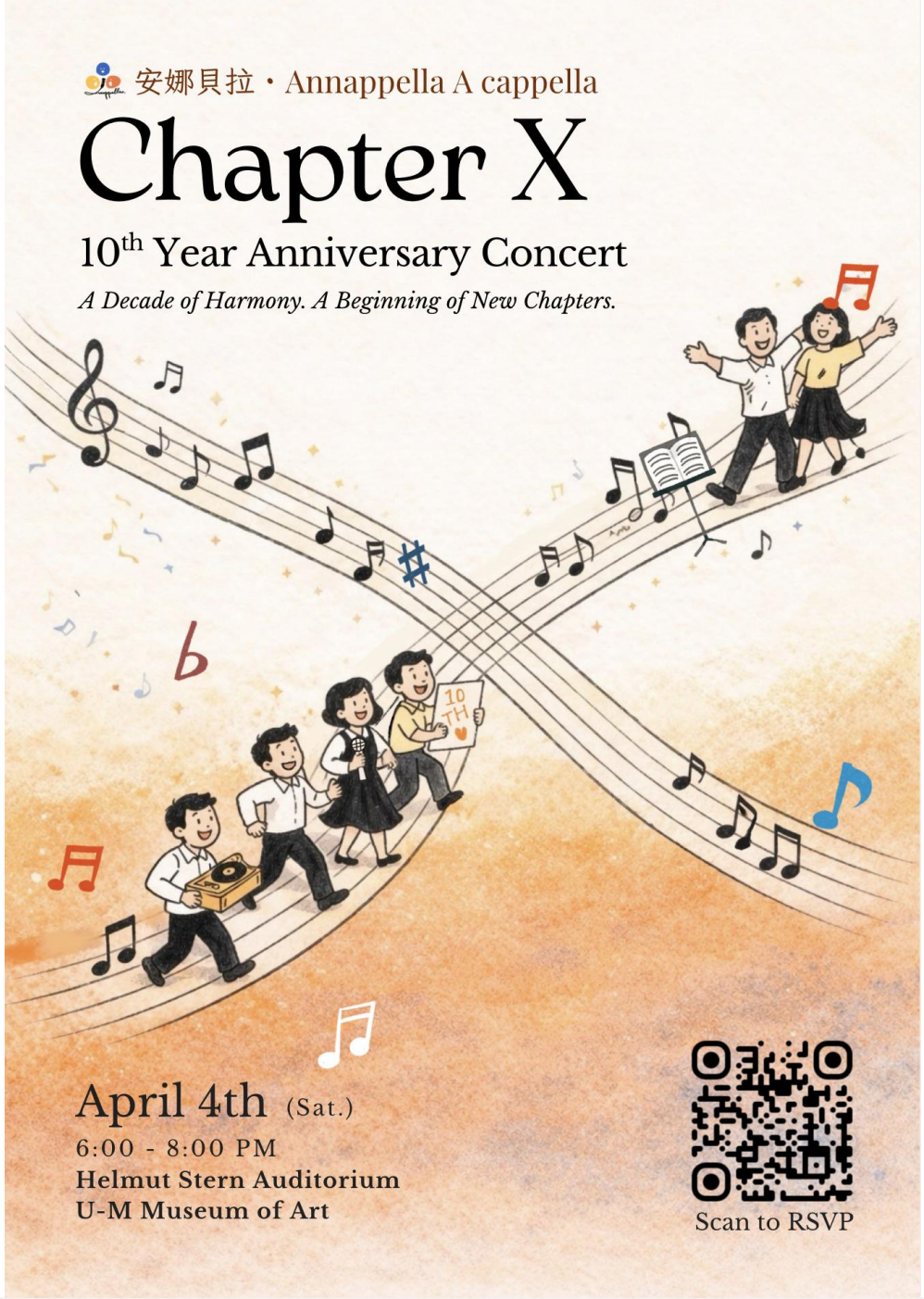

Annappella's
A Cappella Concert

April 4 at 6pm

Helmut Stern Auditorium
U-M Museum of Art

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