

21. Compose & Embellish:

Two-Stage Piano

Performance Generation

Generative Music AI

THE **SOUND** OF AI



Universitat
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Group

COMPOSE & EMBELLISH: WELL-STRUCTURED PIANO PERFORMANCE GENERATION VIA A TWO-STAGE APPROACH

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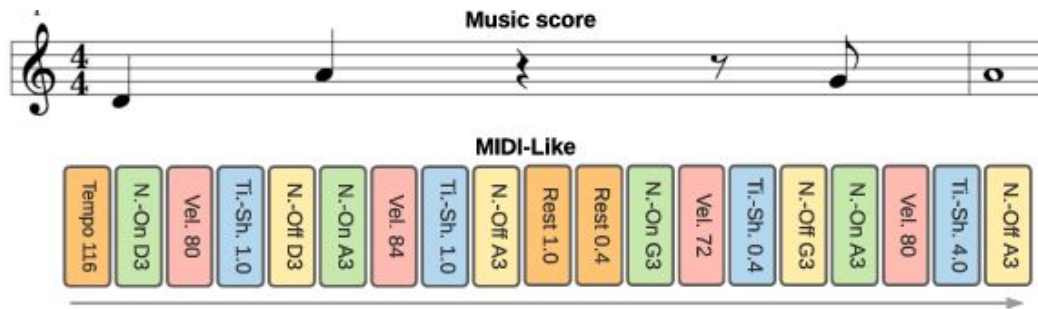
What will we cover?

- Compose and Embellish approach + architecture
- Usage to generate music!

Compose and Embellish: approach

Given a symbolic piece of music X :

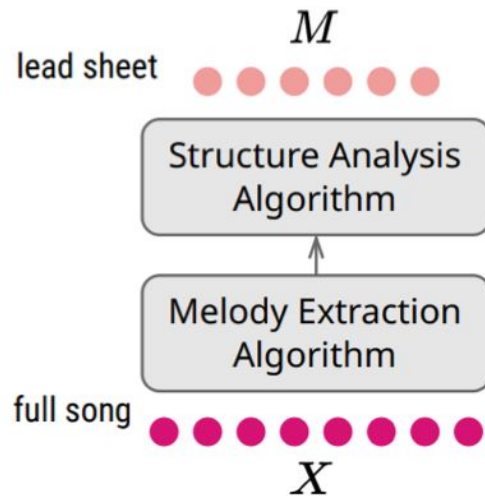
- note: X is a sequence of tokens



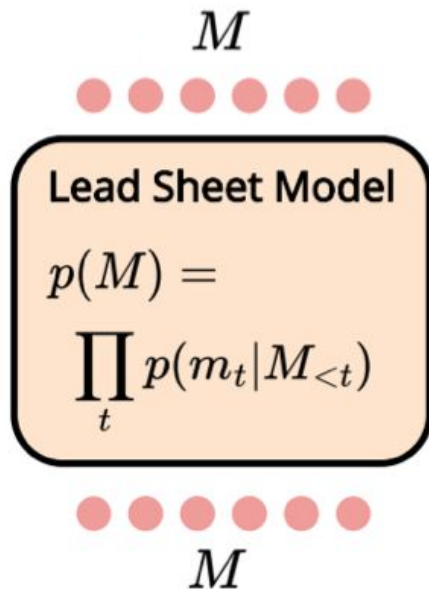
Compose and Embellish: approach

Given a symbolic piece of music X :

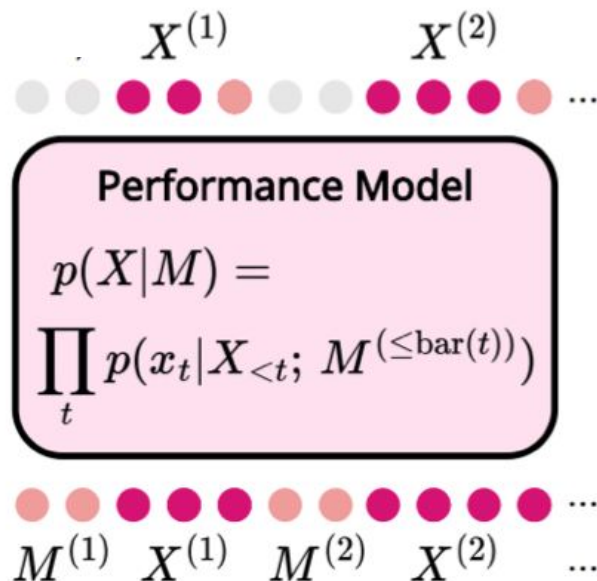
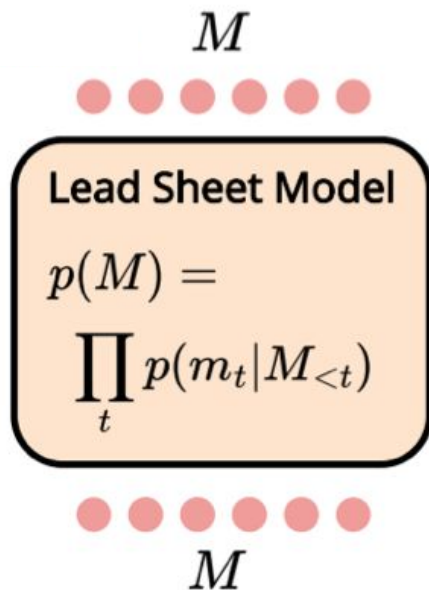
- note: X is a sequence of tokens
- X is rich and complex, it contains:
 - melody
 - chords
 - phrases/structure
- use X to generate M , a **leadsheet**
 - think of M as a simpler version of X



Compose and Embellish: approach

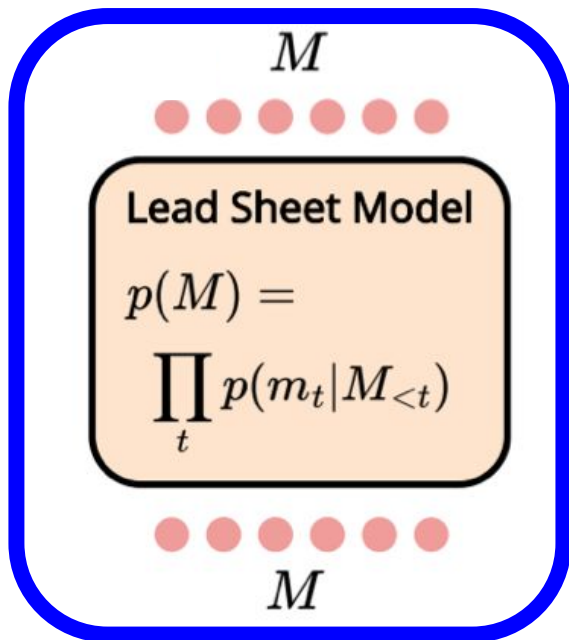


Compose and Embellish: approach

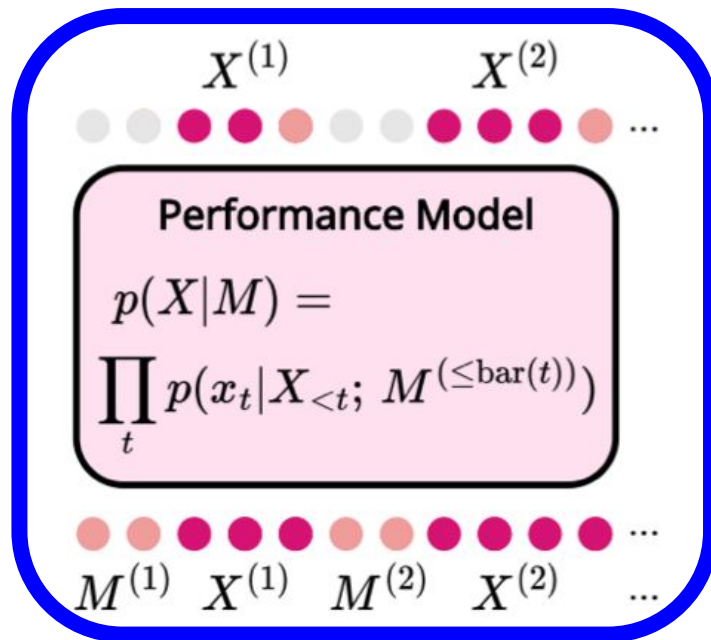


Compose and Embellish: architecture

FANCY TRANSFORMERS



Zihang Dai, Zhilin Yang, Yiming Yang, Jaime G Carbonell, Quoc Le, and Ruslan Salakhutdinov, "Transformer-XL: Attentive language models beyond a fixed-length context," in *Proc. ACL*, 2019.



Krzysztof Choromanski, Valerii Likhoshesterov, David Dohan, Xingyou Song, Andreea Gane, Tamas Sarlos, Peter Hawkins, Jared Davis, Afroz Mohiuddin, Lukasz Kaiser, David Belanger, Lucy J Colwell, and Adrian Weller, "Rethinking attention with Performers," in *Proc. ICLR*, 2021.

Compose and Embellish: summary

Compose a leadsheet!

420. **TAKE FIVE** — PAUL DESMOND

E_b^- $Bb-7$ E_b^- $Bb-7$



Lead Sheet Model

$$p(M) =$$

$$\prod_t p(m_t | M_{<t})$$

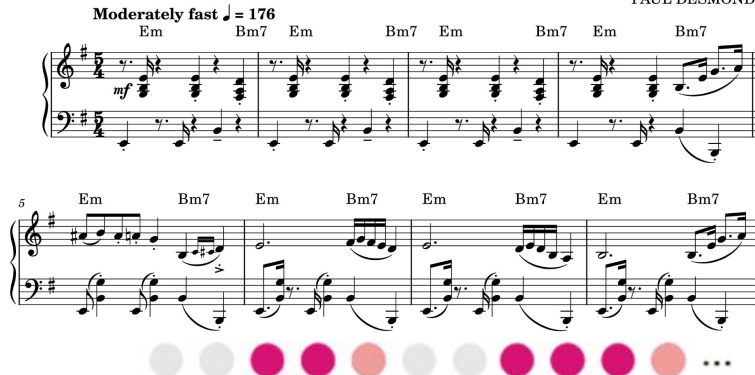
Perform it!

TAKE FIVE

PAUL DESMOND

Moderately fast $\text{♩} = 176$

E_m $Bm7$ E_m $Bm7$ E_m $Bm7$ E_m $Bm7$



Performance Model

$$p(X|M) =$$

$$\prod_t p(x_t | X_{<t}; M^{(\leq \text{bar}(t))})$$

Demo time!
