

# The ACCompanion v0.1: An Expressive Accompaniment System

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The ACCompanion is an expressive accompaniment system. The system consists of a probabilistic monophonic score follower that tracks the position of the soloist in the score, and the Basis-Mixer, a state-of-the-art computational model of expressive music performance.

## Score Following

HMM-based monophonic score follower:  $\dots \rightarrow I_{k-1} \rightarrow I_k \rightarrow \dots$

Observed variables:

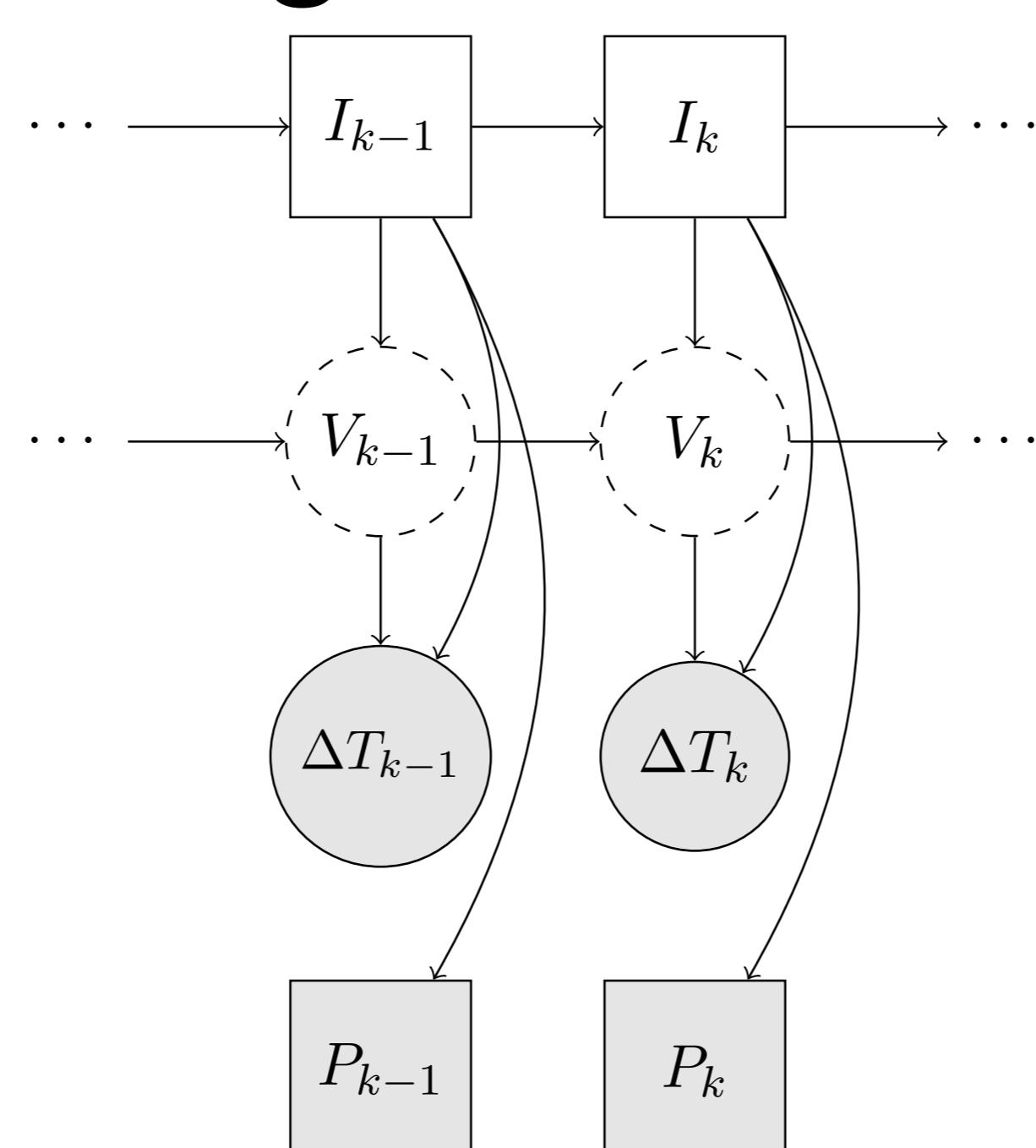
- $\Delta T_k$ : performed inter-onset-interval
- $P_k$ : MIDI pitch

Hidden variable:

- $I_k$ : Position in the score

Linear Gaussian Model:

- Hidden state: Beat period ( $V_k$ )
- Observed state: Performed IOI ( $\Delta T_k$ )



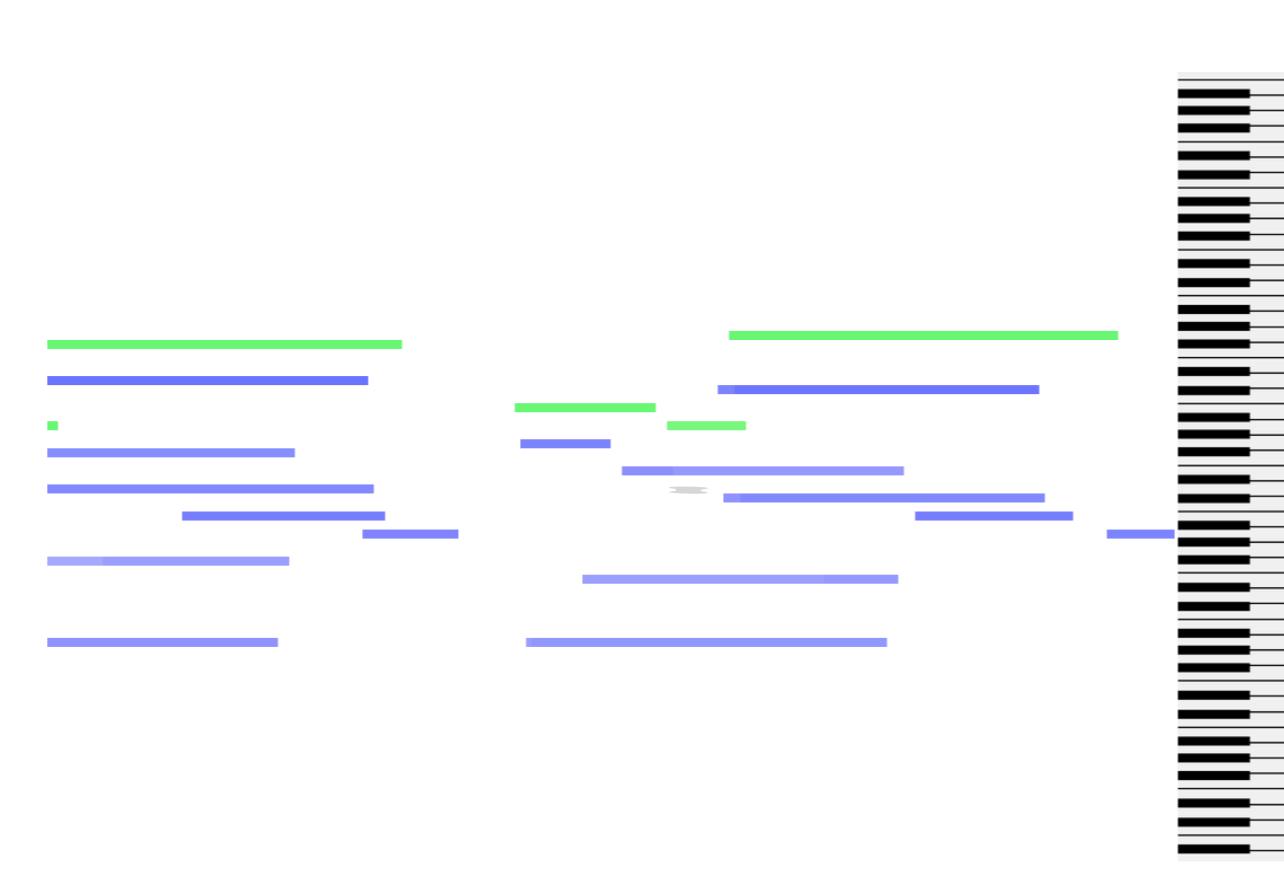
### Onset-wise targets:

- Loudness (trend): Ratio of the maximal MIDI velocity at each accompaniment onset to the corresponding MIDI velocity of the solo performance.
- BP: Ratio of the beat period at each accompaniment onset to the corresponding beat period of the solo performance, as estimated by the score follower.

### Note-wise targets:

- Loudness (dev): Deviation of each accompaniment note velocity from Loudness (trend) at each onset.
- Micro-deviations of each note in a chord from the average onset time in the accompaniment.
- Ratio of the performed IOIs in seconds to the score IOIs in beats.

## Visualization



Display solo and accompaniment parts in a piano roll in real time.

Solo (green) and Accompaniment (Blue)

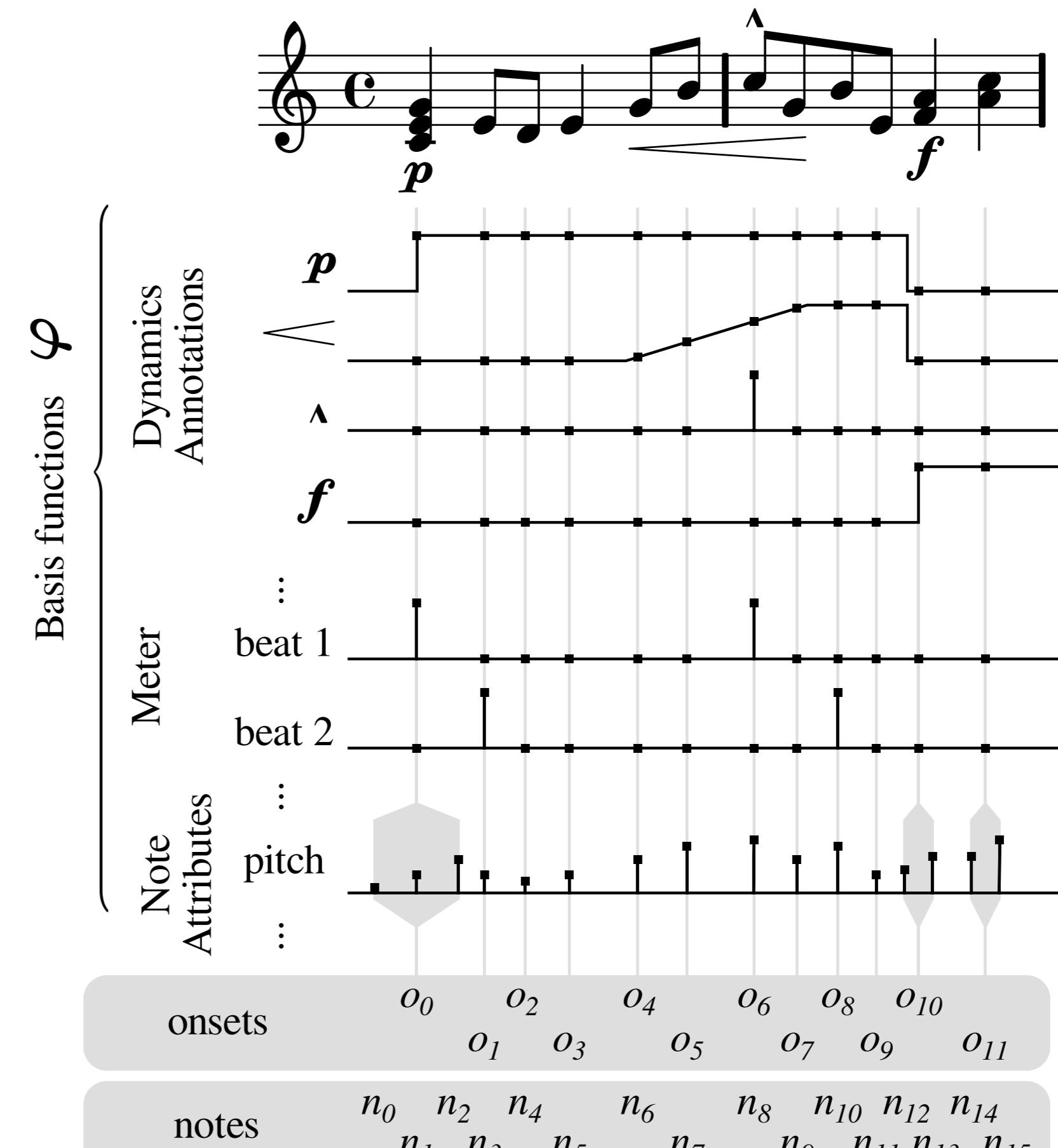
Intensity of the colors represents loudness

## Acknowledgements

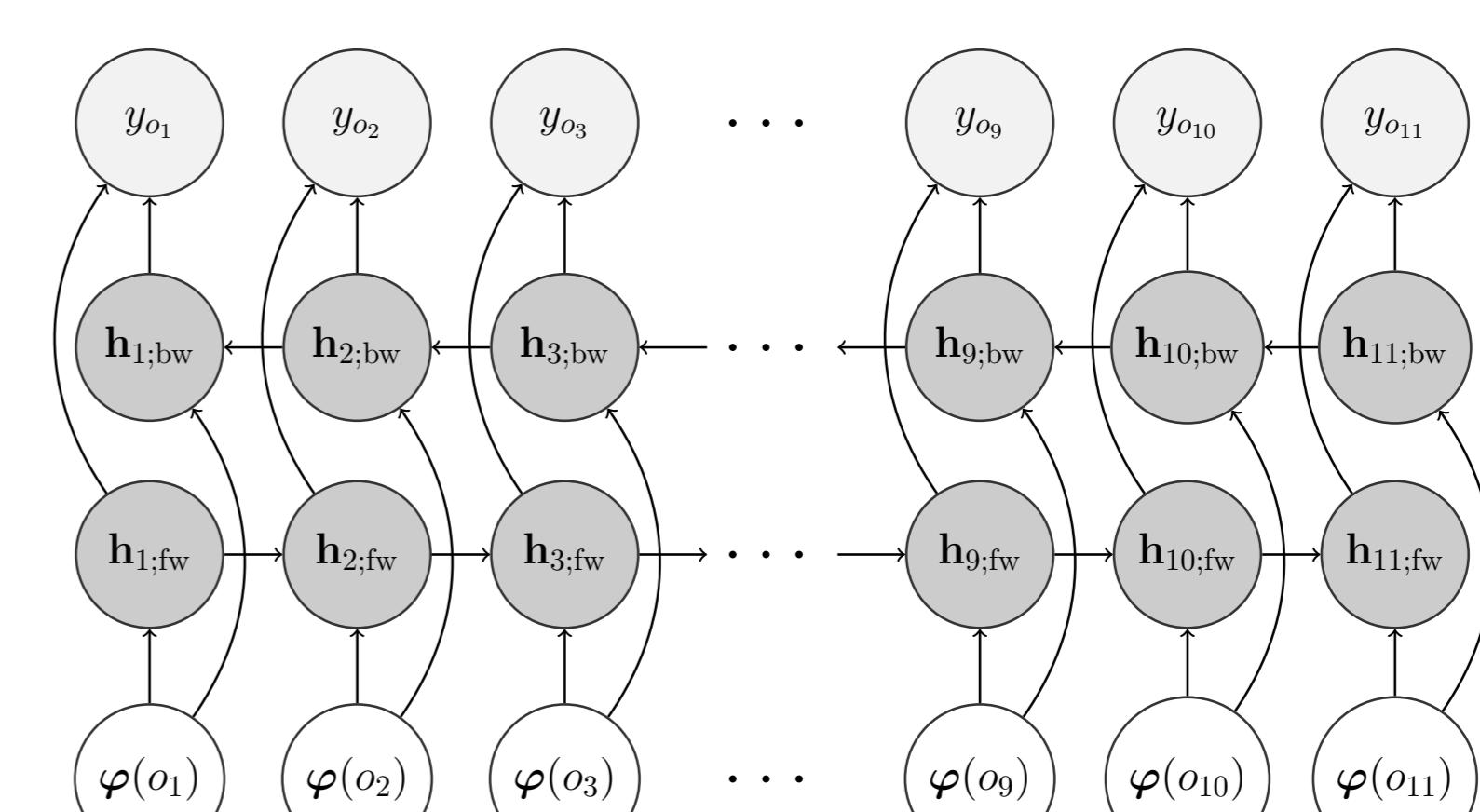
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## The Basis-Mixer

The BM framework models numerical descriptors that encode an expressive performance, referred to as *expressive targets*  $y$ , as a function of *basis functions*  $\varphi$ , i.e. numerical encodings of a variety of descriptors of a musical score.



Onset-wise targets: bi-directional RNN



Note-wise targets: FFNN

