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Rhythmic Similarity through Elaboration

www.cc.gatech.edu/cpl/projects/elaboration/

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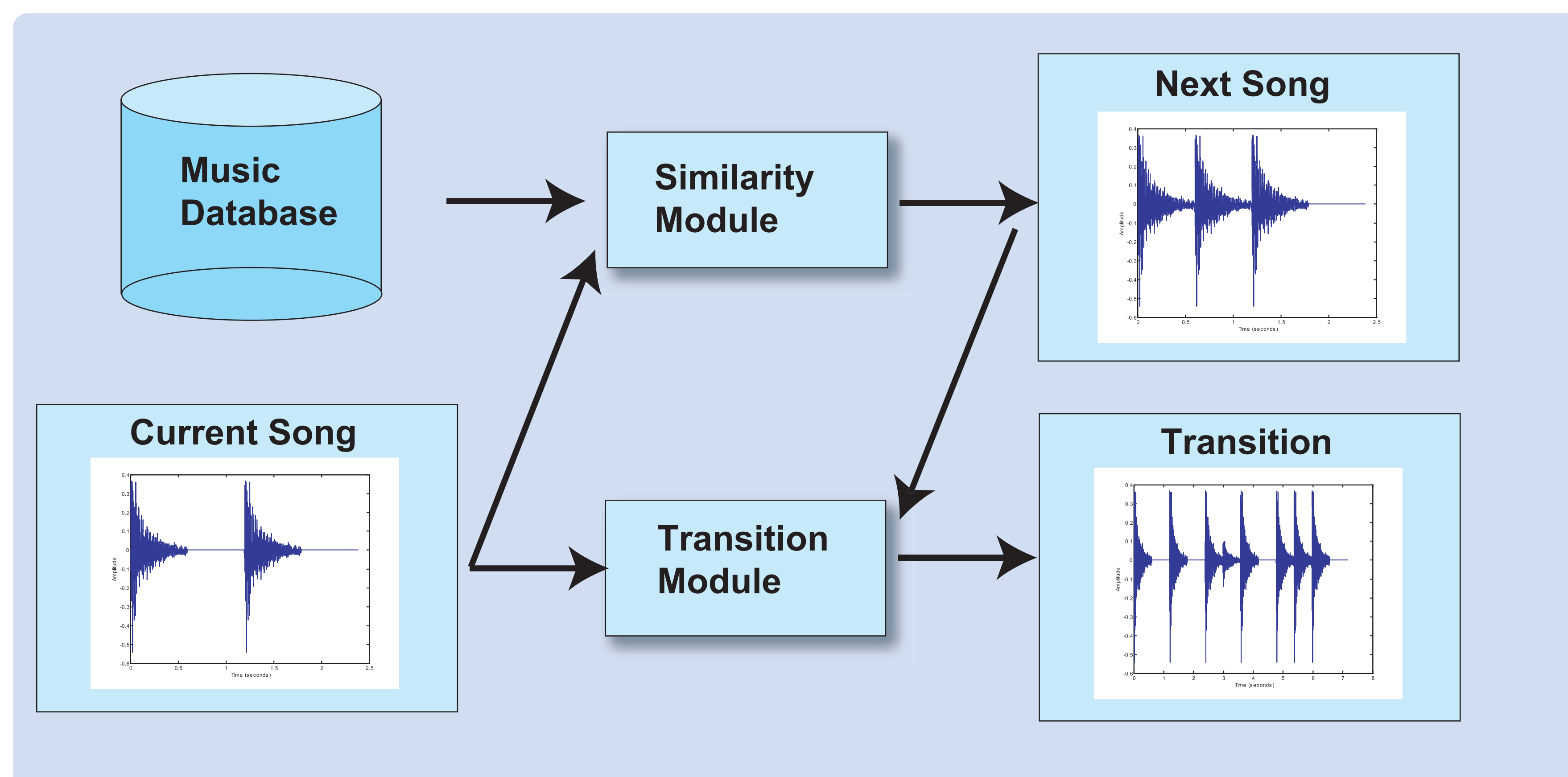


Goal

- Create similarity metric that identifies good transitions for music audio.

Application

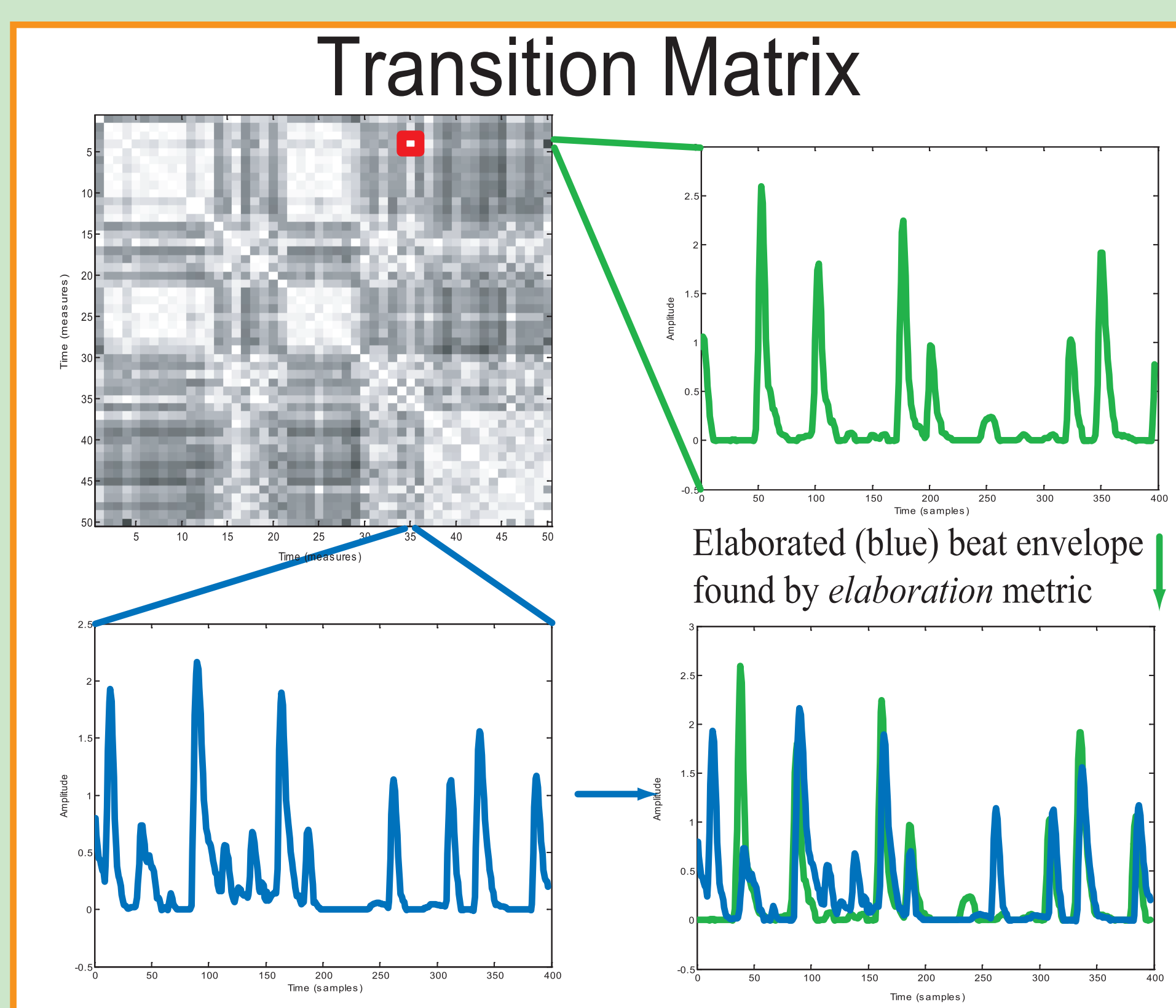
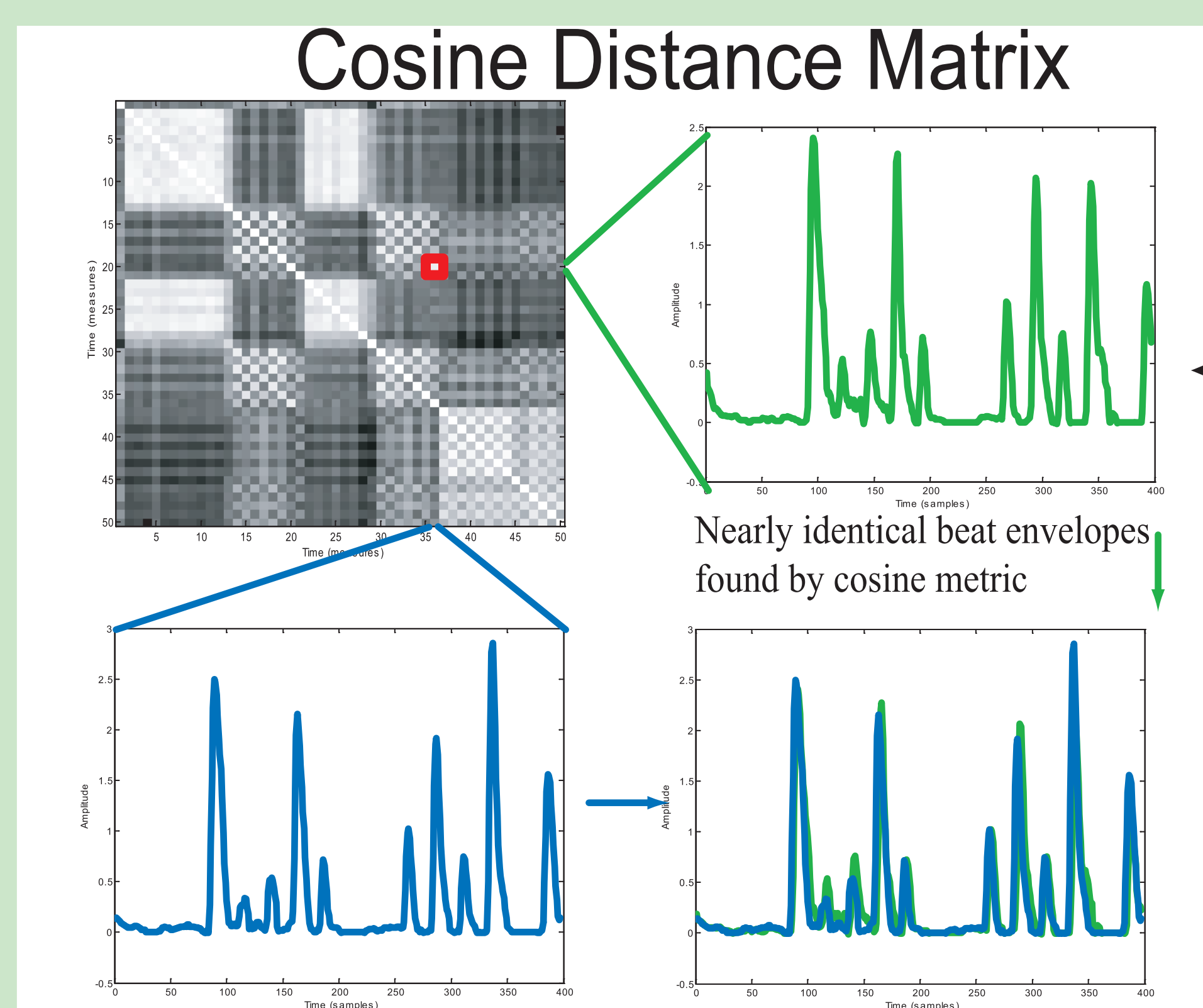
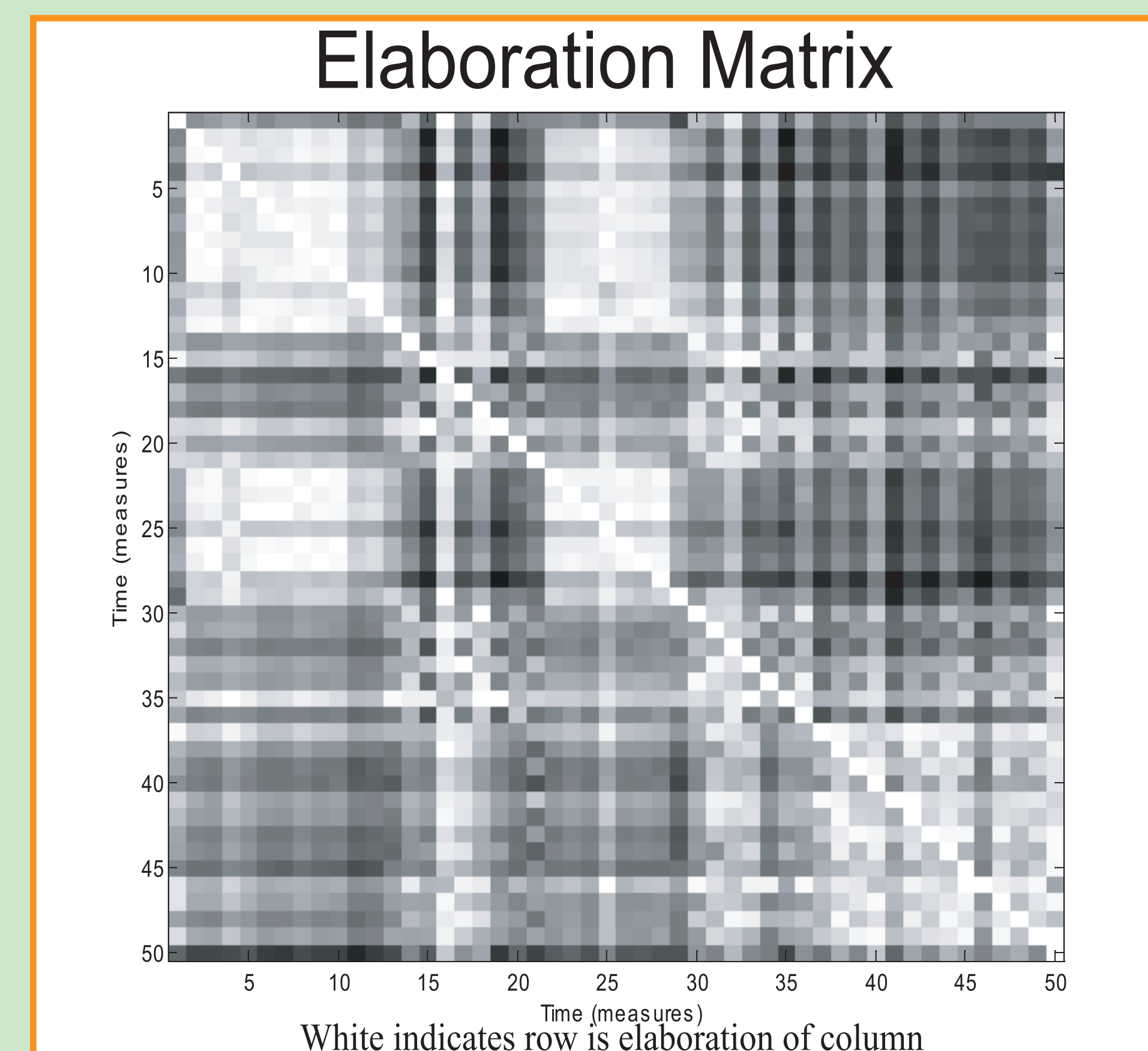
- Automatic disc-jockey system
- Sonic browsing of music database



Elaborations

- Good for transitions
- Dissimilar (according to standard metrics)
- We employ *elaboration* as similarity metric

Single Song



Proposed Approach

- Partition audio into measure-length segments
- Extract beat envelope
- Compare segments s_i and s_j by *elaboration*,

$$elab(s_i, s_j) = 1 - \frac{\min(s_i \cdot s_j, s_j \cdot s_i)}{\max(s_i \cdot s_j, s_j \cdot s_i)}$$

- Complexity (light rows + dark columns),

$$complexity(s_i) = \sum_j elab(s_i, s_j) - elab(s_j, s_i)$$

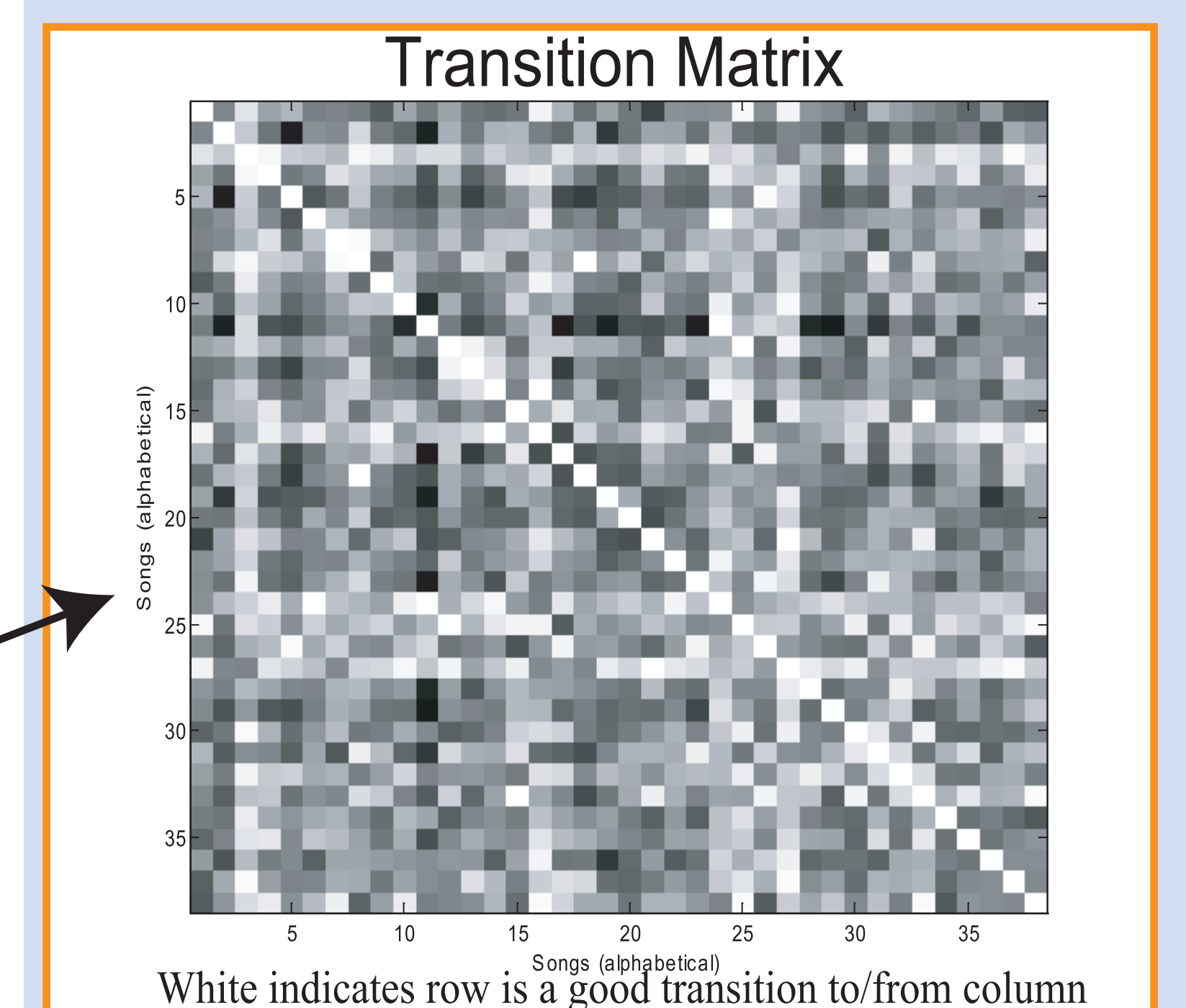
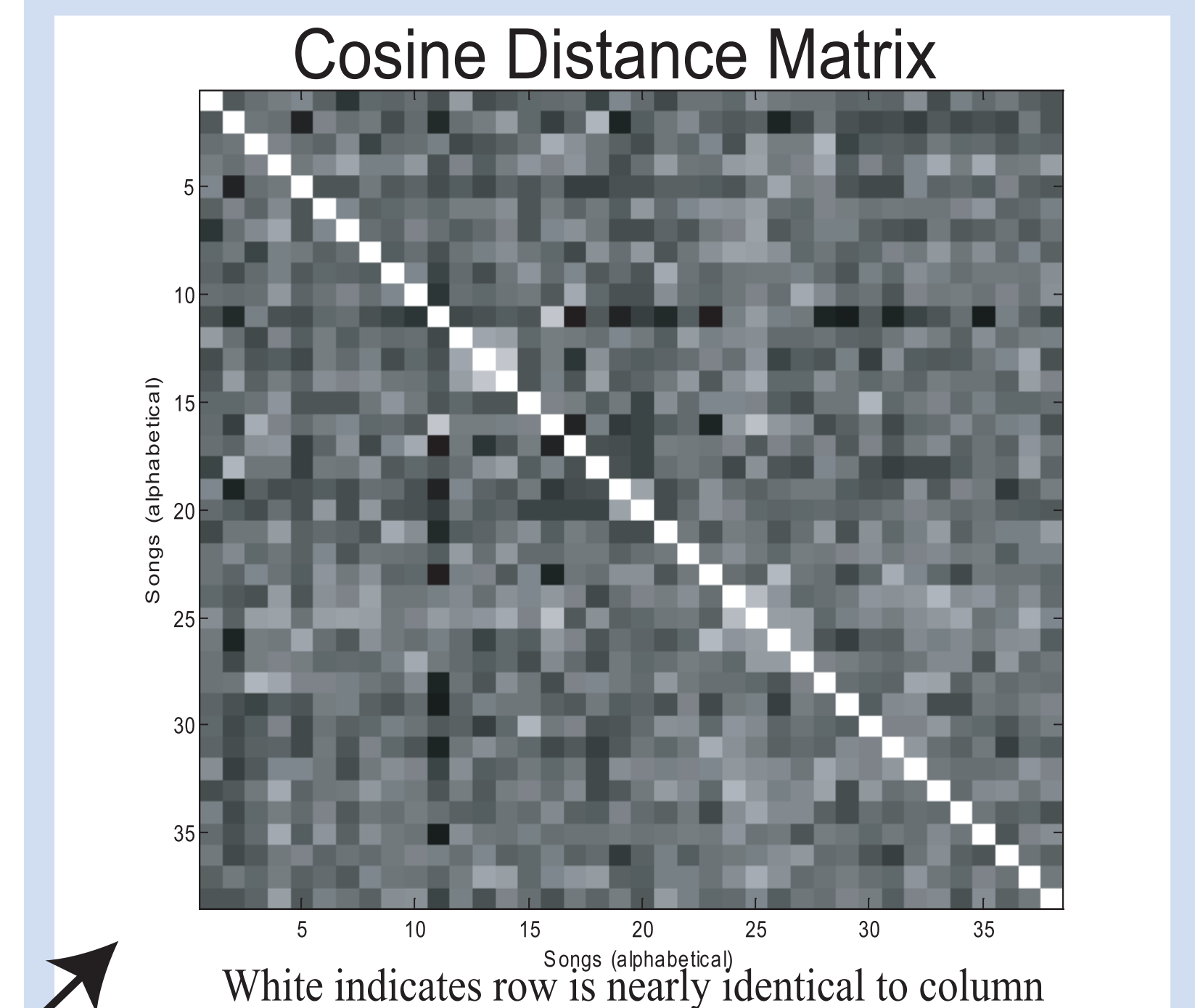
- For comparison, cosine distance

$$dcos(s_i, s_j) = 1 - \frac{s_i \cdot s_j}{\|s_i\| \|s_j\|}$$

- Transition quality,

$$trans(s_i, s_j) = \min(elab(s_i, s_j), elab(s_j, s_i))$$

Between Songs



Overlapping beat envelopes at varying transition ratings (lower is better)

