

**Exploring Expressive Performance Trajectories:
Six Famous Pianists Play Six Chopin Pieces**
by Werner Goebel, Elias Pampalk, and Gerhard Widmer

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About the Authors
Austrian Research Institute for Artificial Intelligence

- **Werner Goebel**
 - Currently doing research with Caroline Palmer at McGill on movement strategies and sensory feedback in piano playing
- **Elias Pampalk**
 - PhD student in computer science at Vienna Institute of Technology
 - Supervised by Gerhard Widmer
- **Gerhard Widmer**
 - Head of the Machine Learning, Data Mining, and Intelligent Music Processing Group at OFAI
 - Professor and Head of the Department of Computational Perception at the Johannes Kepler University Linz, Austria



Six Famous Pianists

- **Claudio Arrau** (1903 - 1991)
 - Chilean-American
 - Repertory spanning from Baroque to 20th century composers
- **Vladimir Ashkenazy** (1937 - present)
 - Russian-Icelandic
 - Conductor as well as pianist
- **Adam Harasiewicz** (1932 - present)
 - Polish
 - Won 1st prize in the International Chopin Competition in 1955





Six Famous Pianists

- **Maria João Pires** (1944 - present)
 - Portuguese
 - Performing Mozart concertos in public by age of 7
- **Maurizio Pollini** (1942 - present)
 - Italian
 - Especially noted for his Chopin performances
- **Artur Schnabel** (1887 - 1982)
 - Polish/Jewish
 - Received acclaim for his performances of Chopin and his championing of Spanish music.





Six Chopin Pieces

Nocturnes

- Op. 15, No. 1 - performed by *Oleg Boshniakovich* 🎧
- Op. 27, No. 1 - performed by *Oleg Boshniakovich* 🎧
- Op. 27, No. 2 - performed by *Oleg Boshniakovich* 🎧

Preludes

- Op. 28, No. 4 - performed by *Oleg Boshniakovich* 🎧
- Op. 28, No. 8 - performed by *R. Stahlbrand* 🎧
- Op. 28, No. 17 - performed by *R. Stahlbrand* 🎧

Performance Comparisons

Chopin's Nocturne Op. 15, No. 1

Arrau Pires Askenazy Pollini Harasiewicz Rubinstein

Method

- Data**
 - Determine *onset* times using automatic beat-tracking
 - Determine *loudness* value for each measured onset
 - 2D time series - tempo on x axis and loudness on y axis
- Segmentation**
 - Each piece segmented into 1-2 bar length according to phrase structure
 - Keep segments with 5-15 data pairs and 2-10 seconds long
 - 1216 segments kept
 - All segments interpolated so each phrase has 25 data points
- Clustering**
 - Determine clusters of tempo/loudness trajectories using parameters
 - Cluster using aligned self-organizing maps

Visualization

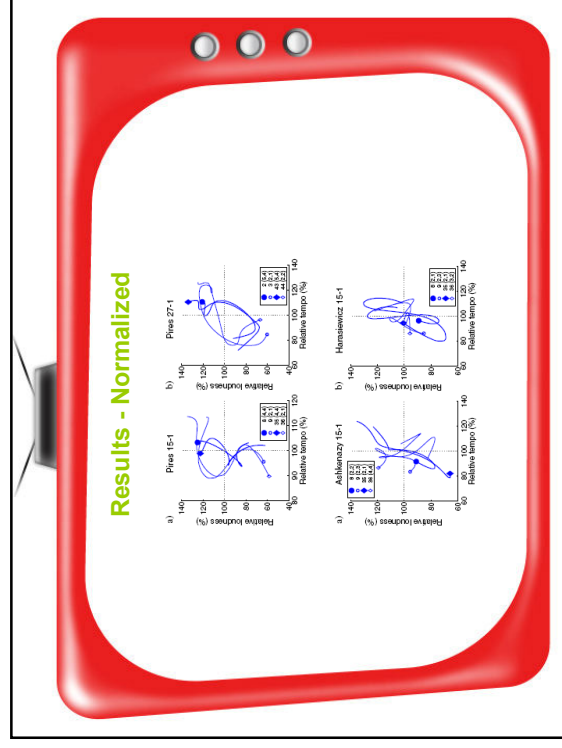
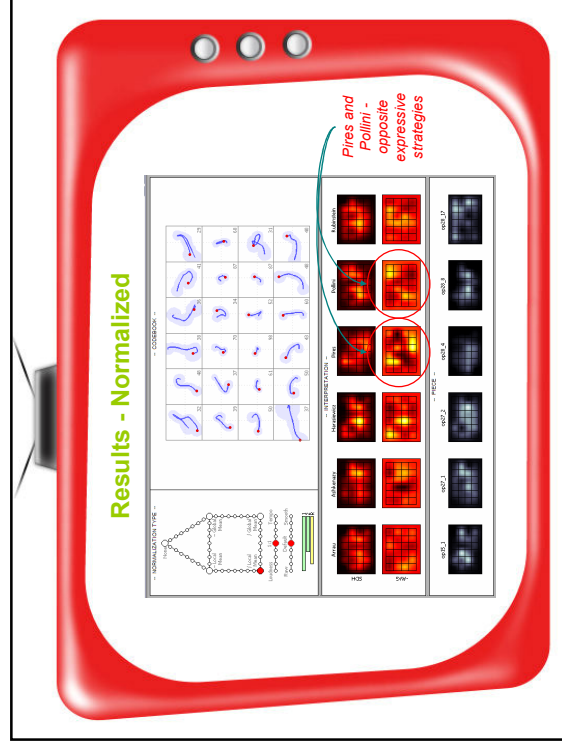
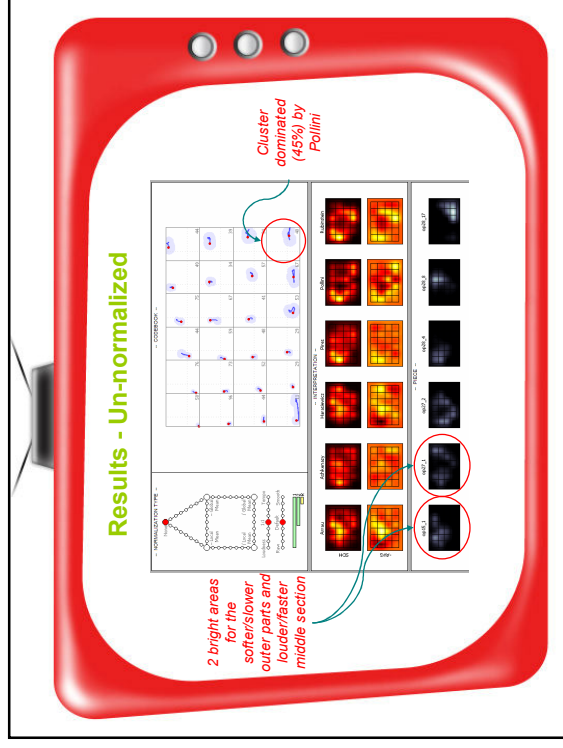
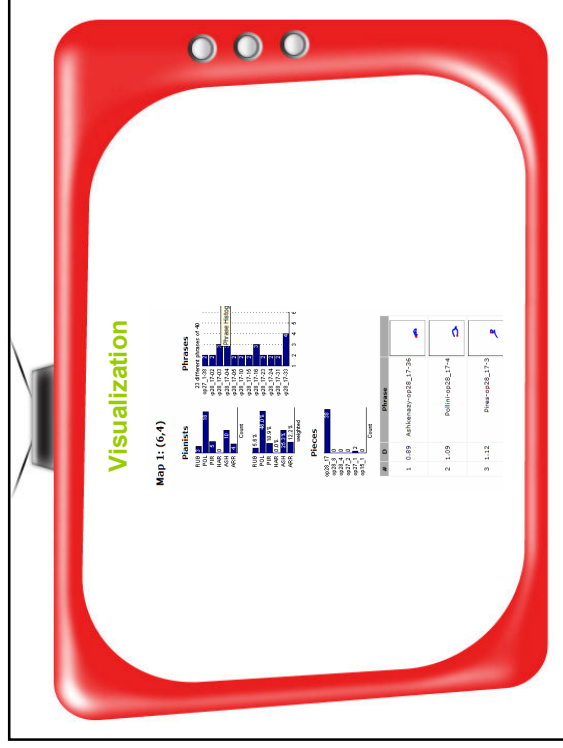
3 levels of normalization

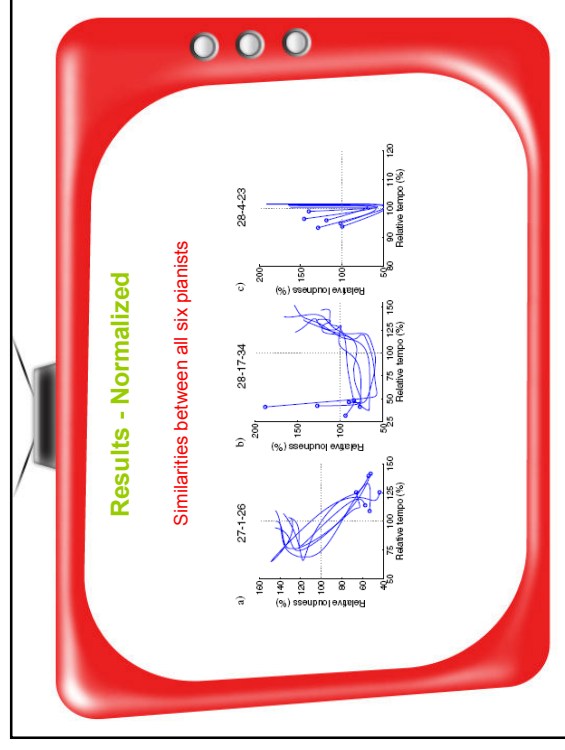
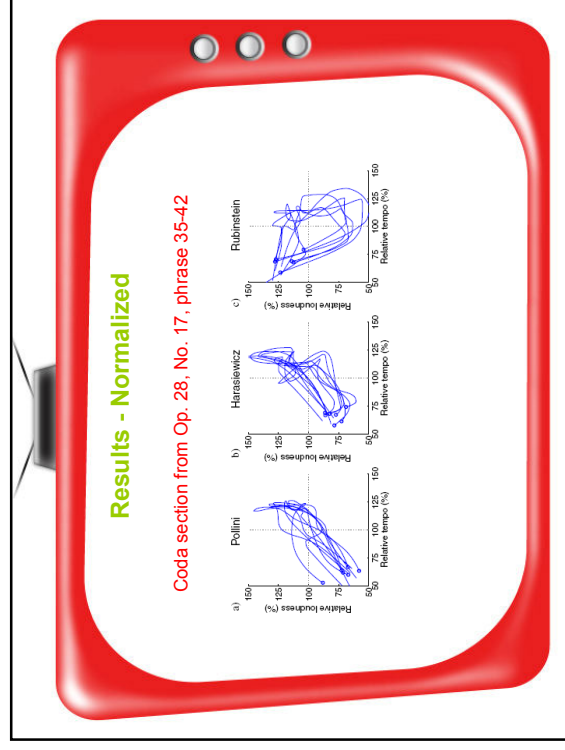
Weighing between tempo and loudness

Smoothing

2D map of clusters

Frequency distributions over codebook





- Problems**
- Disregarded loudness of individual voices
 - Performance information determined at a defined track level
 - Measurement error of +/- 10 ms
 - Data interpolation - outliers can disassociate trajectory from the actual performance
 - Disregarded articulation, pedaling, and score information