An Audio-Based Strategy for Investigating Style Evolution in Western Choral Music

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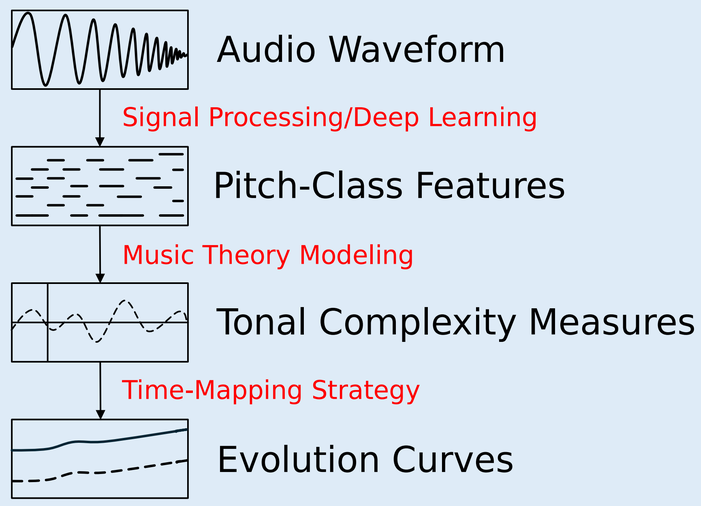
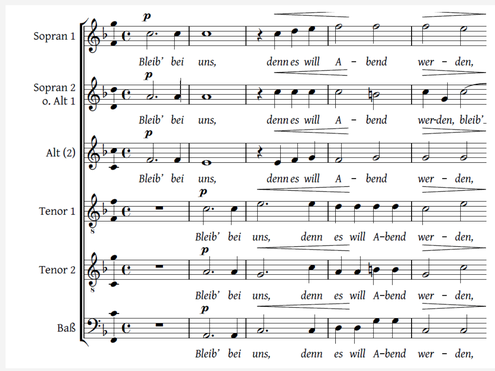
Scenario: Large-Scale Corpus Analysis

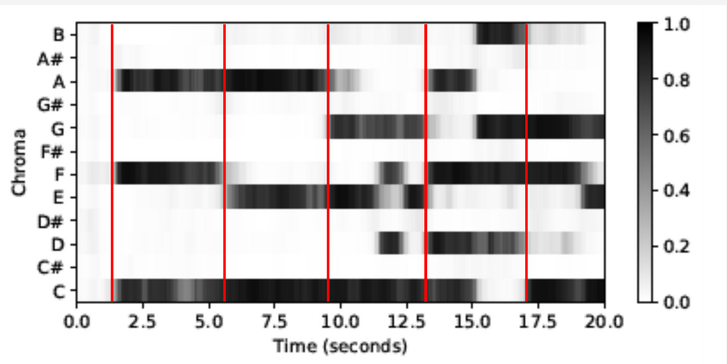
- Exploiting advantages of **audio recordings**: availability, performance information, …
- Research Question: How to conduct large-scale corpus analyses of audio recordings?
- Challenges: properties of vocal music (vibrato, …) and missing data (work dates, …)
- Case Study: Carus Audio Corpus (CAC) with 5,729 tracks of choral music (1550–2020)

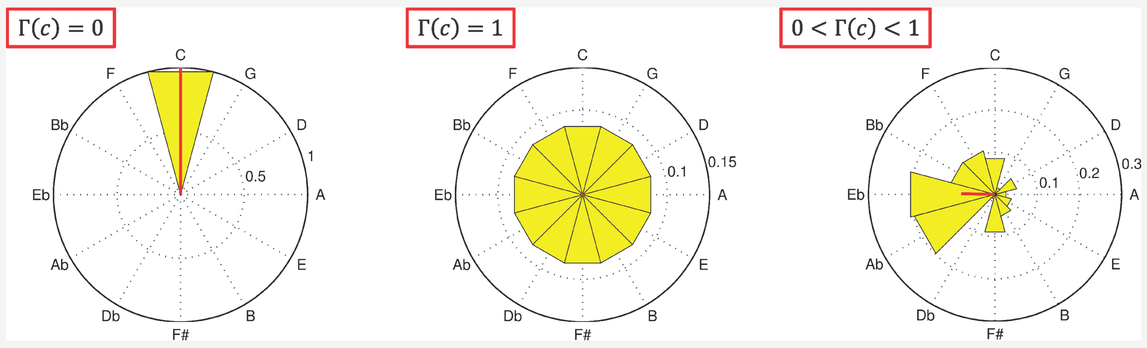


Proposed Strategy: Tonal Features and Evolution Curves

Step 1:
Use a **deep neural network** (CNN) to detect the presence of the twelve chromatic **pitch classes**.

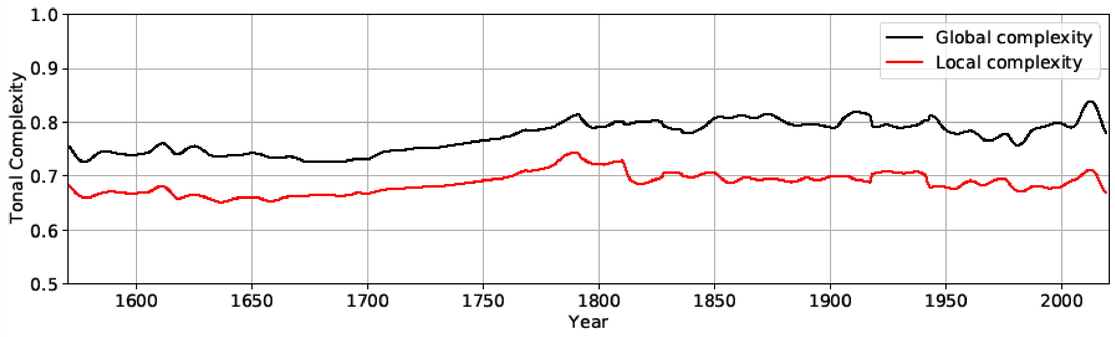






Step 2:
Calculate **tonal complexity** features based on their distribution over the **circle of fifths** as a proxy for "compositional style".

Step 3:
Compute so-called **"evolution curves"**, which map style-relevant features onto **historical timelines**.

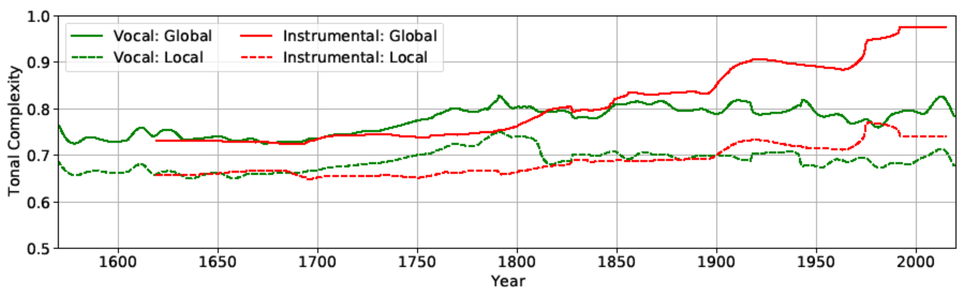


Case Study: Style Evolution in Western Classical Music

- **Datasets**: CAC and Cross-Era Dataset (2,000 additional tracks of instrumental music)
- **Hypothesis A:** In Western classical music, **instrumental music** has been more complex than **vocal music** over the last centuries.
- **Hypothesis B:** Heinrich Schütz' style was constant throughout his life.

Weiß, C. and Müller, M., **Studying Tonal Evolution of Western Choral Music: A Corpus-Based Strategy**. In: Proceedings of the Computational Humanities Research Conference (CHR), 3558:687–702, 2023.

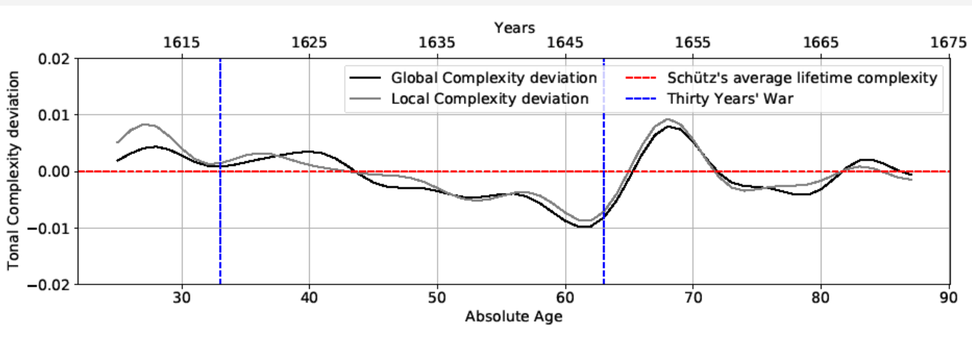
Weiß et al., **Investigating Style Evolution of Western Classical Music: A Computational Approach**. Musicae Scientiae, 23(4), 486–507, 2019.



A) Vocal vs. Instrumental Music

Three observable time spans:

- 1625–1725: similar tonal complexity
- 1725–1810: vocal music appears more complex
- 1850–2020: instrumental music surpasses in complexity



B) Individual Composers

Example: Heinrich Schütz (1585–1672)

- Complexity Deviation (CD): yearly difference to the lifetime average
- 1610–1630: positive CD
- 1630–1650: steady decline of CD
- 1650–1655: recovering CD

Conclusion

- Proposed **methodology** can produce insights of musicological relevance and underlines the **potential of computational approaches** for corpus studies
- **Limitations**: available data, "accidental" correlations?

-> Method proves to be a valuable tool for future studies