Using Corpus Studies to Find the Origins of the Madrigal

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The madrigal: a new musical genre

- Appears first c. 1520 in Florence
- Multiple theories about its origins
 - Einstein (1949): transformation of the frottola
 - Largely rejected; two distinct traditions (Fenlon, Haar, Carter)
 - Haar, Fenlon, Carter (1986, 1988, 1992): derived from the motet and French chanson
 - **Anthony Cummings (2004):** came out of Florentine song and the villotta
- We tested these theories using a corpus study



Our corpus: MIDI files of all the pieces in the MS Florence 164, c. 1520

Manuscript organization: genre classification from that time

Section 1: 27 of the earliest madrigals

by Pisano, Sebastiano Festa, anon.

Section 2: 19 Other Italian-Texted pieces ("OITs"), mostly villotte

• by Pesenti, F.P., Sebastiano Festa, anon.

Section 3: 24 French chansons

• by Bruhier, Compere, Josquin, Ninot le Petit, Pipelare, anon.

Section 4: 12 motets

• by Andreas de Silva, Isaac, Josquin, Carpentras, Mouton, anon.



Method

- We used jSymbolic 2.2 (McKay et al., 2018)
 - To extract 801 features (relevant to Renaissance music) from each MIDI file
 - "Feature": a numerical measurement of a single, precisely defined musical characteristic that can be extracted from a digital score
- We used the features as input to machine learning and statistical analysis processing, using Weka (the SMO SVM implementation)
- We trained the classification models on the 4 sections of Florence 164
 - Using a 10-fold cross-validation methodology
- Classification accuracy can suggest similarity and difference
 - If it is hard to classify pieces, the genres are similar
 - If it is easy to classify pieces, the genres are different



Classification accuracy results

Comparison	Classification Accuracy
Madrigals vs. Motets	100.0%
Madrigals vs. Chansons	100.0%
Madrigals vs. OITs	71.7%



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Madrigals are significantly different from Motets and Chansons



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Madrigals are more similar to OITs than they are to Motets and Chansons



Information gain analysis

- Information gain analysis provides insight into
 - which individual features are
 - statistically most effective in **separating** the genres
- We identified the features with the highest information gain for each classification task
 - Full feature descriptions are found in the jSymbolic manual online



Andreas de Silva Motet









Four features with the highest individual information gains in separating madrigals from motets

Information Gain (high)	Feature Name
0.890	Variability in rhythmic value run lengths
0.890	Prevalence of very long rhythmic values
0.890	Mean rhythmic value run length
0.890	Rhythmic value variability

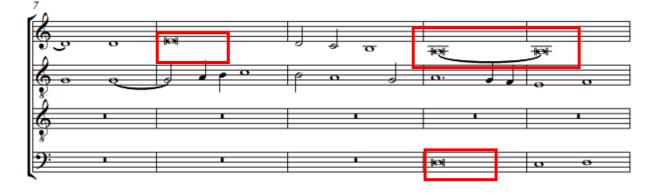


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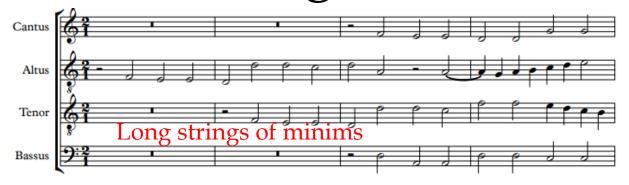


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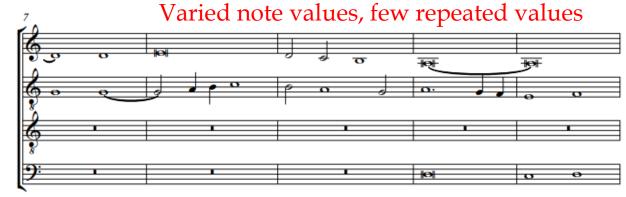


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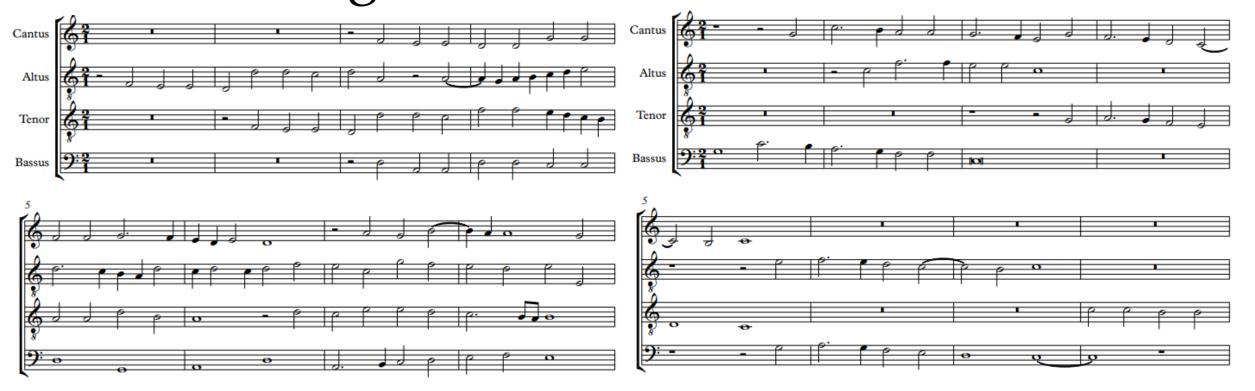


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Ninot, Et la la la Chanson



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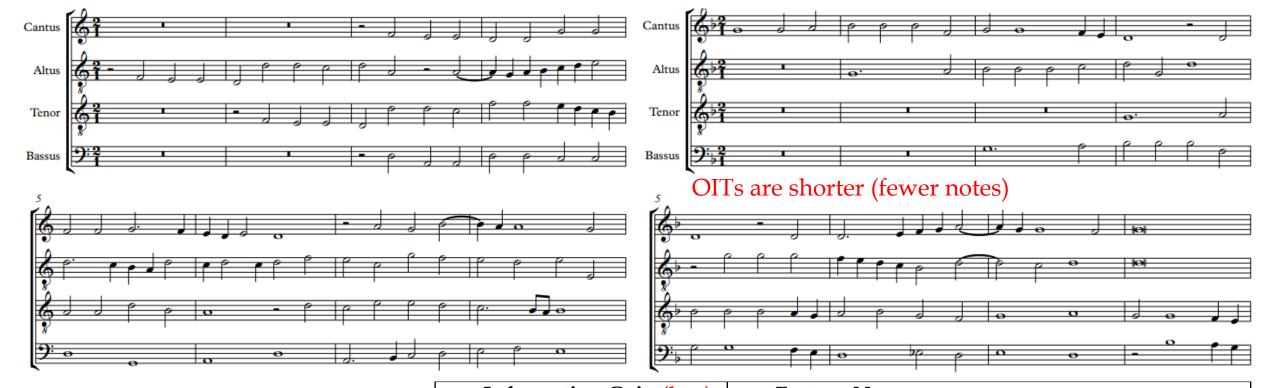
Pesenti, O dio OIT (Villotta)



Four features with the highest individual information gain in separating madrigals from OITs

Information Gain (low)	Feature Name	
0.388	Relative note durations of lowest line	
0.351	Rhythmic value histogram (eighth notes)	
0.351	Prevalence of short rhythmic values	
0.343	Total number of notes	12

Pesenti, O dio Villotta (from OITs)



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Conclusion

Our results:

- Suggest that the madrigal did NOT derive its style from the motet or chanson (as opposed to Haar, Fenlon, and Carter)
- Indicate that the madrigals are closer in musical style to OITs, especially the villotta, than they are to chansons and motets (supporting Anthony Cummings)

We should therefore investigate the villotta's role in the origins of the madrigal



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