# Mapping Melodic Successions in Renaissance Music

Josquin's Four-Voice Motets

### Search

Powerful multi-field search for scores in symbolic notation with metadata.

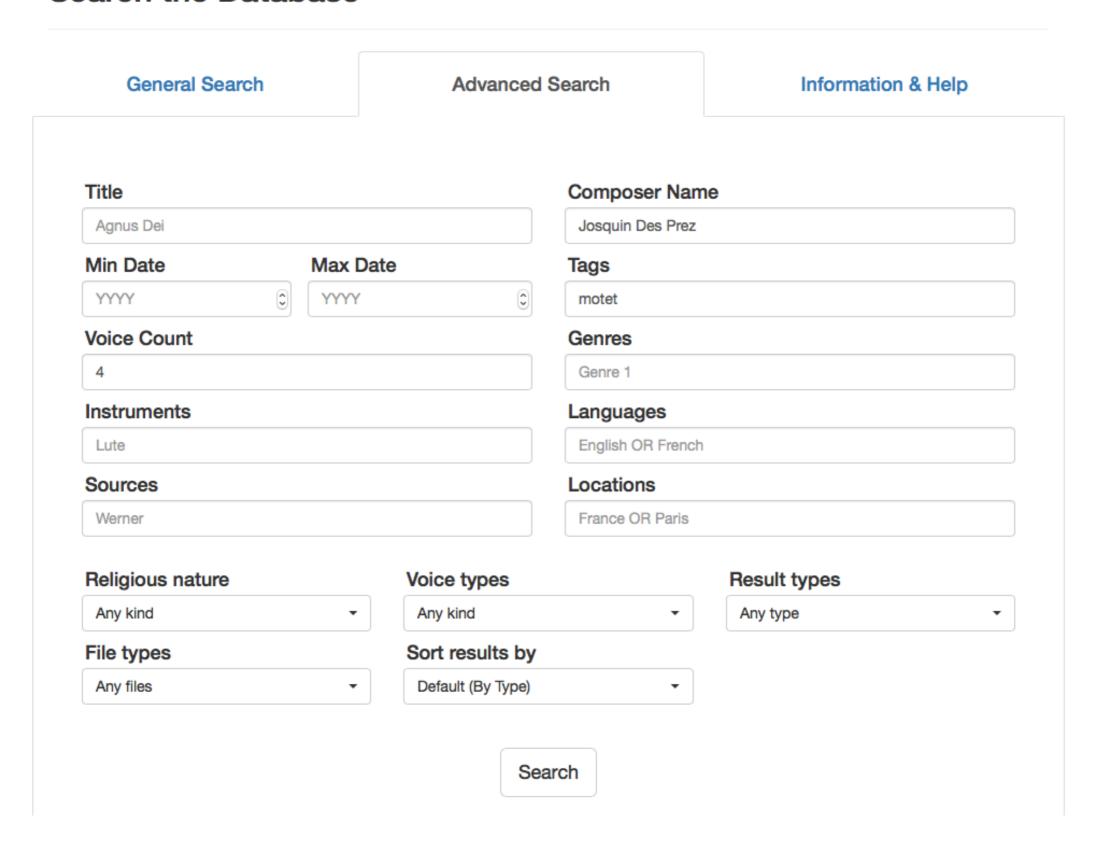
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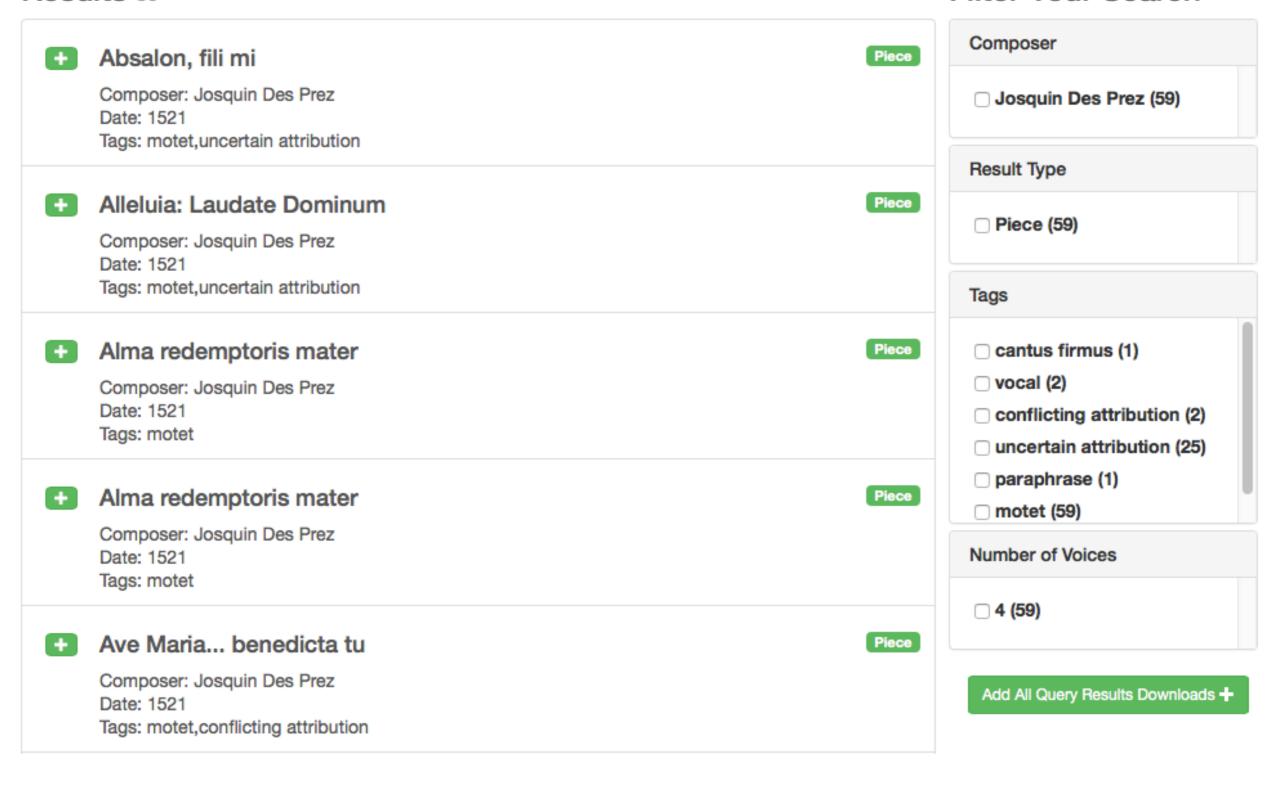
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Upload pieces, movements, and collections of symbolic notation

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#### Results 59



Filter Your Search

### musicus's Collections

•	4 Voice Project Created by Reiner Krämer on July 22, 2015, 12:03 a.m.	4 Pieces, 4 Movements
•	Four-Voice-Project-Collection-1 Created by Reiner Krämer on Sept. 8, 2015, 7:19 p.m.	4 Pieces, 4 Movements
•	Josquin - Four Voice Motets - Confirmed Attribution  Created by Reiner Krämer on Sept. 21, 2015, 2:18 p.m.  A collection of Joaquin's four voice motets of confirmed attribution (may include duplicate).	32 Pieces, 0 Movements
•	Josquin - Four Voice Motets - Conflicting Attribution  Created by Reiner Krämer on Sept. 21, 2015, 2:04 p.m.  Set of alleged Joaquin motets with conflicting attribution.	2 Pieces, 0 Movements
•	Josquin - Four Voice Motets - Uncertain Attribution  Created by Reiner Krämer on Sept. 21, 2015, 2:11 p.m.  This collection of Josquin's four voice motets consists of motets of uncertain attribution.	25 Pieces, 0 Movements
•	Lassus Duos Created by Reiner Krämer on Sept. 18, 2015, 6:23 p.m.	12 Pieces, 0 Movements

### Josquin - Four Voice Motets - Confirmed Attribution 32 Pieces, 0

Movements

Delete

Make Public

Add to Downloads

Created by Reiner Krämer on 21 September 2015, 2:18 p.m. Last updated 21 September 2015, 2:18 p.m.

A collection of Joaquin's four voice motets of confirmed attribution (may include duplicate).

### Pieces (32)

Add	Title	Composer	Movements	Date
+	Alma redemptoris mater	Josquin Des Prez	No movements	1521
+	Alma redemptoris mater	Josquin Des Prez	No movements	1521
+	Ave Maria virgo serena	Josquin Des Prez	No movements	1485
+	Ave Maria virgo serena	Josquin Des Prez	No movements	1521
+	Ave mundi spes, Maria	Josquin Des Prez	No movements	1521
+	Domine, ne in furore	Josquin Des Prez	No movements	1521
+	Dulces exuviae	Josquin Des Prez	No movements	1521
+	Ecce tu pulchra es	Josquin Des Prez	No movements	1521
+	Factum est autem	Josquin Des Prez	No movements	1521
+	Fama malum	Josquin Des Prez	No movements	1521

### Ave Maria... virgo serena

Piece - Created by Natasha on 05 July 2012. Last updated on 01 September 2015.

Composer Josquin Des Prez

**Date of Composition** 1450-1521

Number of voices

Unknown Genres

Instrument Voice SATB

> Collections Josquin Research Project (JRP)

Place of Origin Unknown

> Language Latin

> > JRP Source

Religiosity Sacred

Voice Type Unknown

> Tags motet

New Josquin Edition (NJE) 23.6

### **Available Attachments**

Title Source Ave-Maria...-virgo-serena\_Josquin-Des-Prez\_file1.krn None



### Mapping Melodic Successions in Renaissance Music

- Josquin's Four-Voice Motets:
  - ELVIS database search summary
    - There are 59 four-voice motets
      - 32 securely attributed (29 with duplicates removed)
      - 27 not securely attributed
        - 25 uncertain attribution
        - 2 conflicting attribution

### Mapping Melodic Successions in Renaissance Music

- What are Melodic Successions?
  - The movement from one note to another
  - Governed by certain contrapuntal principals
    - e.g.: Treatment and symbiotic relationship of consonance and dissonance, expressed through successive horizontal pitch classes

- The movement from one note to another can be statistically captured for each voice.
- The outcome of the statistically captured data can be stored in a State Transition Matrix.\*
- \* Sounds familiar? Well, yes indeed: Hiller and Isaacson used this method to compose the fourth movement of the *Illiac Suite* (String Quartet No. 4) in 1957, by which a STM was used to generate musical material through a series of Markov chains. STMs are also used in ANNs.
- Our advantage: more computational power, the ability to track more symbolic music data.

- Generating a STM:
  - Soprano line of Ave Maria...virgo serena (here expressed in PCs, without durations):
    - ['Start', 7, 0, 0, 2, 4, 0, 'Rest', 'Rest', 'Rest', 0, 11, 9, 7, 9, 7, 0, 11, 9, 11, 0, 'Rest', 'Rest', 'Rest', 'Rest', '0, 0, 0, 2, 4, 0, 11, 9, 7, 5, 4, 0, 11, 9, 7, 5, 4, 'Rest', 'Rest', '0, 9, 7, 0, 2, 4, 'Rest', 4, 2, 0, 11, 0, 'Rest', 0, 0, 2, 4, 4, 5, 4, 2, 4, 'Rest', 'Rest', 'Rest', 'Rest', 'Rest', 'Rest', '4, 4, 5, 4, 2, 0, 11, 7, 9, 11, 0, 9, 11, 0, 2, 11, 0, 2, 4, 2, 4, 5, 4, 2, 0, 2, 4, 2, 0, 11, 0, 'Rest', 7, 0, 11, 0, 2, 11, 9, 7, 7, 9, 7, 0, 11, 0, 'Rest', 7, 7, 7, 9, 9, 11, 11, 7, 7, 0, 0, 9, 9, 2, 0, 11, 9, 7, 7, 0, 0, 2, 4, 2, 0, 11, 0, 'Rest', 'Re
    - Finalis Complex: PCs from Top down (SATB) = (0, 7, 0, 0)
    - OR:

Ave Maria...virgo serena: Soprano

PCs/SiCs	0	1	2	3	4	5	6	7	8	9	10	11	Start	End	Rest
0	0.18	0	0.26	0	0	0	0	0.02	0	0.05	0	0.35	0	0.02	0.13
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.38	0	0.1	0	0.4	0	0	0	0	0	0	0.13	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.14	0	0.4	0	0.17	0.11	0	0	0	0	0	0	0	0	0.17
5	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0.26	0	0	0	0	0.1	0	0.26	0	0.19	0	0	0	0	0.19
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.04	0	0	0	0	0.54	0	0.17	0	0.25	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0.41	0	0.05	0	0.02	0	0	0.07	0	0.27	0	0.17	0	0	0
Start	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rest	0.13	0	0.06	0	0.1	0	0	0.1	0	0	0	0.02	0	0	0.58

Ave Maria...virgo serena: Alto

PCs/SiCs	0	1	2	3	4	5	6	7	8	9	10	11	Start	End	Rest
0	0.19	0	0.2	0	0.03	0.02	0	0.12	0	0.10	0	0.22	0	0.00	0.14
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.50	0	0.00	0	0.31	0.03	0	0.08	0	0	0	0.06	0	0	0.03
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.05	0	0.5	0	0.12	0.26	0	0.02	0	0.02	0	0	0	0	0.1
5	0.03	0	0.10	0	0.52	0.03	0	0.29	0	0.03	0	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	0.08	0	0.02	0	0.09	0.22	0.02	0.25	0	0.2	0	0.02	0	0.02	0.15
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.03	0	0.00	0.1	0	0.5	0	0.03	0.00	0.33	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0.50	0	0.00	0	0.00	0	0	0.07	0	0.27	0	0.13	0	0	0.03
Start	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	1.00
Rest	0.16	0	0.02	0	0.05	0.02	0	0.23	0	0.07	0	0.00	0	0	0.45

Ave Maria...virgo serena: Tenor

PCs/SiCs	0	1	2	3	4	5	6	7	8	9	10	11	Start	End	Rest
0	0.23	0	0.2	0	0.02	0.03	0	0.00	0	0.02	0	0.27	0	0.02	0.18
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.36	0	0.16	0	0.32	0.02	0	0.05	0	0	0	0.09	0	0	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.19	0	0.4	0	0.16	0.19	0	0.00	0	0.00	0	0	0	0	0.1
5	0.00	0	0.22	0	0.39	0.11	0	0.28	0	0.00	0	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	0.13	0	0.00	0	0.09	0.16	0.03	0.22	0	0.2	0	0.00	0	0.00	0.16
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.00	0	0.00	0.1	0	0.7	0	0.00	0.00	0.19	0	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0.48	0	0.07	0	0.00	0	0	0.04	0	0.30	0	0.11	0	0	0.00
Start	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	1.00
Rest	0.20	0	0.07	0	0.04	0.00	0	0.11	0	0.00	0	0.00	0	0	0.59

Ave Maria...virgo serena: Bass

															<b></b>
PCs/SiCs	0	1	2	3	4	5	6	7	8	9	10	11	Start	End	Rest
0	0.30	0	0.1	0	0.04	0.07	0	0.16	0	0.07	0	0.05	0	0.02	0.19
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.63	0	0.06	0	0.19	0.00	0	0.06	0	0	0	0.06	0	0	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.15	0	0.3	0	0.00	0.44	0	0.00	0	0.04	0	0	0	0	0.1
5	0.03	0	0.00	0	0.45	0.06	0	0.45	0	0.00	0	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	0.15	0	0.00	0	0.12	0.19	0.06	0.17	0	0.3	0	0.00	0	0.00	0.06
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.05	0	0.05	0.2	0	0.3	0	0.09	0.05	0.27	0	0	0
10	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
11	0.60	0	0.00	0	0.00	0	0	0.20	0	0.20	0	0.00	0	0	0.00
Start	0	0	0	0	0	0	0	0.00	0	0	0	0	0	0	1.00
Rest	0.21	0	0.00	0	0.00	0.00	0	0.11	0	0.00	0	0.00	0	0	0.68
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Ave Maria...virgo serena: All Parts

															-
PCs/SiCs	0	1	2	3	4	5	6	7	8	9	10	11	Start	End	Rest
0	0.22	0	0.2	0	0.02	0.03	0	0.07	0	0.06	0	0.23	0	0.01	0.16
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.43	0	0.09	0	0.32	0.01	0	0.04	0	0	0	0.09	0	0	0.01
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.13	0	0.4	0	0.12	0.24	0	0.01	0	0.01	0	0	0	0	0.1
5	0.02	0	0.08	0	0.51	0.06	0	0.33	0	0.01	0	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	0.14	0	0.01	0	0.08	0.18	0.03	0.22	0	0.2	0	0.01	0	0.01	0.13
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.03	0	0.01	0.1	0	0.5	0	0.08	0.01	0.27	0	0	0
10	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
11	0.47	0	0.04	0	0.01	0	0	0.07	0	0.27	0	0.13	0	0	0.01
Start	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0.75
Rest	0.17	0	0.04	0	0.05	0.01	0	0.14	0	0.02	0	0.01	0	0	0.58

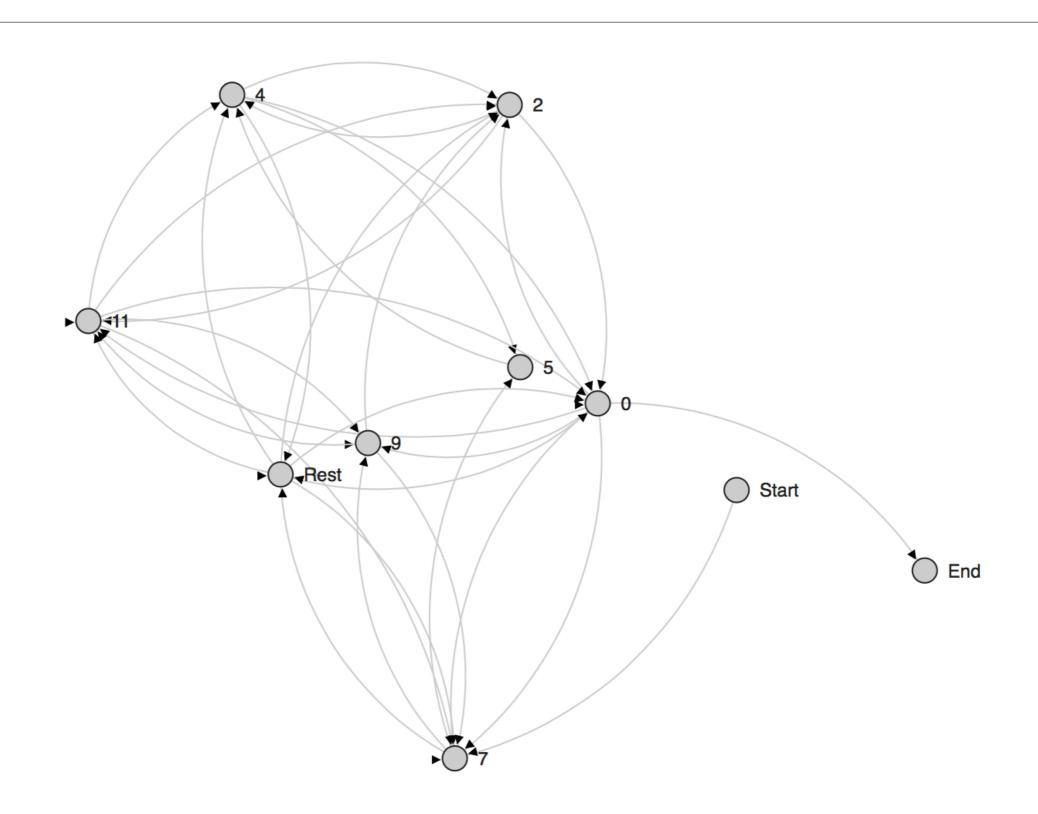
Finalis Complex 0-7: Ave Maria...virgo serena

PCs/SiCs	0	1	2	3	4	5	6	7	8	9	10	11	Start	End	Rest
0	0.22	0	0.2	0	0.02	0.03	0	0.07	0	0.06	0	0.23	0	0.01	0.16
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0.43	0	0.09	0	0.32	0.01	0	0.04	0	0	0	0.09	0	0	0.01
3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0.13	0	0.4	0	0.12	0.24	0	0.01	0	0.01	0	0	0	0	0.1
5	0.02	0	0.08	0	0.51	0.06	0	0.33	0	0.01	0	0	0	0	0
6	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
7	0.14	0	0.01	0	0.08	0.18	0.03	0.22	0	0.2	0	0.01	0	0.01	0.13
8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0.03	0	0.01	0.1	0	0.5	0	0.08	0.01	0.27	0	0	0
10	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
11	0.47	0	0.04	0	0.01	0	0	0.07	0	0.27	0	0.13	0	0	0.01
Start	0	0	0	0	0	0	0	0.25	0	0	0	0	0	0	0.75
Rest	0.17	0	0.04	0	0.05	0.01	0	0.14	0	0.02	0	0.01	0	0	0.58

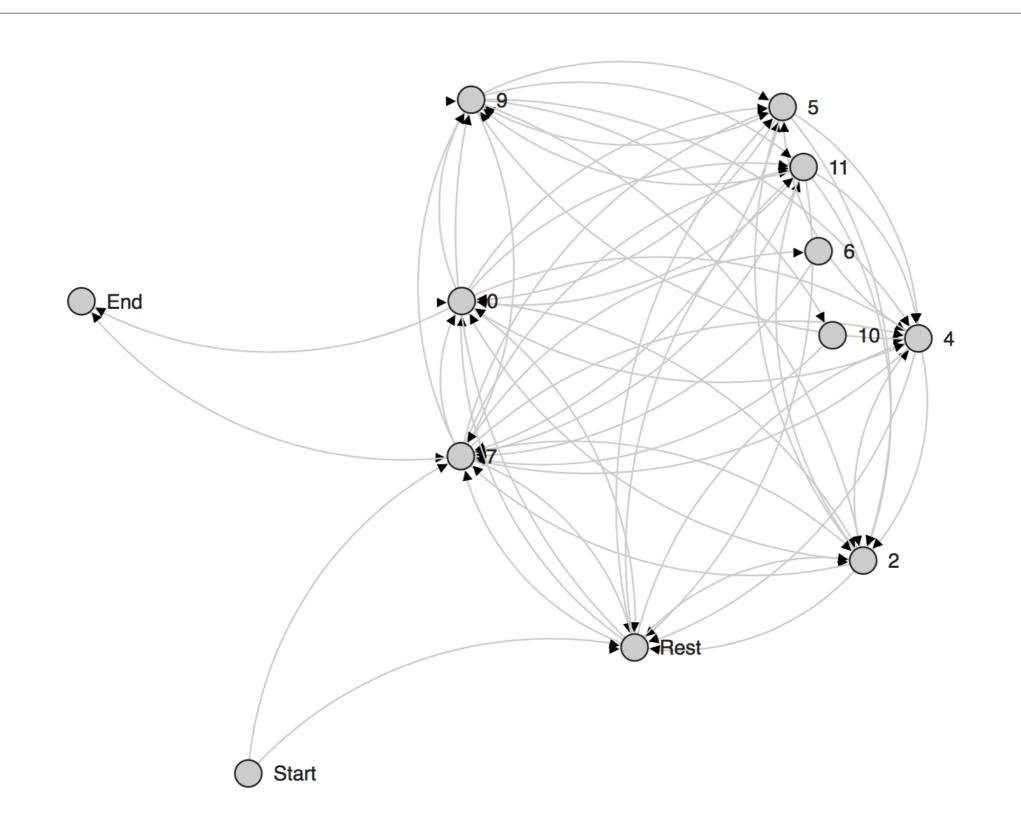
- The STM is great if you are used to reading tables all day, but can a STM be visualized in a more understandable manner?
- An STM can also be represented as a STN (State Transition Network, or a directional network graph)
  - Computer scientist to suggest STNs: Donald Knuth (The Art of Computer Programming) realized a text based network on the characters of Victor Hugo Les Misérables
  - What other music theorists use STNs: Mazzola, Lewin, etc.
- Library used here to visualize STNs
  - Data Driven Document (D3.js)

- Data Driven Document Library (D3.js)
  - comes with Python interface (via NetworkX)
  - ·can use
    - ·CSV
    - ·JSON
  - ·Uses Web Browser
  - generates dynamic Networks the user can interact with
    - · searchable, zoomable, movable
  - has plugins for specific Network graphing tasks
    - arrows
    - sizable nodes

# Ave Maria ... virgo serena - Soprano: Melodic Successions



# Josquin Four-Voice Motets with finalis complex 0-7: Melodic Successions



- What is this method good for?\*
  - It can be used to determine precise melodic procedures within Josquin's Four-Voice Motet writing, on a voice based foreground level.
  - •The melodic procedures can be sorted according to mode, since different modes may consist of different melodic procedures.
  - •The data can be used to compare Josquin's securely attributed, uncertain attributed, and conflicting attributed four-voice motets.
- Can this method be expanded?
  - •Intervallic data can be represented in STMs/STNs
  - · Vertical intervallic data (or chords) can be represented in STMs/STNs
  - Contrapuntal combinations and resulting voice-leading procedures can be represented as STMs/STNs
  - \* Algorithmically composing melodic lines in a style similar to Josquin

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