

# PatternFinder: Symbolic Music Retrieval

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# Search Text With Text

The screenshot shows a Google search interface. The search bar contains the text "this is text" and a magnifying glass icon. Below the search bar are navigation links: "All", "Images", "Videos", "News", "Shopping", "More", "Settings", and "Tools". The search results show "About 22,820,000,000 results (0.59 seconds)". The top result is "Text messaging - Wikipedia" with a green URL and a brief description: "Text messaging, or texting, is the act of composing and sending electronic messages, typically consisting of alphabetic and numeric characters, between two or ...". Below the result are links for "SMS", "Pop-Up Video", and "Mobile phone spam". A "People also ask" section contains four questions with dropdown arrows: "What happens if you text 911?", "How is a text message transmitted?", "Do you need a 1 when texting?", and "Why is texting called texting?". A "Feedback" link is located at the bottom right of the search results area.

Google

this is text

All Images Videos News Shopping More Settings Tools

About 22,820,000,000 results (0.59 seconds)

**Text messaging - Wikipedia**  
[https://en.wikipedia.org/wiki/Text\\_messaging](https://en.wikipedia.org/wiki/Text_messaging) ▼  
Text messaging, or texting, is the act of composing and sending electronic messages, typically consisting of alphabetic and numeric characters, between two or ...  
[SMS](#) · [Pop-Up Video](#) · [Mobile phone spam](#)

People also ask

What happens if you text 911? ▼

How is a text message transmitted? ▼

Do you need a 1 when texting? ▼

Why is texting called texting? ▼

Feedback

# Search Music With Music

## Content-Based Symbolic Music Retrieval

1 \*\*kern  
2 \*clefG2  
3 \*k□  
4 =-  
5 4b 4d  
6 4f a  
7 1e cc



Search!

#9177 Occurrences

Piece ID #1443 Jubilate-Deo-omnis-terra Josquin-Des-Prez file4.midi

86



Piece ID #1744 Magnus-es-tu-Domine Josquin-Des-Prez file2.mid

181



# Symbolic Content-Based Music Retrieval

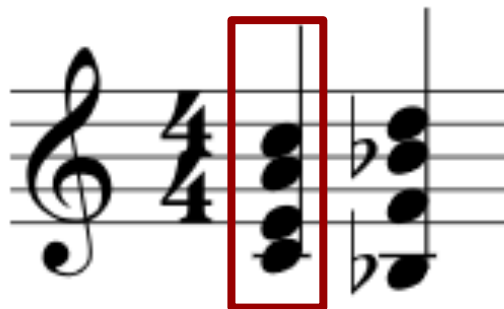
- **Search music by its content:** Given a musical passage, find all of its occurrences (and/or similar occurrences) in a corpus of digitized music scores.
- PatternFinder is software for symbolic music retrieval
- Python package using music21: <https://github.com/ELVIS-project/patternfinder>
- You can use PatternFinder's web application at <https://patternfinder.elvisproject.ca>

## PatternFinder Web Application: <https://patternfinder.elvisproject.ca>

- Query with the digital music representation “\*\*kern”
- Search to find occurrences of our musical passage
- Filters to expand or narrow search results
- Add a piece (e.g. from SIMSSA DB)
- Search over a collection of pieces

# Entering Your Query

```
1 **kern
2 *clefG2 → Clef
3 *k[] → Key Signature
4 *M4/4 → Time Signature
5 =-
6 4c e a cc
7 4B- f b- dd
```



# Entering Your Query

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```



## Algorithm to Find Polyphonic Occurrences

- Developed at the University of Helsinki in 2011
- Searches through polyphonic texture for exact voice leading
- Transpositions
- Partial matching
- Rhythmically altered occurrences



# Credo movement of Missa Veni creator spiritus à 6

11

The image shows a musical score for six staves in 4/2 time. The score is divided into two systems of three staves each. The first system consists of three treble clef staves. The second system consists of a bass clef staff, a treble clef staff, and a bass clef staff. Red dots highlight specific notes: a G4 in the first staff of the first system, a G3 in the second staff of the first system, a G3 in the first staff of the second system, a G3 in the second staff of the second system, a G3 in the first staff of the third system, and a G3 in the second staff of the third system. Arrows point from these red dots to a G3 note in the second staff of the first system, a G3 note in the first staff of the second system, a G3 note in the first staff of the third system, and a G3 note in the second staff of the third system.

Query:

The image shows a musical notation query consisting of two staves. The top staff is a treble clef staff with a G3 note. The bottom staff is a bass clef staff with a G3 note.

# Filters

- Partial matches: how many notes of our query do we want to find?
- Chromatic transpositions: what transpositions of our query do we care about?
- Intervening notes: how thick is the polyphonic texture which obscures our query?

# One intervening note

105

A musical score for the 'Gloria' movement of *In te domine speravi* à 4, measures 105-106. The score is in 4/2 time and consists of four staves. The first staff (treble clef) contains a whole note G4 in measure 105 and a whole note A4 in measure 106. The second staff (treble clef) contains a whole note G4 in measure 105, followed by a dotted quarter note A4, an eighth note B4, a dotted quarter note C5, and an eighth note B4 in measure 106. The third staff (treble clef) contains a whole note G4 in measure 105, followed by a whole note A4 with a sharp sign in measure 106. The fourth staff (bass clef) contains a whole note G3 in measure 105, followed by a whole note A3 in measure 106. Red markings highlight the notes G4, A4, and A4 with sharp in the first three staves.

“Gloria” movement of *In te domine speravi* à 4

## Query:

A musical notation for a query, consisting of a single treble clef staff. The first measure contains a whole note chord of G4, A4, and B4. The second measure contains a whole note chord of G4, A4, and B4 with a flat sign on the B4.

# Integration with SIMSSA DB

The system was designed with the future intent of integrating with SIMSSA DB

- Add pieces
- Search by collection

# Demo

## Content-Based Symbolic Music Retrieval



All  Palestrina  Bach

```
1 **kern
2 *c1efG2
3 *k[]
4 ==
5 |
```

Search!

#0 Occurrences

# of intervening notes

0  0

Chromatic transpositions

mod 12

0  0

# of notes permitted to be missing

0  0

[About](#)  
[Github](#)  
[Contact](#)



# Future Work

- Just monophonic search
- Integrate with SIMSSA DB
- Rhythmic filters
- Ranking results

# SIMSSA | Single Interface for Music | Score Searching and Analysis



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