

Staff Finding, Pitch Finding & MEI Generation

Noah Baxter

SIMSSA Workshop XVII
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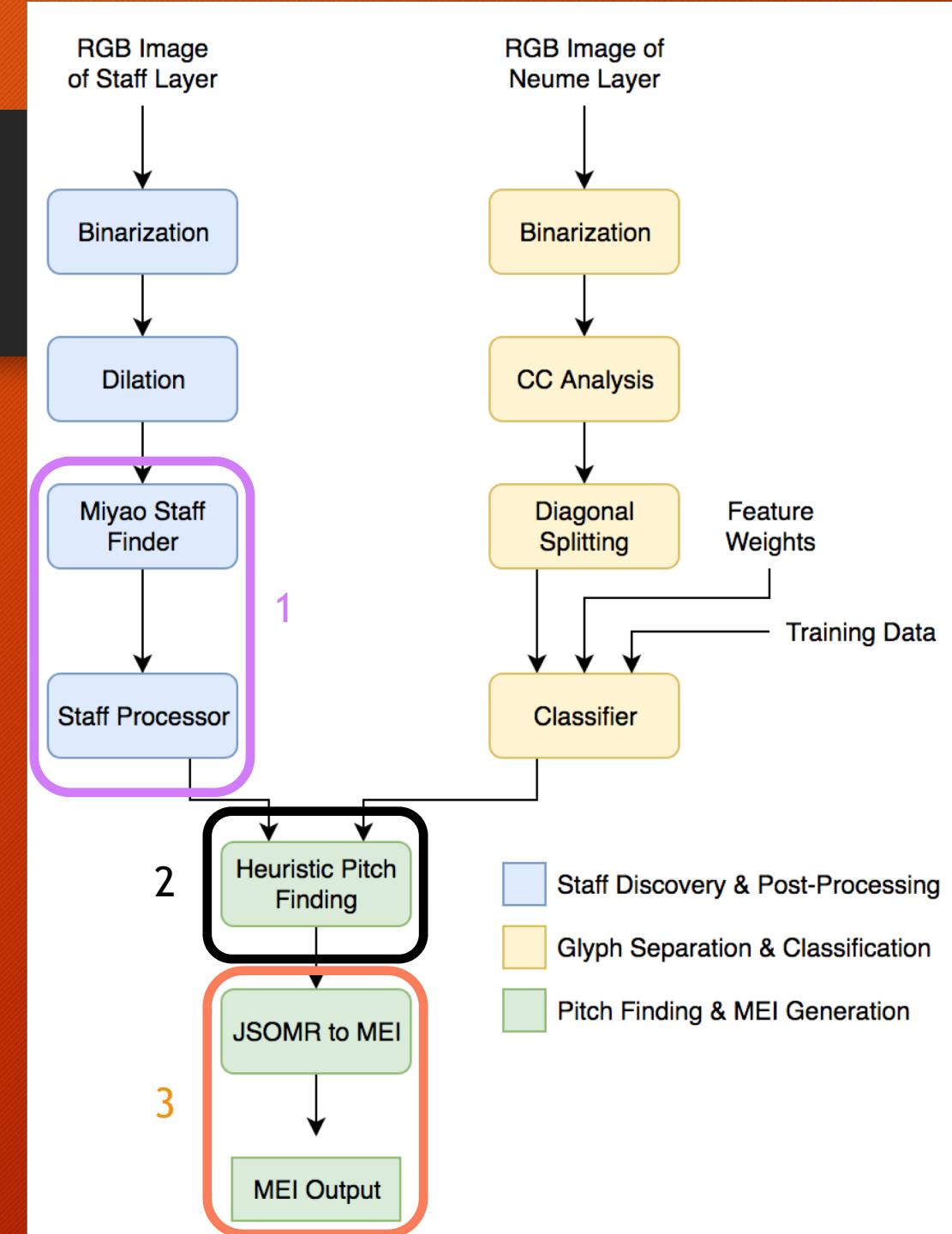
Analysis Within OMR

DDMAL

The Big Picture

A multi-step Rodan workflow:

1. Staff Finding
 - Detection
 - Processing (Interpolation, sorting, etc.)
2. Pitch Finding
3. MEI Generation



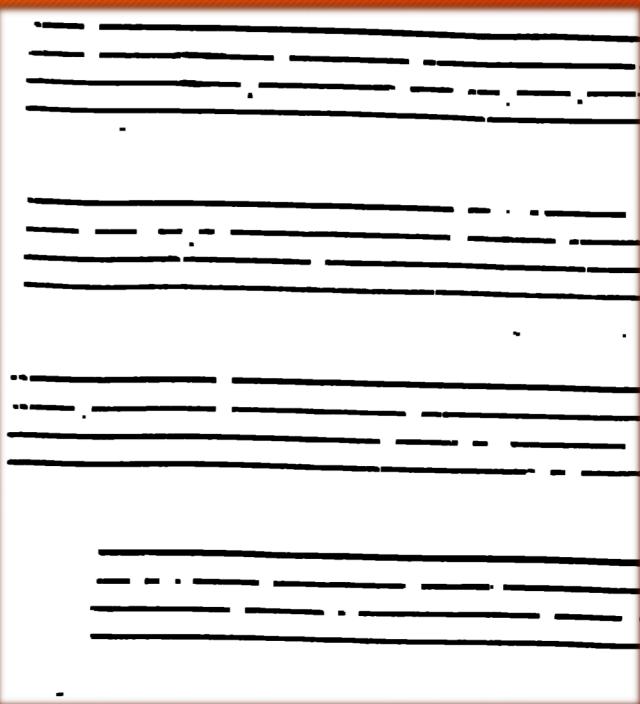
Staff Finding

INPUT

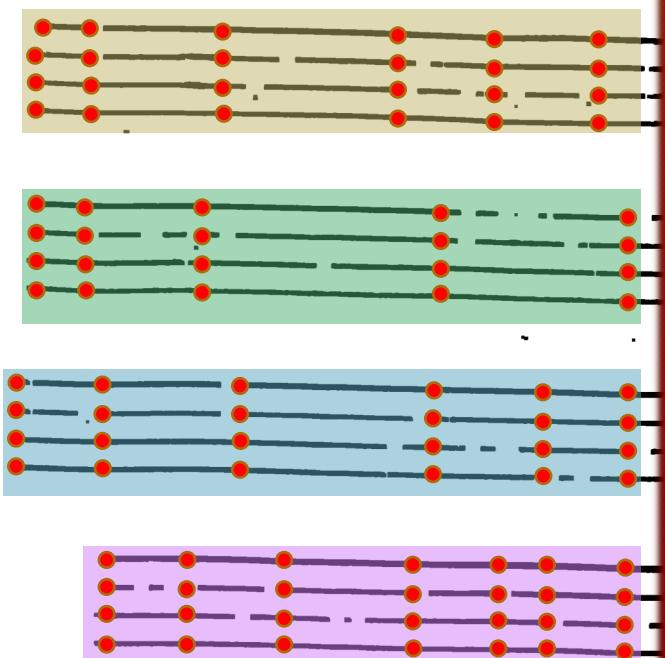
Stage
1 / 3



Convolutional
image classification



Miyao
staff-finding



Staff Finding

OUTPUT

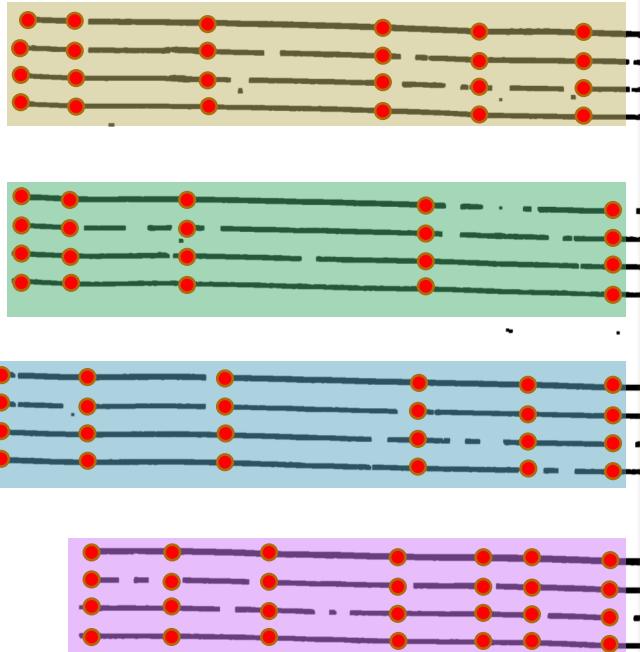
JSOMR

For each staff:

- Ordering
- Number of staff lines
- Position
- List of points on each line

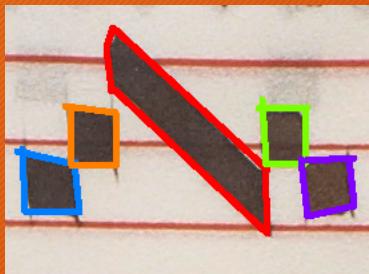
```
"staff_no": 1,  
"bounding_box": {  
    "nrows": 226,  
    "ulx": 752,  
    "uly": 568,  
    "ncols": 2693  
},  
"num_lines": 4,  
"staff_coordinates": [...],
```

```
"staff_no": 2,  
"bounding_box": {  
    "nrows": 227,  
    "ulx": 749,  
    "uly": 958,  
    "ncols": 2666  
},  
"num_lines": 4,  
"staff_coordinates": [...],
```



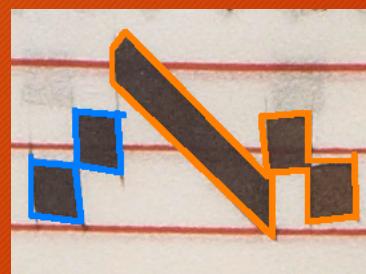
Types of Neume Classifications

Split Component



neume.punctum,
neume.punctum,
neume.oblique4,
neume.punctum,
neume.punctum

Non-Split Component



neume.punctum.u2.punctum,
neume.oblique4.u2.punctum.d2.punctum

Neume Based



neume.punctum.u2.punctum.u3.
oblique4.u2.punctum.d2.punctum

Pitch Finding PROCESS



Stage
2 / 3

```
<glyph uly="505" ulx="759" nrows="137" ncols="32">
  <id name="clef.c"/>
</glyph>
<glyph uly="541" ulx="874" nrows="51" ncols="41">
  <id name="neume.punctum"/>
</glyph>
<glyph uly="607" ulx="874" nrows="57" ncols="41">
  <id name="neume.punctum"/>
</glyph>
```

GameraXML

Classified
Components

Pitch Finding OUTPUT

JSOMR

For each neume component:

- Type
- Pitch (name & oct)
- Position
- Clef
- Staff

```
"glyph": {  
  "bounding_box": {  
    "nrows": 137,  
    "ulx": 759,  
    "uly": 505,  
    "ncols": 32  
  },  
  "state": "MANUAL",  
  "name": "clef.c"  
},  
"pitch": {  
  "strt_pos": "4",  
  "clef_pos": "None",  
  "note": "None",  
  "octave": "None",  
  "offset": "759",  
  "clef": "None",  
  "staff": "1"  
}
```

```
"glyph": {  
  "bounding_box": {  
    "nrows": 51,  
    "ulx": 874,  
    "uly": 541,  
    "ncols": 41  
  },  
  "state": "MANUAL",  
  "name": "neume.punctum"  
},  
"pitch": {  
  "strt_pos": "5",  
  "clef_pos": "5",  
  "note": "c",  
  "octave": "3",  
  "offset": "874",  
  "clef": "clef.c",  
  "staff": "1"  
}
```

```
"glyph": {  
  "bounding_box": {  
    "nrows": 57,  
    "ulx": 874,  
    "uly": 607,  
    "ncols": 41  
  },  
  "state": "MANUAL",  
  "name": "neume.punctum"  
},  
"pitch": {  
  "strt_pos": "7",  
  "clef_pos": "5",  
  "note": "a",  
  "octave": "2",  
  "offset": "874",  
  "clef": "clef.c",  
  "staff": "1"  
}
```



Stage
2 / 3

Stage
3 / 3

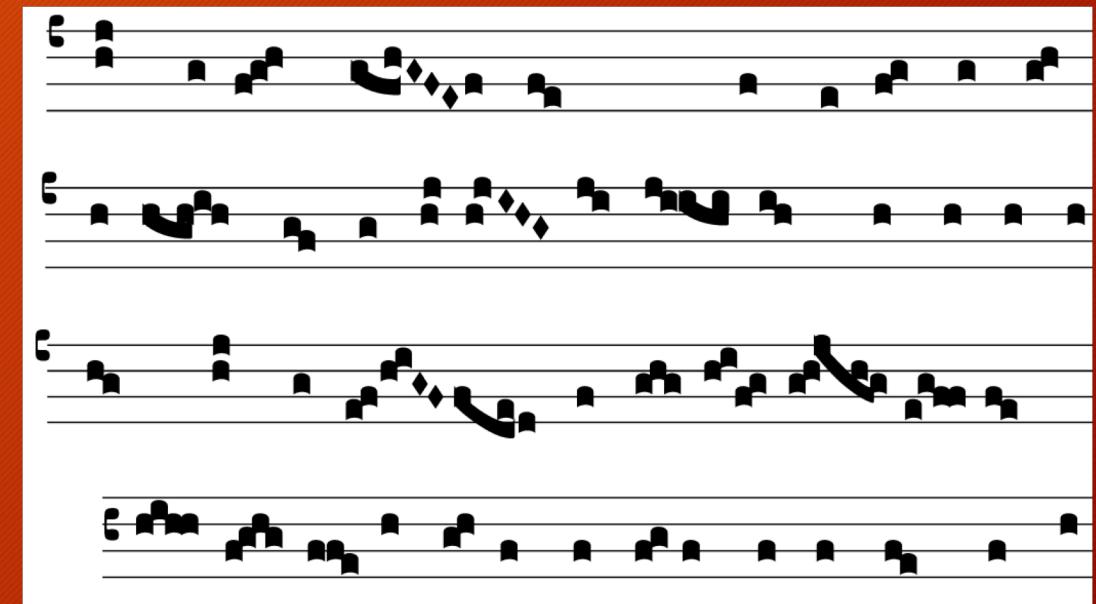
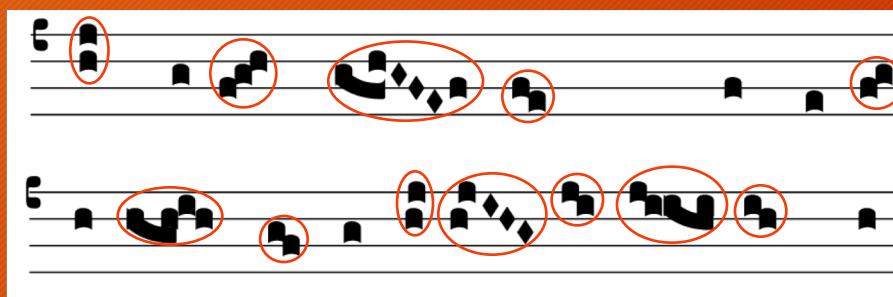
MEI Generation

JSOMR



MEI

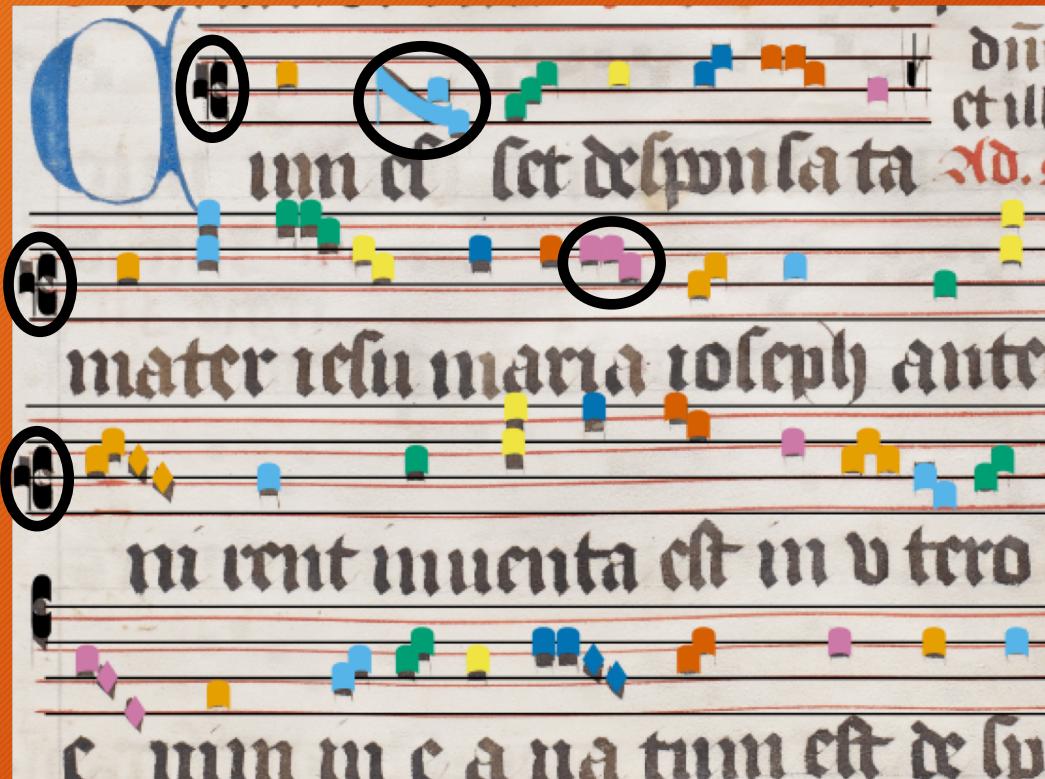
Grouping
Neume Components



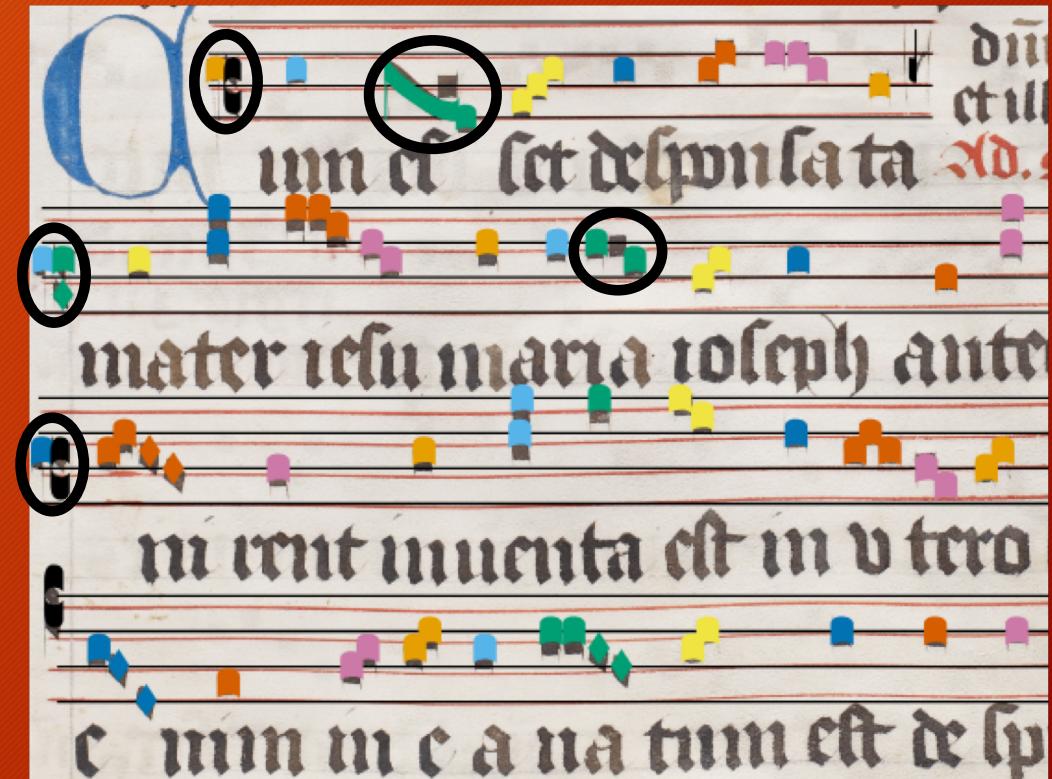
displayed in Neon2

Comparing Results

(Split Component)



Ground Truth



Automated Generation

Thank You



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Research Council of Canada

Conseil de recherches en
sciences humaines du Canada

Canada



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École de musique Schulich

DDMAL

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M M T

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in Music Media and Technology

*Fonds de recherche
Société et culture*

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WEST GRID