Technical Issues in Digitization of Large On-Line Collections of Phonograph Records (2)

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Metadata Extraction for LP Labels

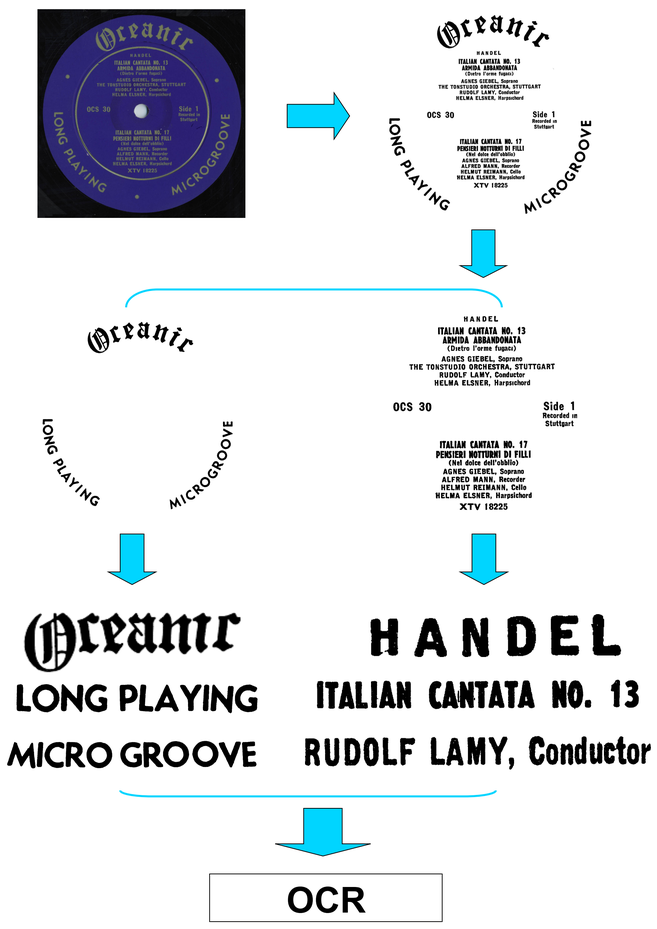
Composer: HANDEL

Title: Italian Cantatas No. 13, 17

Conductor: Rudolf Lamy

Automatic metadata extraction from LP record labels based on document analysis with *GAMERA* and connected component (CC) analysis.

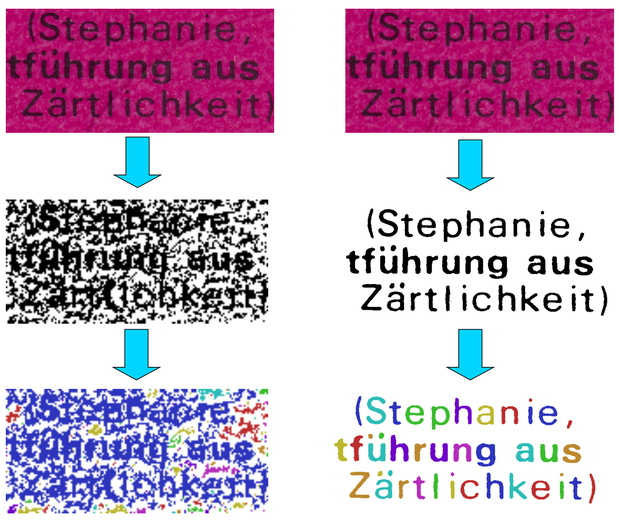
Approach Outline



Pre-Processing and CC Analysis

Color Quantization against Color Diffusion.

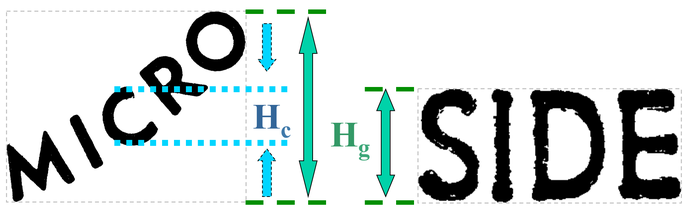
Before and After Color Quantization



Local Aggregation for CCs

Difficult to separate horizontal and curved text systematically, so aggregate locally close CCs first.

Horizontal vs. Curved Text



$$\frac{H_c}{H_g} = 1 \qquad \frac{H_c}{H_g} \approx 1$$

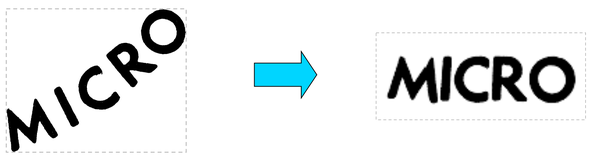
The variance of the CC baselines is another measure to distinguish between horizontal and curved character groups.

Separating Multi-line Curved Text

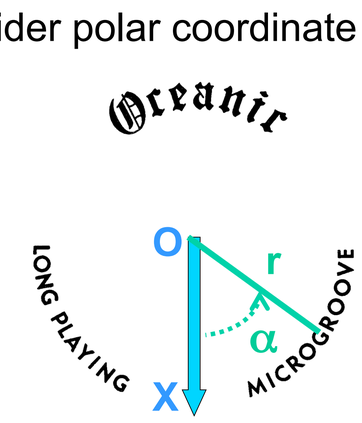
The multi-line curved strings are separated as concentric arcs relative to the label center.

Straightening Curved Text

Necessary for OCR.



Consider polar coordinate system



Rotation Angle: e.g., $\alpha \in [0, \pi/2)$

$$\theta = -\alpha$$

Inter-Character Space:

$$D_{n,n+1} = \frac{r_n + r_{n+1}}{2} \cdot \left| \alpha_{n+1} - \alpha_n \right|$$

Results

OCR Accuracies: (H: horizontal characters, C: curved characters, C1: non-straightened curved characters, C2: straightened curved characters, #: number of characters, Acc.: OCR character recognition rate)

	# of H	# of C	Acc. of H (%)	Acc. of C1 (%)	Acc. of C2 (%)
Label 1	204	20	99.02	0	100
Label 2	322	29	100	10.34	82.76
Label 3	259	162	100	0	99.38
Label 4	598	180	99.00	10.00	93.89

Future work

Track Segmentation:
- More features.
- Larger varied LP collections.

Metadata Extraction:
- Multi-color cases.
- Album covers and liner notes.

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