Muharaf (محرف): Manuscripts of Handwritten Arabic Dataset for Cursive Text Recognition

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USEK

LAH Lebanese Association for History الهيئة اللبنانية للتاريخ

NEURAL INFORMATION PROCESSING SYSTEMS

Manuscripts of Handwritten Arabic (Muharaf) dataset is a machine learning dataset of more than 1,600 historic handwritten page images transcribed by experts in archival Arabic with annotated text lines and various page elements.

Motivation

- Modern Standard Arabic: ~400 million native speakers.
- Massive existing collections, e.g., British library has ~15,000 works in ~14,000 volumes of Arabic manuscripts.
- Limited Arabic resources for handwritten text recognition (HTR) of scanned historic manuscripts.
- Most historic Arabic datasets in neat calligraphic writing.

Muharaf dataset

- “Muharaf” is Arabic for “typeface”.
- Historic Arabic manuscripts: 1800-2011.
- Images: 1,644.
- Text lines: 36,311.
- Text regions: 4,867 (main text, headings, floating).
- Muharaf-Public images: 1,216.
- Muharaf-Restricted images: 428.

Sample images from Muharaf dataset from (a) USEK Al Batroun Collection, (b) USEK Joseph El Hachem Collection, (c) KCLDS El-Khouri Collection, (d) KCLDS Nasrallah Collection, (e) USEK Papers of Kfarchima Municipality Collection, (f) KCLDS K. Joseph Collection, (g) USEK Amin Farhat Collection, (h) KCLDS T. Attallah Collection.

Contribution

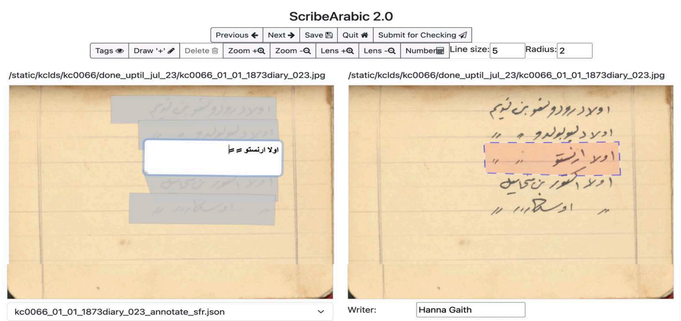
- Largest publicly available historic Arabic HTR dataset.
- Scanned manuscripts (not scribed like IAM [1], KHATT [2]).
- Ruq‘ah: casual/informal style of writing.
- Not calligrahic like RASM [3], RASAM [2].
- Type of manuscripts: letters, notes, poems, dialogs, legal records, church documents, official correspondences.
- Uses: handwritten text recognition, text-line segmentation, layout detection, writer identification.
- Challenges: ink bleeds, crossed-out text, barely legible handwriting, damaged paper.

Dataset	Page Count	Text Regions	Line Count
IAM [1]	1,539	1,539	13,353
RASAM [2]	300	676	7,540
RASM [3]	120	132	2,613
KHATT [4]	4,000	4,000	13,435
Muharaf-public	1,216	3,479	24,495
Muharaf-restricted	428	1,388	11,816
Muharaf	**1,644**	**4,867**	**36,311**

Comparison of Muharaf and other publicly available datasets.

ScribeArabic

Custom software used to annotate and transcribe images



Screenshot of ScribeArabic software.

Expert transcription team

- History professor from Lebanese Association for History.
- Two expert Arabic manuscript archivists at USEK.
- QA: history professors at USEK and KCLDS.

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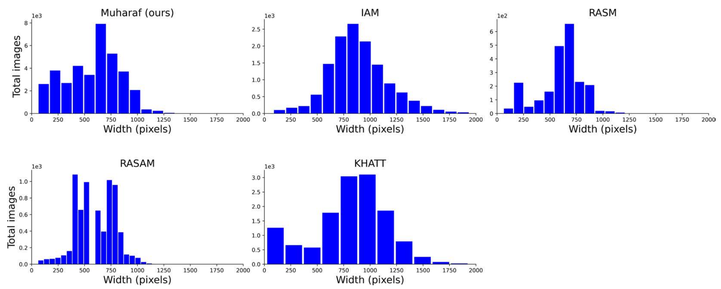
Packaged dataset

- Images (JPG) + Ground truths (JSON + PAGE-XML).
- Compatible with: PAGE-XML viewer [5] + Aletheia tool [6].
- Separate directory with warped, preprocessed line images and ground truths.



Comparison of the distribution of width of line images of Muharaf and other publicly available datasets.

Page elements

- Annotated page elements:
  - Main paragraph regions.
  - Floating text regions.
  - Page numbers.
  - Signature areas.
  - Graphics (logos, stamps).
- Page elements viewer included.

Viewer of different page elements.

Experimental results

Results using CNN based start, follow, read network [7]

Dataset	Split (Train, Validate, Test)	Level	CER	WER
Muharaf-public	(1100, 50, 66)	Page	0.157 ± 0.008	0.398 ± 0.007
		Line	0.181 ± 0.009	0.430 ± 0.011
Muharaf	(1500, 50, 96)	Page	0.134 ± 0.007	0.353 ± 0.012
		Line	0.149 ± 0.004	0.380 ± 0.004

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