

# Quick International Character Recognition (QUICR)

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MITRE Sponsored Research

# Problem

- Many documents of potential intelligence value are hard copy and contain handwritten foreign languages.
- Handwriting recognition technology for document triage is critical.
- Handwriting technologies for most low-density languages will not be commercially developed.

# Background

- **Each script and language pair presents a unique set of challenges to recognition algorithms.**
- **Example: Arabic Script**
  - Cursive
  - Right-to-left, with some left-to-right interspersed
  - Each character has up to four contextual variants
  - Number and location of dots distinguish characters
  - Diacritic marks around character indicate pronunciation
  - ...

# Objectives

- **Identify steps to rapidly modify existing handwriting system to handle new script / language pairs**
- **Compare algorithms for classification and recognition**
- **Expand ability to handle dots and diacritics**
- **Determine contribution of language models to recognition performance**
- **Create cross-lingual “super inventory” or hierarchy of character features**

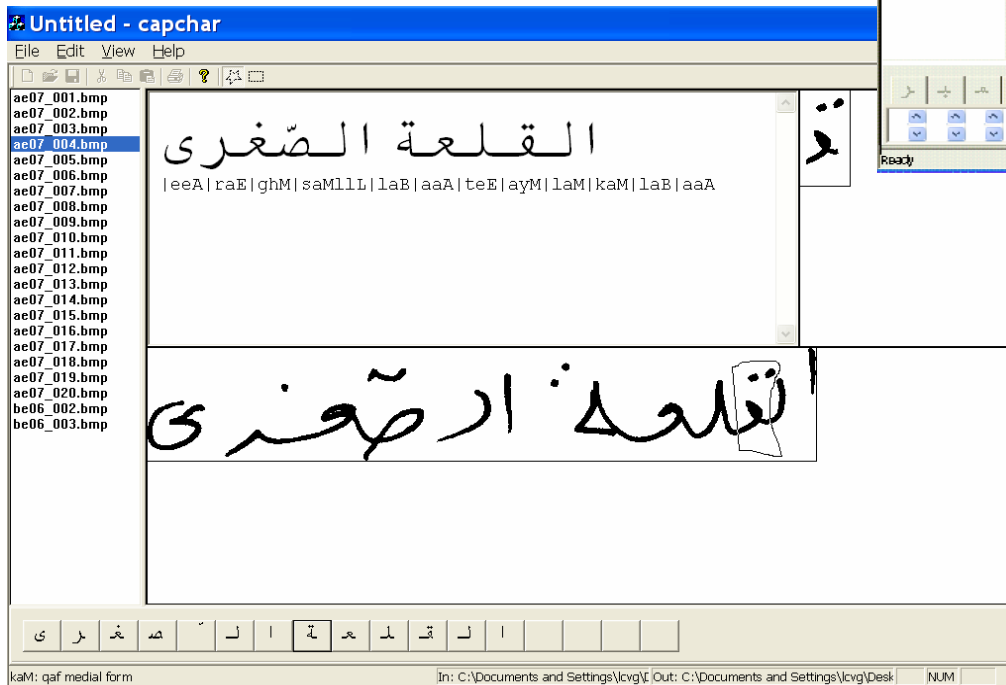
# Activities

- **Development of handwritten corpora and ground-truthing tools for public release**
- **Experimentation on handwritten Arabic**
  - Identification of symbol and feature set
  - Modification of dot and diacritic handling
  - Research on word matching algorithms
  - Exploration of language modeling techniques
- **Conversion to hybrid statistical – rule based approach**
- **Implementation of alternative machine learning approaches**

# Highlight: Corpus Collection

Page 1 of 16

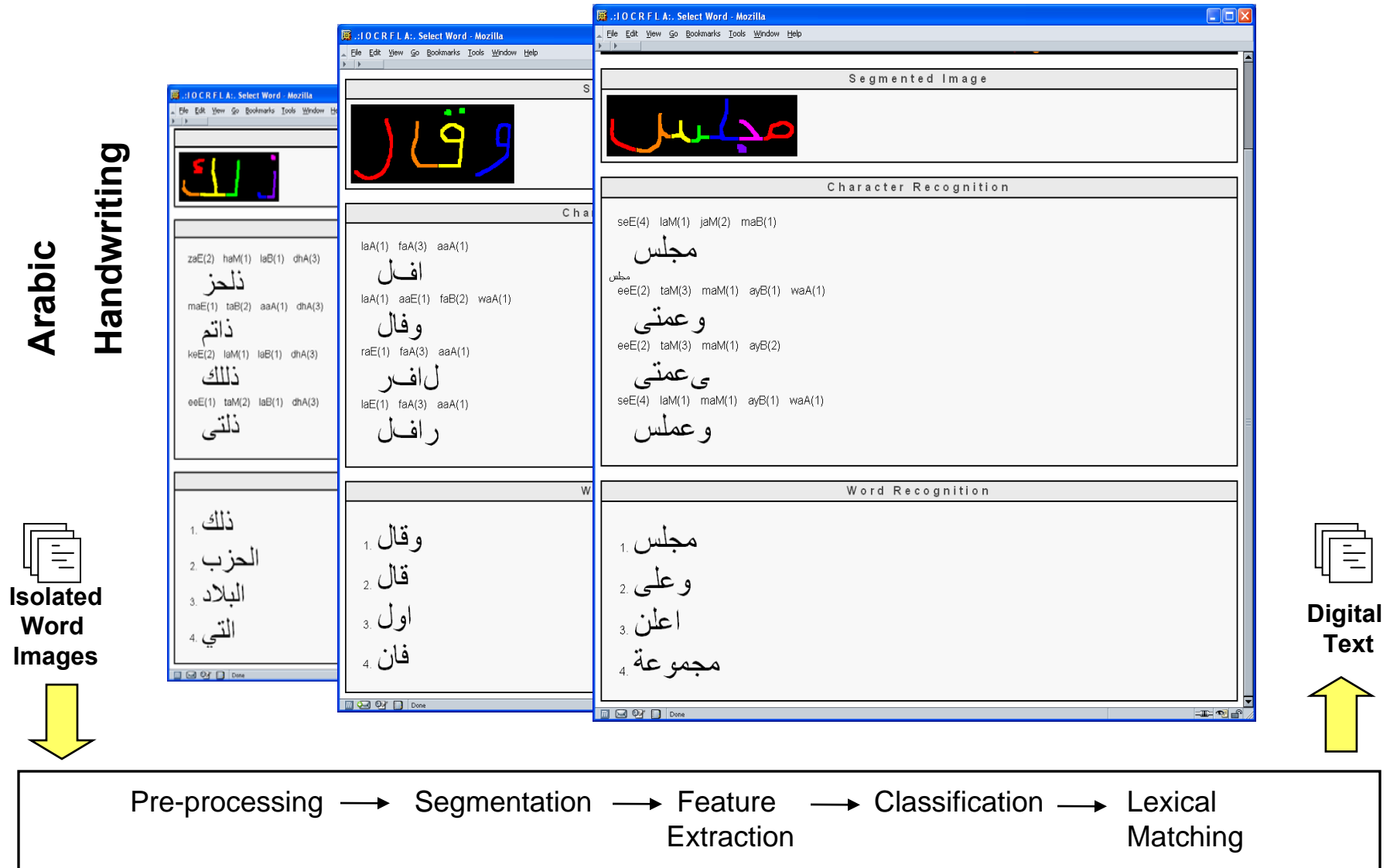
Repetition	Repetition	Repetition	Word	#
			شغماً	1
			مادرات	2



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# Demonstration



# Impacts

- **MITRE prepared to help address the next language processing crisis**
- **Prototypes for recognition of isolated word handwritten Arabic for technology transfer**
- **Publicly released source code and MITRE-developed corpora**
- **Publications, technical reports, and journal articles to contribute to the state of the research**

# Future Plans

- **FY05** Extend Arabic prototype for configurable features, classification algorithms, string matching; explore multiple machine learning approaches
- **FY06** Experiment with language modeling techniques, including phonotactic and syntactic models; gather data for second language
- **FY07** Generate prototype for second language; perform experiments in extending to third language/script combo, e.g., Korean