Problem Statement

The project, named XDOCS, aims at extending to a much wider audience the possibility to access a variety of historical documents published on the web. In this context, we develop a new word spotting technique able to extract document indexes in quasi-automatic mode from their handwritten contents. The devised solution is based on HOG descriptors and exploits Dynamic Time Warping technique to compare feature vectors elaborated from single handwritten words.

Indexing Pipeline

1. **Image Dewarping**
   - Aims at mapping the projection of the curved surface, represented by four polynomial lines, to 2D rectangular area with fixed dimensions.

2. **Word Extraction and Preprocessing**
   - Extracted Word
   - Binary Word
   - Cropped and Resized Word
   - Canny

3. **Word Matching Based on HOG Descriptor and Dynamic Time Warping**

   \[
   \text{MAP} = \frac{\sum_{i=1}^{N} \text{ap}@n_{i}}{N} \quad \text{ap}@n = \frac{\sum_{k=1}^{N} P(k)}{n_{\min}},
   \]

   \[
   \text{Intra and Inter dataset evaluation of word spotting algorithm with:}
   \]

   \(\text{– Mean Averages Precision (MAP) with cut-off at } C = \{5, 10, 15\}:
   \)

   \[
   \text{Correct Match First (CMF): percentage of queries with } P(1) = 1.
   \]

Experimental Results

### Intra and Inter dataset evaluation of word spotting algorithm with:

- **Mean Averages Precision (MAP)** with cut-off at \( C = \{5, 10, 15\}:

\[
\text{MAP}\@n = \frac{\sum_{i=1}^{N} \text{ap}@n_{i}}{N} \quad \text{ap}@n = \frac{\sum_{k=1}^{N} P(k)}{n_{\min}},
\]

- **Correct Match First (CMF):** percentage of queries with \( P(1) = 1.\)