

WORD MODELING FOR HANDWRITTEN WORD RECOGNITION

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Abstract

In this paper we investigate three different approaches for the global modeling and recognition of the words used to write the legal amount on French bank checks (27 lexicon entries), mainly written in *mixed cursive and discret* style. The first Model is a global one since it does not require any explicit letter level. The second Model is built to use the explicit concatenation of letter Models and is called "a letter reconstruction based approach". The third Model is able to give each grapheme its corresponding interpretation within a word (either part of a letter, letter or group of letters) and has been called a grapheme reconstruction based approach. To analyse the three approaches independently from a specific description, each of them uses the same segmentation process and feature set. The three approaches have been tested on real images of Bank Checks scanned for the French Postal Technical Research Service (SRTP).

1. Introduction

A computer unconstrained handwriting recognition has been the object of several studies over the past thirteen years and is still a challenging task [1][2][3]. Generally the difficulty of making a reading machine comes from the large variety of writing styles it has to deal with (from pure cursive to hand-printed). Furthermore, there is a wide diversity of handwriting even for the same writer. Up to now, the field of automatic handwriting recognition was only restricted to domains for which specific constraints could restrain the set of the possible solutions. But it is necessary to build reliable reading machines to read addresses on envelopes, amounts on bank checks,

handwritten letters... These various applications need a particular lexicon either static or dynamic restricting the possible solutions.

When dealing with dynamic or large lexicon, handwritten words can only be recognized by identifying each of their letter. Except for hand-printed styles, in which the segmentation of words into individual characters is relatively simple, many efforts have been made to overcome the segmentation paradigm [4]. The most sophisticated approaches now include a segmentation-recognition scheme [5][6] to guide the segmentation process by the classification results.

With applications dealing with small lexicon (a few dozen) the segmentation paradigm can be overcome by using a global recognition scheme of individual words thanks to a suited description. From this point of view, ligature between cursive letters are not taken into account in the word image. Consequently, neither the learning nor the recognition of word models require the knowledge of segmentation statistics. This could be the most ideal approach for word recognition but it is rather limited to a restricted vocabulary since it involves the computation of a matching score for each of the lexicon entries.

In this paper we investigate three different approaches for the global modeling and recognition of the words used to write the legal amount on French bank checks (27 lexicon entries), mainly written in *mixed cursive and discret* style. In section 2 we describe the three different modeling. In section 3 a brief description of the features used is given, as well as the principle of the segmentation process. Section 4 is devoted to the learning of the global word models and recognition results are presented on

