

PREFACE

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In 1979–80, when I was becoming interested in automatic signature verification, I began testing the waters to find out if a research project in this domain would be of any interest in my milieu. Friends and colleagues were very encouraging, but added a note of caution. This would undoubtedly be an interesting application, they said, an original, down-to-earth project in keeping with the aims and objectives of an engineering school. However, they felt that perhaps it would be unwise to become involved in what was then a fairly limited, highly specialized domain. What would I do when it was over, in two or three years, when my system was up and running?

At the time, I didn't really know how to answer that question. Full of youthful enthusiasm, I too believed that we would succeed in developing a functional prototype within a fairly short period of time. I did have a feeling, though, that the problem would not be nearly as simple as we had at first thought, that there would be a few surprises, perhaps a Pandora's box full!

Over the years, and with occasional schedule delays, we have succeeded in developing several systems. The one with the best performance, which is described in this book, was recently patented. As time went by, these prototypes, while increasingly promising from a practical point of view, revealed the existence of many problems that I had not anticipated. On the positive side, I very happily became aware of the extent of the research domain into which I had ventured.

Signature verification is a domain that is highly specialized, but at the same time very general. On one hand, the practical objective is clear and precise: to develop a system capable of verifying the identity of an individual based on an analysis of his or her signature through a process that discriminates a genuine signature from a forgery. On the other, the achievement of this objective requires that the researcher takes an interest in a host of related domains: the psychophysics of perception and movement, computer architectures, digital signal and image processing, shape recognition, knowledge representation, theories of learning, the man-machine interface, systems security, the forensic sciences, etc. The varied points of view of these disciplines enable researchers in signature verification to widen their horizons and to approach practical problems from a richer perspective. Does the signature not contain a great deal more information than is apparent at first glance? What are the many facets of the signer's identity that can be revealed by his or her signature? Shouldn't we explore all possible avenues of automatic signature verification in order to arrive at the best performance for a given application?

In this book, we have highlighted some of the multidisciplinary aspects of automatic signature verification by including work that is currently examining them.

The first two chapters serve as an introduction to the book. The first, by F. Leclerc and R. Plamondon, constitutes a review of the literature of the past five years, updating the in-depth survey published in 1989 by Plamondon and Lorette in the journal, *Pattern Recognition*. As far as we know, all the major projects undertaken in recent years in the domain have been included in this article and are briefly discussed. The second chapter consists of a paper by M.C. Fairhurst and P. Brittan, addressing a problem that is common to both static and dynamic systems, which is the use of parallel strategies to construct and optimize feature vectors to describe a signature, with the help of transputer arrays.

The remaining six chapters are divided into two sections: research on static systems and research on dynamic systems.

The first paper in the section on off-line systems, by H. Cardot, M. Revenu, B. Victorri, and M.-J. Revillet, describes a system, based on cooperative neural networks, that has been developed for automatic processing of signatures on checks. The second paper, by I. Yoshimura and M. Yoshimura, addresses the specific problem of background removal and proposes a preprocessing procedure to eliminate background patterns. The third paper by R. Sabourin, R. Plamondon, and L. Beaumier, describes a model-based system that segments the signature into elements which are then processed locally and globally to evaluate the similarity between two specimens.

The first paper in the section on on-line systems, by W. Nelson, W. Turin, and T. Hastie, compares three verification methods, based on statistical models of signature features, using the same benchmark. The second paper by G. Dimauro, S. Impedovo, and G. Pirlo, describes a step-wise verification method based on the analysis of the signature components. The third and final paper, by R. Plamondon, describes the different design phases of an operational system, focusing on the various decisions that have to be made throughout the development of such a prototype.

The papers in this book are also published in a special issue of the *International Journal of Pattern Recognition and Artificial Intelligence* (Volume 8, Number 3, 1994). Many people have been directly or indirectly involved in the production. I would like first of all to thank Professor Patrick Wang, Co-Editor-in-Chief of *IJPRAI* who offered me the job of Guest Editor, and Ms. Jennifer Gan, Senior Editor at World Scientific Publishing Co., for her assistance and timely advice. I would also like to sincerely thank the outside reviewers who evaluated the papers submitted. Their uncompromising assessments and constructive suggestions contributed greatly to the quality of the articles that were ultimately selected. Finally, I would like to mention the highly competent and tireless assistance of Mrs. Hélène Dallaire, Secretary for the Département de Génie Électrique et de Génie Informatique throughout the various stages of production of this volume.