

Preface

It is hard to say what started first, the perpetual drive of humans to understand their place in the world, or the perpetual challenges the world gives to humans, forcing us to evolve as intelligent beings capable of critically analyzing our environment and making (for the most part) sensible decisions. While this question might never be fully answered by historians and philosophers, it provides a rich soil on which fruits of knowledge could be pastured, cherished, gathered, and shared freely among others.

Over the course of human history, sharing such knowledge has taken on many different forms: from pre-historic cave drawings found in Andalusia, Spain, to Egyptian clay tables now on display in Louvre, France, from Ancient Mediterranean papyrus writing to encyclopedia Britannica, from Julius Ceasar's Roman calendar to Wikipedia, there are various forms the knowledge can take. While some of its most noble carriers who rightfully take their place in history believe in sharing it freely with the world—through pupil tutoring, creation of academies, and free public lectures—some also realize the power and competitive edge the knowledge can bring. Thus, almost as old as writing, encryption methods have been introduced; secret files and protocols were established, and some literary works were prohibited from being displayed in public. Ceasar's ciphers, Enigma machines, RSA private-public encryption, digital signatures, watermarking, and firewalls are only a few examples of how information can be protected from unwanted eyes. Thus, the area of biometrics comes to light, addressing the unresolved balance between the privacy and security, between overt and covert data collection, between high secrecy surrounding some algorithm developments, and the need to disseminate the research to the wildest population possible.

The foundation for this book is the research conducted at the Biometric Technologies Laboratory, established at the University of Calgary in 2001. The methodology presented in Part I and Part III of the book introduces reader to the biometric field and describes general directions of research conducted by members of BT lab. It includes applications of neural networks, intelligent processing, context-based methods to security problems in biometric recognition and virtual reality domains. Part II of the book is written in collaboration with a doctoral student of the BT Lab, working on Markov Chains and Fuzzy logic for rank-level fusion.

It gives me great pleasure to invite the reader for a journey into the area of biometric security, intelligent agents, self-replicating robots, virtual entities, multi-modal biometrics, data fusion, fuzzy logic, neural networks, and social behavioral profiling, and leaving him/her to emerge with perhaps a slightly changed perception of the world and his/her own journey in it.

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