The workings of the brain have fascinated me since childhood. I had observed with interest that whenever a question was asked in the classroom many different answers were given. Every classmate was thinking and perceiving the same question from an entirely different viewpoint and thus an answer was given according to their own particular perspective. This diversity in perspective is so profound. It adds even more dimension to the world around us. We (humans) have a depth of visualization so powerful that we can close our eyes and... imagine. Imagination is timeless, boundless, unlimited and it happens right there in a few cubic centimeters of soft matter, the brain. Close your eyes and you can "see" faces you have not seen for years or "smell" summer fragrances in the middle of the winter; or "travel" through space, crossing distant galaxies with an incomprehensible speed that defies all laws of physics. Close your eyes and you can create ideas that never before existed. Someone "saw" a wheel for the first time and made a cart; another heard the first music before music was sung. Someone for the first time "saw" the benefit of the volcanic fire and used it to warm houses, to cook, to extract metals from rocks, and to make tools and weapons. And this inventiveness continues to this day. We "saw" the invisible forces of matter, controlled them, and produced electricity, we made radios and computers and we escaped into space. So, is it surprising that for many years this mind-boggling power of the brain has been the subject of research?

I have been compiling information about the biology of the brain and sifting through articles and studies on neural research for quite a few years now. As a physicist and an engineer, I wanted to understand the mechanics and innerworkings of the brain. As soon as I had an organized set of notes that I thought had pedagogical value, I decided to give a tutorial in neural
networks at the Globecom '91 communications conference. To the best of my knowledge, such a tutorial had not been presented previously at any communications conference and I thought this would be a good chance to find out how much interest there is in this area. We expected a relatively small audience. To our surprise, we had an overwhelming attendance—a full house. The feedback I received at the end of the tutorial was very enthusiastic. I therefore enhanced my tutorial notes, simplified certain math-intensive sections, and included fuzzy logic and fuzzy neural networks. I also organized conference sessions on neural networks and fuzzy logic. Although participation was small at first, it has steadily increased. The interest from the communications community alone has so increased that, in 1993, a conference was organized on neural networks in communications. I presented my tutorial a few more times and, every time, the audience suggested that I should publish my notes as a book.

The intention of this book is to provide an introduction to the subject of neural networks, fuzzy logic, and fuzzy neural networks; to provide, in a coherent and methodical manner, the concepts of neural networks and fuzzy logic with easy to understand examples that describe a number of applications in a nonmathematical way; to address a need of the scientific community that other books in neural networks and in fuzzy logic do not address; and to provide a linkage between neural networks and fuzzy logic. The majority of books I have seen on this subject require a level of expertise to understand the material. Some, however, are invaluable tools for the connoisseur. The material and depth of this book was prepared for those who want an introduction to neural networks and fuzzy logic but need more than a tutorial. For a more advanced textbook, IEEE PRESS, as well as other publishers, has a number of them available by catalog. I wish you happy and easy reading.