Foreword

It is an honor to write a foreword for Roy Davies' new edition of Computer and Machine Vision, now entitled *Computer Vision: Principles, Algorithms, Applications, Learning*. This is one of the major books in Computer Vision and not just for its longevity, having now reached its Fifth Edition. It is actually a splendid achievement to reach this status and it reflects not only on the tenacity and commitment of its author, but also on the achievements of the book itself.

Computer Vision has shown awesome progress in its short history. This is part due to technology: computers are much faster and memory is now much cheaper than they were in the early days when Roy started his research. There have been many achievements and many developments. All of this can affect the evolution of a textbook. There have been excellent textbooks in the past, which were neither continued nor maintained. That has been avoided here as the textbook has continued to mature with the field and its many developments.

We can look forward to a future where automated computer vision systems will make our lives easier while enriching them too. There are already many applications of Computer Vision in the food industry and robotic cars that will be with us very soon. Then there are continuing advancements in medical image analysis, where Computer Vision techniques can be used to aid in diagnosis and therapy by automated means. Even accessing a mobile phone is considerably more convenient when using a fingerprint and access by face recognition continues to improve. These have all come about due to advancements in computers, Computer Vision, and applied artificial intelligence.

Adherents of Computer Vision will know it to be an exciting field indeed. It manages to cover many aspects of technology from human vision to machine learning requiring electronic hardware, computer implementations, and a lot of computer software. Roy continues to cover these in excellent detail.

I remember the First Edition when it was first published in 1990 with its unique and pragmatic blend of theory, implementation, and algorithms. I am pleased to see that the Fifth Edition maintains this unique approach, much appreciated by students in previous editions who wanted an accessible introduction to Computer Vision. It has certainly increased in size with age, and that is often the way with books. It is most certainly the way with Computer Vision since many of its researchers continue to improve, refine, and develop new techniques.

A major change here is the inclusion of Deep Learning. Indeed, this has been a major change in the field of Computer Vision and Pattern Recognition. One implication of the increase in computing power and the reduction of memory cost is that techniques can become considerably more complex, and that complexity lends itself to application in the analysis of "big data." One cannot ignore the performance of deep learning and convolutional neural networks: one only has to peruse the program of top international conferences to perceive their revolutionary effect on research direction. Naturally, it is early days but it is good to have

guidance as we have here. The nature of performance is always in question in any system in artificial intelligence and part of the way to answer those questions is to consider more deeply the architectures and their basis. That again is the function of a textbook for it is the distillation of research and practice in a ratiocinated exposition. It is a brave move to include Deep Learning in this edition, but a necessary one.

And what of Roy Davies himself? Following his DPhil in Solid State Physics at Oxford, he later developed a new sensitive method in Nuclear Resonance called "Davies-ENDOR" (Electron and Nuclear Double Resonance) which avoided the blind spots of its predecessor "Mims-ENDOR." In 1970 he was appointed as a lecturer at Royal Holloway and a long series of publications in pattern recognition and its applications led to the award of his Personal Chair, his DSc and then the Distinguished Fellow of the British Machine Vision Association (BMVA), 2005. He has served the BMVA in many ways, latterly editing its Newsletter. Clearly the level of his work and his many contacts and papers have contributed much to the material that is found herein.

I look forward to having this Fifth Edition sitting proudly in my shelf, replacing the Fourth that will in turn pass to one of my student's shelves. It will not stop there for long for it is one of the textbooks I often turn to for the information I need. Unlike the snapshots to be found on the Web, in a textbook I find it placed in context and in sequence and with extension to other material. That is the function of a textbook and it will be well served by this Fifth Edition.

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