Acknowledgment

It's a great pleasure to acknowledge all who have helped me during my doctoral work. The person who deserves a special mention is my supervisor Prof. Ram Ramaswamy who provided support and guidance throughout the work. He has played an important role in inducing interest in statistical methods and nurturing it further. His feedback on my scientific approach as well as on presentation has helped me to improve considerably. I also learnt skills of scientific writing by his critical comments and suggestions on the manuscripts, and this thesis. He encouraged me to question hypotheses and helped me to formulate new approaches for carrying out research work.

Another person whose contribution has been very valuable is my collaborator Dr. Rajeev K. Azad. He has been of immense help in implementation of Markov segmentation. He was always there to clear my small doubts and answer my queries promptly.

I also got generous support from the former Dean of our School, Prof. Alok Bhattacharya. He has been very accessible, and suggested me several potential applications of my work. I specially thank him for taking pains to provide financial help after the tenure of my senior research fellowship was over.

The faculty of CCBB have been very supportive and helped me whenever I approached them with a problem. Dr. Andrew Lynn helped with installation/usage of softwares. Dr. Narinder Sahni guided me in implementing the supervised clustering method. Prof. Rahul Roy provided his help for problem related to statistics. I presented a poster in STATPHYS-22 conference in collaboration with Dr. Himanshu Agarwal.

Members of my doctoral committee, Prof. Karmeshu (SCSS, JNU), Prof. Abhay Bhatt (ISI, Delhi), Prof. J. Subba Rao (SES, JNU), Dr. A. Krishnamachari, and Dr. Andrew Lynn, made their availability for the meetings, and their suggestions helped considerably in shaping my work.

Collaboration with the team of Prof. Deepti Deobagkar and Ashwin Kelkar has been very instructive and helped me see the potential application of the theoretic techniques we developed. I found the discussions with Ashwin very insightful.

My PhD journey has been very special, courtesy my colleagues, Anchal, Diwani, Raghu, Alok, Hemant, Payal, Candida, Vikram, Anupama, Soumya, Kamal, Sonika, Rajeev and Rithun. They have been more like a family with whom I shared the moments of joy and sadness. Anchal has always been there to help both at personal as well as professional level.
It was Dhwani and Anchal who spared their time in discussing the problems/developments related to my work. For technical problems it was Soumya, Hemant, and Raghu whom I always looked upon.

My friends - Sunil, Manish, Inder, Ravinder, Ruchi, Satyendra, Manoj, Amit, Rohit, Bharat, Sri Devi, Falguni, Anupama Bhat, Roshan, Ambrish, Azeet, Anupam, Mayank, Prabhat and Prashant have been inevitable part of the PhD days.

I also thank some of my old friends Alok, Kislay, Manibhushan, and Pranay who were quite excited about my decision to pursue research.

The SIT office staff have been most cooperative and have been very helpful during past six years.

I acknowledge the financial support from University Grants Commission and DBT-CoE.

My parents have been important pillars of support as they gave freedom that I could dream of pursuing research, which was an unconventional career option. My brother and sisters made every effort in sharing my non-academic workload as well as the difficulties during the challenging phases of my PhD days. My grandmother and other family members have also been very encouraging.

Finally I thank almighty God who brought me to a platform where I could understand the broader meaning of education.

Vivek