

REALTIME APPLICATIONS OF DEEP LEARNING

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PREFACE

Pneumonia is a life-threatening infectious disease affecting one or both lungs in humans commonly caused by bacteria called *Streptococcus pneumoniae*. It is one of the largest infectious diseases that cause death in children and elderly people across the globe.

Pneumonia impacts all the elderly and young people's families and children everywhere but is most prevalent in Sub-Saharan Africa and South Asia. One in three deaths in India is caused due to pneumonia as reported by World Health Organization (WHO). Chest X-Rays which are used to diagnose pneumonia need expert radiotherapists for evaluation. Doctors must do a lot of certain tests to identify if the patient has Pneumonia or not. To solve the cumbersome problem, developing an automatic system for detecting pneumonia would be beneficial for treating the disease without any delay particularly in remote areas.

Two models have been developed for pneumonia detection namely SimpleVGG like Convnet and VGG16, both the deep learning models have shown a remarkable accuracy in detection of pneumonia. The VGG16 model has achieved accuracy more than Simple VGG like Convnet, which is 90%. In India a countless number of children are reported missing every year. Among the missing child cases a large percentage of children remain untraced. It implements deep learning methodology for identifying the reported missing child from the photos of multitude of children available, with the help of face recognition.

The public can upload photographs of suspicious children into a common portal with landmarks and remarks. The photo will be automatically compared with the registered photos of the missing child from the repository. Classification of the input child image is performed and photo with best match will be selected from the database of missing children. For this, a deep learning model is trained to correctly identify the missing child from the missing child image database provided, using the facial image uploaded by the public.

The Convolutional Neural Network (CNN), a highly effective deep learning technique for image based applications is adopted here for face recognition. Face descriptors are extracted from the images using a pre-trained Convolutional Neural Network (CNN) model Visual Geometric Group (VGG)-Face deep architecture. Compared with normal deep learning applications, so the algorithm uses convolution network only as a high level feature extractor and the child recognition is done by

the trained KNN classifier. Choosing the best performing Convolutional Neural Network (CNN) model for face recognition, Visual Geometric Group (VGG)-Face and proper training of it results in a deep learning model invariant to noise, illumination, contrast, occlusion, image pose and age of the child and it outperforms earlier methods in face recognition based missing child identification.

Throughout this book, the main emphasis is on a practical and hands-on approach, providing examples and case studies, to reinforce the understanding of Deep Learning and techniques.

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