

人臉偵測與基於鑑別性特徵之超暗人臉辨識

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摘要

近年來，人臉識別的技術廣泛地應用於我們的日常生活上，例如：公共安全、監控系統、身分認證與通行控制等。由於其非侵入之特性，人臉識別是生物辨識系統中最廣為人們所接受的技術。此外，這項技術更可以延伸至人機介面的研究上，由於人臉識別技術具備無限的發展潛力，使得未來智慧型人類生活的實現變成可能。此外，人臉識別技術也可應用於基於內容的影像檢索與醫學影像處理上。人臉偵測最重要的兩個困難點就是人臉追蹤與定位。膚色擷取通常是人臉偵測中最重要的前處理步驟，因為它具備有角度、姿勢與表情等不變性。但是基於膚色的偵測方法，在複雜的背景或變化的光線環境中並不可靠。為了解決光線變化的問題，本研究提出適應性膚色模型切換方法並結合AdaBoost進行人臉追蹤。適應性膚色模型切換的方法是透過一個定義良好的品質指標來加以決定。接著再針對人臉候選區域利用AdaBoost來進一步驗證候選區域是否為人臉。根據實驗結果顯示：本研究所提方法在陰暗、側光與背光的環境中，皆有強健性的表現，本方法花費的時間平均約為每幀60ms，人臉偵測率為94.4%。在超低亮度環境下的人臉辨識，本研究首先採用直方圖匹配(Histogram matching)作為人臉辨識的前處理，本研究同時與Local Binary Patterns比較結果；其次使用線性鑑別分析法(Linear Discriminant Analysis; LDA)提取人臉的特徵。最後在特徵分類方面本研究除採用支持向量機(Support Vector Machine; SVM)進行人臉特徵辨識外，同時也比較歐氏距離(Euclidean Distance)與餘弦距離(Cosine Distance)之分類結果。本研究人臉辨識實驗使用Yale Face Database B資料庫，實驗結果顯示在超暗環境下之影像經過直方圖匹配可有效的將影像還原，配合SVM分類器其辨識率更可高達96%。

關鍵詞：人臉辨識、人臉偵測、膚色分割、支持向量機

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