Library Book Counting Based on the Image Recognition of Book Spines and Color Labels

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With the construction of libraries in small communities, book inventory and management have become labor-intensive and resource-consuming. In order to save manual labor, this research enabled librarians to quickly count books by merely taking a picture of a row of books. This research proposed an information acquisition algorithm for the number and categories of books on library bookshelves based on the feature extraction of book spines and color labels. The algorithm in this paper included image preprocessing based on Canny operator and histogram equalization, spine and color label segmentation based on the processing of image matrix, and color classification based on RGB extraction and threshold determination. We proposed a novel algorithm for detecting boundaries between book spines based on a recursive strategy on the binary image and compared it with the Hough transform. Book images were randomly collected in our school library. The accuracy of book quantity recognition was approximately 94%, and the accuracy of color label recognition, or book classification, was approximately 86%. Our spine detection algorithm was averagely 30% faster than the line detection by Hough transform. The results indicated that the algorithm could detect the number and categories of books. Therefore, this solution for library book counting based on spine segmentation and color label recognition is applicable. The experiment suggested that our spine detection algorithm has lower time complexity than Hough transform. Therefore, this algorithm also has high efficiency.

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