ARABEX: Automated Dotted Arabic Expiration Date Extraction using Optimized Convolutional Autoencoder and Custom Convolutional Recurrent Neural Network

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Abstract : In this paper, we introduced an approach for Automated Dotted Arabic Expiration Date Extraction using Optimized Convolutional Autoencoder (ARABEX) with bidirectional LSTM. This approach is used for translating the Arabic dot-matrix expiration dates into their corresponding filled-in dates. A custom lightweight Convolutional Recurrent Neural Network (CRNN) model is then employed to extract the expiration dates. Due to the lack of available dataset images for the Arabic dot-matrix expiration date, we generated synthetic images by creating an Arabic dot-matrix True Type Font (TTF) matrix to address this limitation. Our model was trained on a realistic synthetic dataset of 3287 images, covering the period from 2019 to 2027, represented in the format of yyyy/mm/dd. We then trained our custom CRNN model using the generated synthetic images to assess the performance of our model (ARABEX) by extracting expiration dates from the translated images. Our proposed approach achieved an accuracy of 99.4% on the test dataset of 658 images, while also achieving a Structural Similarity Index (SSIM) of 0.46 for image translation on our dataset. The ARABEX approach demonstrates its ability to be applied to various downstream learning tasks, including image translation and reconstruction. Moreover, this pipeline (ARABEX+CRNN) can be seamlessly integrated into automated sorting systems to extract expiry dates and sort products accordingly during the manufacturing stage. By eliminating the need for manual entry of expiration dates, which can be time-consuming and inefficient for merchants, our approach offers significant results in terms of efficiency and accuracy for Arabic dot-matrix expiration date recognition.

Keywords : computer vision, deep learning, image processing, character recognition

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