Optical Character Recognition Algorithms: Reading, Playing, and Converting Music to Braille

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Optical Character Recognition (OCR) refers to the recognition of printed characters by a computer. While there are many different algorithms for OCR, they fall into two main categories: Matrix Matching and Features Extraction. This project uses the latter type of algorithm to read simple music (such as Christmas Carols) from scanned copies of music sheets and play it back to the user. The analysis involves object detection algorithms to extract notes and rhythms from the music sheet. The problem is complicated by the presence of symbols on the scanned music other than notes, such as rests, lyrics, or accidentals, to name a few. These extra complexities lead to the existence of “false positives” and “false negatives”. A false negative occurs when the algorithm fails to detect an actual musical note. A false positive occurs when the algorithm wrongly identifies markings other than notes as musical notes. Once all the objects on the music sheet are analyzed and recognized by the algorithm, it plays out these notes for the user to hear. This is done by generating sound waves and makes sure the timing of the sounds corresponds to the detected rhythms. Different music gives different results. For example, the sample sheet “Twinkle Twinkle Little Star” gave 4 false negatives and 0 false positives when played, however “Happy Birthday” gave 1 false negatives and 2 false positives. The project aims to improve on existing object recognition algorithms and help make object detection more efficient to ultimately produce better OCR methods for music recognition.

Awards Won: