

ABSTRAK

Segmentasi citra merupakan salah satu upaya pendekatan dalam analisis dan pengenalan citra manuskrip yang dapat membantu proses digitalisasi naskah-naskah kuno. Proses segmentasi pada citra manuskrip adalah pemisahan struktur naskah menjadi bagian-bagian seperti baris dan objek aksara sehingga mendukung proses alih aksara.

Penelitian ini bertujuan untuk melihat kemampuan metode *Four Directional Depth First Search* (4-Directional DFS) dan metode *Projection Profile* dalam menyegmentasi sebuah citra manuskrip beraksara Jawa tulisan tangan. Proses segmentasi dibagi menjadi dua bagian, yaitu segmentasi baris menggunakan metode *Projection Profile* dan metode (4-Directional DFS) untuk segmentasi objek aksara. *Projection Profile* digunakan untuk mendeteksi posisi dan keberadaan baris aksara dalam citra dengan memanfaatkan distribusi proyeksi piksel. Sementara itu, (4-Directional DFS) bekerja mengelompokkan piksel terhubung dalam empat arah guna menyegmentasi objek aksara.

Untuk menguji keberhasilan metode, dalam penelitian ini digunakan data sebanyak 10 halaman dari masing-masing buku “Serat Pratanda” dan buku “Serat Primbon Reracikan Jampi Jawi” yang diambil secara acak. Setiap citra terlebih dahulu dilakukan *preprocessing* awal (*grayscale* dan binerisasi) untuk mendapatkan citra biner, karena metode yang digunakan memerlukan *input* berupa citra biner. Selanjutnya setiap citra akan dikenai dua perlakuan, yaitu dengan *preprocessing* lanjut dan tanpa *preprocessing* lanjut.

Hasil penelitian menunjukkan akurasi rata-rata segmentasi baris, mencapai 100% pada kedua perlakuan citra. Pada segmentasi objek aksara, didapatkan nilai akurasi rata-rata mencapai 91.02% dengan *preprocessing* lanjut dan 84.28% tanpa *preprocessing* lanjut. Kesalahan segmentasi berupa *over-segmentation* dan *under-segmentation*. Dengan demikian, disimpulkan metode segmentasi terbukti berhasil dalam menyegmentasi baris dan objek aksara, terutama pada *preprocessing* lanjut yang disesuaikan kembali dengan karakteristik citra manuskrip. Penelitian ini diharapkan dapat menjadi pemantik pengembangan dalam proses alih aksara Jawa.

Kata Kunci: segmentasi, aksara Jawa, *projection profile*, *four directional depth first search*

ABSTRACT

Image segmentation is one approach used in the analysis and recognition of manuscript images, which can support the digitization of ancient texts. In manuscript images, the segmentation process involves separating the manuscript's structure into components, such as text lines and character objects, thereby facilitating the transliteration process.

This research evaluates the capabilities of the Four-Directional Depth First Search (4-Directional DFS) method and the Projection Profile method in segmenting handwritten Javanese script manuscripts. The segmentation process is divided into two stages: line segmentation using the Projection Profile method, and character object segmentation using the 4-Directional DFS method. The Projection Profile method detects the position and presence of text lines in the image by analyzing the distribution of pixel projections, while the 4-Directional DFS method groups connected pixels in four directions to segment character objects.

To evaluate their effectiveness, 10 randomly selected pages from two manuscripts, “Serat Pratanda” and “Serat Primbon Reracikan Jampi Jawi”, were used. Each image first undergoes initial preprocessing (grayscale conversion and binarization) to produce binary images, as both methods require binary input. Subsequently, images were subjected to two treatments: with and without advanced preprocessing.

The results show that line segmentation achieved an average accuracy of 100% for both treatments. For character object segmentation, the average accuracy reached 91.02% with advanced preprocessing and 84.28% without it. Segmentation errors observed include over-segmentation and under-segmentation. Based on these findings, it is concluded that the segmentation methods are effective in segmenting both lines and character objects, particularly when advanced preprocessing is tailored to the characteristics of each manuscript image. This study is expected to serve as a foundation for further development in the process of Javanese script transliteration.

Keywords: *segmentation, aksara Jawa, projection profile, four directional depth first search*