# Vector-based Morphological Operations On Polygons Using Straight Skeletons For Digital Pathology

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**Abstract**

In this work we present an efficient implementation of vector-based mathematical morphology operators applied to simple polygons by performing wavefront propagation and computing polygon straight skeletons. In Digital Pathology (DP), the slide scanner generates important volume of images from tissues called Whole Slide Image (WSI). The main goal of the DP is to detect the biological stained structures in order to quantify the tissue pathology, such as lesions or cancerous regions. We propose the use of Adapted Straight Skeletons on polygons as an efficient technique in time and memory, to improve image segmentation and image analysis. Thanks to the use of polygons instead of bitmaps to store segmentation results, the performance of straight skeletons depends only on the polygon control points.These straight skeletons can be applied in order to perform fast morphological operations such as dilation, erosion, closing, opening, skeletonizing. When combined, these operations offer different interesting outcomes: i) multiple disjoint-segmented shapes can be linked together to create a joint skeleton, ii) the topological structure of segmentation can be extracted as a straight skeleton. Then, it can be used as features for structural and spatial tissue analysis.

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