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Towards machine learning-based segmentation of zigzag patterns in BSA film micrographs

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Dried films of biofluids and biopolymer solutions are a promising object for querying the state of biomolecules and their interactions with biologically active substances, without requiring complex and expensive equipment. Particularly for express diagnostics, it is important that the resulting textures and patterns can be analyzed with relatively little time and effort. Changes in "zigzag" structures are one such indicative marker. These structures have been observed under certain drying conditions for saline solutions of DNA or BSA. Earlier studies quantified zigzag density using manual tracing. This study attempted to use machine learning to segment these patterns. A U-Net model was trained to predict segmentation masks for medium-sized patches of input images. The results agree well with manual markings on photographs with clearly visible zigzags, but in 63% of cases, the difference in segmentation exceeds 75%. This points to the need for more advanced architectures or training approaches.

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