Sistem Deteksi Drill Cuttings Berbasis Semantic Segmentation Menggunakan Model MobileViT-UNet dan
BiSeNet v2 di PT Parama Data Unit
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Universitas Gadjah Mada, 2026 | Diunduh dari http://etd.repository.ugm.ac.id/

INTISARI

SISTEM DETEKSI DRILL CUTTINGS BERBASIS SEMANTIC SEGMENTATION MENGGUNAKAN MODEL MOBILEVIT-UNET DAN BISENET V2 DI PT PARAMA DATA UNIT

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Pemantauan *drill cuttings* pada *shale shaker* masih bergantung pada pengamatan visual manusia yang bersifat subjektif dan belum terdokumentasi secara kontinu. Untuk mengatasi permasalahan tersebut, penelitian ini mengembangkan sistem deteksi *drill cuttings* berbasis *semantic segmentation* dengan membandingkan MobileViT-UNet dan BiSeNet v2 yang dilatih menggunakan PyTorch pada 142 citra hasil rekaman CCTV di PT Parama Data Unit. Hasil evaluasi menunjukkan bahwa MobileViT-UNet dengan augmentasi data menghasilkan kualitas segmentasi terbaik dengan nilai *Foreground Intersection over Union* (FG IoU) sebesar 0,3114 dan *Foreground Dice* (FG Dice) sebesar 0,4750, mengungguli BiSeNet v2 yang konfigurasi terbaiknya diperoleh tanpa augmentasi dengan FG IoU sebesar 0,2823 dan FG Dice sebesar 0,4403. Sebaliknya, BiSeNet v2 unggul dalam efisiensi komputasi dengan *throughput* 168,7–169,0 *Frames Per Second* (FPS), dibandingkan 91,1 FPS pada MobileViT-UNet. Kedua model terbaik dikonversi ke format *Open Neural Network Exchange* (ONNX) dan diintegrasikan ke purwarupa aplikasi web yang diuji melalui *Black Box Testing*, pengujian pemrosesan video, dan *User Acceptance Testing* (UAT). Sistem ini diharapkan mendukung pemantauan *drill cuttings* secara lebih objektif, terukur, dan terdokumentasi untuk membantu aktivitas *mud logging* di lapangan.

Kata kunci: *semantic segmentation, drill cuttings, shale shaker, MobileViT-UNet, BiSeNet v2.*

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ABSTRACT

DRILL CUTTINGS DETECTION SYSTEM BASED ON SEMANTIC SEGMENTATION USING MOBILEVIT-UNET AND BISENET V2 MODELS AT PT PARAMA DATA UNIT

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Monitoring drill cuttings on the shale shaker still relies on human visual observation, which is subjective and has not been continuously documented. To address this limitation, this study develops a drill cuttings detection system based on semantic segmentation by comparing MobileViT-UNet and BiSeNet v2 trained using PyTorch on 142 images from CCTV recordings at PT Parama Data Unit. The evaluation results show that MobileViT-UNet with data augmentation produced the best segmentation quality with a Foreground Intersection over Union (FG IoU) of 0.3114 and a Foreground Dice (FG Dice) of 0.4750, outperforming BiSeNet v2 whose best configuration was achieved without augmentation with FG IoU of 0.2823 and FG Dice of 0.4403. Conversely, BiSeNet v2 demonstrated superior computational efficiency with a throughput of 168.7–169.0 Frames Per Second (FPS), compared to 91.1 FPS on MobileViT-UNet. Both best models were converted to Open Neural Network Exchange (ONNX) format and integrated into a web application prototype tested through Black Box Testing, video processing testing, and User Acceptance Testing (UAT). This system is expected to support drill cuttings monitoring in a more objective, measurable, and documented manner to assist mud logging activities in the field.

Keywords: semantic segmentation, drill cuttings, shale shaker, MobileViT-UNet, BiSeNet v2.