COCOTherm: A Simulated Thermal Dataset for Training Wildlife Monitoring Models With Optical to Thermal Image Conversion

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COCOTherm addresses the challenges of monitoring wildlife overpasses as part of the I-90 Snoqualmie Pass East Project. The wildlife monitoring program for this project involves 15 networked motion-activated thermal cameras, generating over two million images and videos annually. Classifying this data currently requires a dedicated full-time biologist, which is unfeasible at scale. The lack of automation is attributed to the absence of effective computer vision models for thermal imagery, a challenge stemming from the limited availability of annotated thermal data. The proposed solution is the creation of a morphing pipeline to convert large datasets of annotated optical imagery to thermal imagery, which is novel in the field of computer vision. This pipeline can make thermal image datasets without having access to any real thermal data. By simulating thermal data, small thermal datasets will never be an issue in the training of accurate thermal models, making the idea of effective automated animal monitoring possible. Spanning 11 classes of animals across 27,000 images, the thermal data set generated as part of this research is the most comprehensive and largest thermal animal data set in the public domain. The model trained on this simulated thermal data achieved a recall of 97.65% on real-world animal crossing data from the I-90 corridor and a precision of 100%, meaning there were no false positives, which solves the biggest problem on the overpasses. The model is currently being deployed for cameras on two overcrossings, and will be scaled to 12 other I-90 overcrossings/underpasses incrementally.

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