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Abstract:

In remote areas of Alaska, subsistence-oriented indigenous communities rely heavily on Traditional Ecological Knowledge (TEK), a holistic understanding of their environment acquired through generations of observation and cultural transmission. Among the Anishinaabek tradition, sweetgrass symbolizes wisdom and knowledge, passed down from elders to younger generations. Indigenous hunters and gatherers have long observed the alignment of grass and plants after the growing season as indicative of prevailing wind directions and shifts. Wind direction plays a crucial role for subsistence practitioners when hunting, fishing, settling, and keeping track of changing weather. On islands like St. Lawrence Island in Savoonga, AK, natives have observed a shift from historically predominant northerly wind patterns to southerly and easterly and dominated winds. This hypothesis has not yet been confirmed, due to the absence of weather stations.

This research project seeks to reinforce Traditional Ecological Knowledge (TEK) with Scientific Ecological Knowledge (SEK) to develop our understanding of Alaskan indigenous wisdom and its correlation with modern scientific findings. By employing advanced image processing and machine learning techniques on local weather and imaging data obtained from the Living Laboratory at St. Lawrence University, we aim to utilize a Histogram of Oriented Gradients (HOG) algorithm to enhance the methodology of data collection and measure the predominant direction in which grass lays after its growing season and relate it with wind direction. This interdisciplinary approach not only deepens our comprehension of indigenous knowledge systems but also sheds light on environmental dynamics and climate change impacts in remote regions.

Title: Applying the Histogram of Oriented Gradients Algorithm for Detecting Grass Lay Direction

In Alaska, indigenous hunters and gatherers have long observed the alignment of grass and plants after the growing season as indicative of prevailing wind directions and shifts. Due to the remote and harsh conditions, traditional weather stations are absent to measure shifts in historically predominant wind directions. In a previous study Dr. Jon Rosales (Environmental Studies) and his team collected images of grass lay from St. Lawrence Island, Alaska, and manually attempted to measure grass lay angles. This project investigated the Histogram of Oriented Gradients (HOG) algorithm to automate this process. We applied the algorithm to various images of grass fields sampled from the internet to test its viability. This poster describes the HOG algorithm and shows how it can apply to grass images and other applications.