

Developing a methodology to measure the regeneration of reindeer antlers

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Abstract

Antler regeneration is widely known as one of the best cases of complete organ regeneration in mammals; however, little is known about the mechanism behind antler regeneration or the directional growth of antlers during the growth period. To grasp a better understanding of how and when different branches of the antler grow, a pilot study was launched in May 2012 to try and develop a methodology to measure the regeneration of reindeer antlers. Using a Swiss Ranger 4000 (SR4000) range camera, data was captured from three reindeer at the University of Calgary Spy Hill Campus Farm once a week until mid-July. Using empirical data from initial epochs, a photo capture time of 63.6ms (≈ 16 FPS) was chosen for the camera, with data of interest captured at a range varying from approximately 1.2 - 2.0 metres. After segmenting the antlers from the range image in 3D, path lengths were computed along the skeletonized, two-dimensional range image of individual antlers. Distances from each epoch were then differenced in order to generate an overall growth rate of the antler. While more time is required for conclusive results, preliminary results show that reasonable lengths can be calculated using this method; the final three-dimensional path length of one of the antlers being measured at approximately 2.243m, giving an approximate growth rate of about 2.67cm/day across the longest path of the antler, which is within our expected values of about 1-4cm/day of overall daily growth. However, the time-cost of post-processing remains large, and is primarily limited by factors such as antler-extraction time, post-identification of antler regions, and computation time. Future work may involve automating the extraction and post-identification, to improve efficiency of the method. Furthermore, greater consistency in the data capture methodology is desired to increase both quantity and quality of acquired data.
