



Computer Imaging of Alopecia Areata

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This summer I worked as a research assistant under the mentorship of Dr. Castelo-Soccio and Dr. Elena Bernardis from the Dermatology department at Children's Hospital of Philadelphia on the subject of using computer vision to tackle the difficulties of measuring the area of alopecia areata on pediatric patients. Overall, it has been a great experience for me to work with my mentors to overcome the many challenges. The project has been very fruitful and has inspired many surprising ideas and thoughts along the way. Through working on this research project, I have gained substantial research skills and technical knowledge that I would surely be able to benefit from in the future.

My work focuses on investigating an easier and clearer way to calculate the area of hair loss using computer vision. This will ultimately lead to the ability to improve measures of patients' progression and improvement during therapy. Its goal was to improve the existing measurement of Severity of Alopecia Tool "SALT" score, which is the sum of percentage of hair loss in all the above-mentioned areas. Currently, the SALT score measurement that physicians employ is less precise and can be inexact. Researchers are looking for a better way to automate and improve this scoring system and our project looked at a new approach of using computer vision to help such measurement. My first work involved the labeling of the alopecia area. At the first stage of the project, I took pictures of the alopecia patients' head, and use the interface to label the patients' de-identified pictures. Later, I used the labeled mask to analyze the hair loss and calculate the relevant SALT score base off of the labeled masks.

I learned Matlab, to code for the project, capturing the images and running them through different measurements that my code calculates. I also learned to be very patient conducting research, as I meticulously labeled the hair loss by hand in the process, and wrote up code to calculate the area of the hair loss. Through my research experience, I have learned to code with Matlab, read many different research articles and learned about the connection between computer science and its medical applications. Participating in this research has expanded my horizon to learn that my major can have such great impact on so many other disciplines and helped me to learn to code in new

ways. I've also gained more experience with linear algebra and matrices, along with some computer vision concepts, which I know will be useful in the future. I want to thank the PURM program for enabling me to enjoy such experience.