**Implementing Machine Learning to Detect Melanoma Skin Cancer**

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HIT 759

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March 18, 2023

Our group was able to brainstorm through blackboard collaboration and through WhatsApp. We created a group chat on WhatsApp where we shared our ideas for the project with each other. The first topic we decided on revolved around skin cancer, but we realized that may be too broad. To make it more specific, we had to choose between focusing on squamous cell carcinoma, basal cell carcinoma, or melanoma skin cancer. We ultimately came to the decision that the topic of implementing machine learning to detect melanoma skin cancer would be the most suitable for us since melanoma is the deadliest type of skin cancer.

Mayo Clinic indicated that a physical skin exam and receiving a skin biopsy for lab examination would be the method to detect melanoma skin cancer (*Melanoma*, 2022). Patients should obtain skin checks by a board-certified dermatologist once per year in person. However, seeing the dermatologist annually just adds another chore to their list. Some patients may not believe that it is necessary and it also might be too expensive, especially if they do not have insurance. Without skin exams, melanoma could be caught too late and treatment may not be available. With this in mind, our project's goal is to develop a scanning tool that can detect melanoma and be available for use at home.

Implementing machine learning algorithms to detect melanoma skin cancer has the potential to transform the way this fatal cancer is diagnosed and treated. Melanoma skin cancer is a form of cancer that begins in the cells that create pigment in the skin, the melanocytes (*Melanoma*, 2022). Without detection, melanoma can rapidly spread and be lethal. Early detection is essential for effective treatment, and machine learning techniques have shown promise for enhancing the precision and speed of melanoma diagnosis. Dermatologists can swiftly identify probable cases of melanoma and intervene before cancer advances by analyzing photos of skin lesions with machine learning algorithms.

Numerous research has proved the capability of machine learning algorithms to identify melanoma. We utilize a range of machine learning algorithms to predict whether a tumor is benign or malignant based on the attributes presented by the data. The research published in the Journal of the American Academy of Dermatology, for instance, demonstrated that a machine-learning algorithm could reliably differentiate between melanoma and non-melanoma skin lesions with a sensitivity of 92.1% and a specificity of 91.1% (Haenssle et al., 2018). Another study published in the Annals of Oncology discovered that a deep learning algorithm could identify melanoma with 95% sensitivity and 91% specificity, outperforming human dermatologists in the same job (Han et al., 2018).

Using machine learning algorithms for the identification of melanoma skin cancer is not only essential for enhancing diagnosis and treatment but also has the potential to have a substantial impact on public health. According to the American Cancer Society, melanoma skin cancer is the sixth most prevalent cancer in the United States, and its prevalence has been rising over the past several decades (*Key Statistics*, 2022). By increasing the precision and speed of melanoma detection, machine learning algorithms can help minimize the death rate associated with this fatal disease and eventually save lives.

From our research in this area, skin scanners are generally created to be used in the office by a dermatologist rather than by the patient at home. Afifi et al. (2020) indicated various methods to detect melanoma cells through non-invasive visual-based technologies, for instance, dermoscopy, total body photography, sequential digital dermoscopic imaging, specialized imaging modalities with non-visible light, mobile applications, teledermatology, and technology-aided diagnosis.

Our proposed solution is to develop a skin scanner that may use total body photography and sequential digital dermoscopic imaging to detect melanoma. The tool will be available to purchase without a prescription and will have easy-to-follow instructions. The scanner will be made affordable to everyone. Users will also create an account and download an accompanying mobile application to store information and communicate with dermatologists. Once the skin scanner scans the users’ skin, it will keep the pictures in the app. Any abnormal appearing moles will be flagged, and users will be advised to see a dermatologist to have that mole biopsied. Board-certified dermatologists local to the users' area will be listed in the app along with accepted insurances.

References

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