AI-based localization and classification of skin disease with Erythema

DOMAIN NAME : ARTIFICIAL INTELLIGENCE

GROUP

NAME :AI based localization and classification of skin disease with erythema

BATCH :B9-3A5E

TEAM LEADER : SUBISHKA R [510419205031]

TEAM MEMBER : HEMALATHA J[510419205009]

TEAM MEMBER : PRIYA S [510419205016]

TEAM MEMBER : SHALINI S [510419205023]

TEAM MEMBER : SOWBARNIKA M S [510419205028]

Paper 1 : The Classification of Six Common Skin Diseases Based on Xiangya-Derm: Development of a Chinese Database for Artificial Intelligence

Published year : 2021

Author : Shuang Zhao

Journal Name : Journal of medical Internet Research

Summary : In this study, we established a new database, Xiangya-Derm, which consists of over 150,000 clinical images of 571 different skin diseases in the Chinese population. Xiang-Derm is the first integrated, normative database based on skin conditions in the Chinese population. Based on this database, we selected six common skin diseases and proposed an AI network, Xy-SkinNet. The top 1 and top 3 diagnostic accuracies of Xy-SkinNet were higher than those of dermatologists from the Department of Dermatology. This study was an attempt at exploring AI products and services and has successfully set the stage for future development. An increasing number of studies are incorporating clinical images.There are already some open databases, such as AtlasDerm, Derm101, and Dermnet. Considering differences in skin color, Xiangya-Derm can provide data for realizing AI diagnosis of skin diseases among the Chinese population. Many existing databases lack medical history information, especially information about pathological diagnosis, and, potentially, contain some misdiagnosed photos. Notably, one of the greatest advantages of Xiangya-Derm is that most images contain corresponding skin pathology results, providing the category annotation of a gold standard, which can be most effectively applied to various research studies and in the development of AI.

This feature ensures that the diagnostic information about pictures used for deep learning is accurate and reduces the diagnostic errors caused by misdiagnosis. Of course, there are also a small number of unmatched pictures in our database, which is correlated with the lack of corresponding dermoscopic images.In addition, XiangyaDerm provides image data with the location for all skin lesions, thus enabling researchers to apply object detection algorithms in computer vision for the automatic diagnosis of skin diseases. Moreover, each image has a full set of clinical information about the patient, including demographic information, complaints, current medical history, past medical history, and family history. Given the complete set of big data, conducting further research on AI diagnosis using multimodal data, which is more coincident with the real-world diagnosis process and more intuitive for both doctors and patients, is achievable.

Methodology Used : Artificial intelligence

Paper 2 : Skin disease detection using artificial intelligence

Published Year : 2022

Author Name : S. Kuzhaloli,L. M. Varalakshmi,Kamal Gulati,Makarand Upadhyaya,Narinder Kumar Bhasin,Vijayakumar Peroumal

Journal Name : AIP Conference Proceedings

Summary : Artificial intelligence (AI) algorithms for automated classification of skin diseases are available to the consumer market. Studies of their diagnostic accuracy are rare. We assessed the diagnostic accuracy of an open-access AI application for recognition of skin diseases. The AI algorithm classified the images giving 5 differential diagnoses, which were then compared to the diagnoses made clinically by the dermatologists and/or histological. The level of diagnostic accuracy varied considerably for diagnostic groups. The online application demonstrated low diagnostic accuracy compared to a dermatologist evaluation and needs further development. Input signs have been developed to classify the disorder. With the aid of experts in the area, we received symptoms of 10 skin diseases. The symptom data were trained by various classifiers. We observed that high quality AI-based support for clinical decision making enhances the accurate diagnosis of either AI or doctors alone and that less skilled physicians are better served by AI.

Methodology Used : Artificial Intelligence

Paper 3 : Skin Diseases Classification Using Hybrid AI Based Localization Approach

Published Year : 2022

Author Name : Vijay Kumar

Journal Name : Hindawi Computational Intelligence and Neuroscience Volume 2022, Article ID 6138490

Summary : One of the most prevalent diseases that can be initially identified by visual inspection and further identified with the use of dermoscopic examination and other testing is skin cancer. Since eye observation provides the earliest opportunity for artificial intelligence to intercept various skin images, some skin lesion classification algorithms based on deep learning and annotated skin photos display improved outcomes. The researcher used a variety of strategies and methods to identify and stop diseases earlier. All of them yield positive results for identifying and categorizing diseases, but proper disease categorization is still lacking. Computer-aided diagnosis is one of the most crucial methods for more accurate disease detection, although it is rarely used in dermatology. For Feature Extraction, we introduced Spectral Centroid Magnitude (SCM). The given dataset is classified using an enhanced convolutional neural network; the first stage of preprocessing uses a median filter, and the final stage compares the accuracy results to the current method.

Methodology Used : Artificial Intelligence

Paper 4 : AI-Skin: Skin disease recognition based on self-learning and wide data collection through a closed-loop framework

Published Year : 2019

Author Name : Min chen,Ping Zhou

Journal Name : Science Direct Journal and Book

Summary : There are a lot of hidden dangers in the change of human skin conditions, such as the sunburn caused by long-time exposure to ultraviolet radiation, which not only has aesthetic impact causing psychological depression and lack of self-confidence, but also may even be life-threatening due to skin canceration. Current skin disease researches adopt the auto-classification system for improving the accuracy rate of skin disease classification. However, the excessive dependence on the image sample database is unable to provide individualized diagnosis service for different population groups. To overcome this problem, a medical AI framework based on data width evolution and self-learning is put forward in this paper to provide skin disease medical service meeting the requirement of real time, extendibility and individualization. First, the wide collection of data in the close-loop information flow of user and remote medical data center is discussed. Next, a data set filter algorithm based on information entropy is given, to lighten the load of edge node and meanwhile improve the learning ability of remote cloud analysis model.

In addition, the framework provides an external algorithm load module, which can be compatible with the application requirements according to the model selected. Three kinds of deep learning model, i.e., LeNet-5, AlexNet and VGG16, are loaded and compared, which have verified the universality of the algorithm load module. The experiment platform for the proposed real-time, individualized and extensible skin disease recognition system is built. And the system's computation and communication delay under the interaction scenario between tester and remote data center are analyzed. It is demonstrated that the system we put forward is reliable and effective.

Methodology Used : Deep learning

Paper 5 : Automatic histologically-closer classification of skin lesions

Published Year : 2018

Author Name : Pedro Pedrosa Rebouças Filhoa , Solon AlvesPeixotoa ,Raul VictorMedeiros da Nóbregaa

Journal Name : Science Direct Jouranl and Book

Summary : According to the American Cancer Society, melanoma is one of the most common types of cancer in the world. In 2017, approximately 87,110 new cases of skin cancer were diagnosed in the United States alone. A dermatoscope is a tool that captures lesion images with high resolution and is one of the main clinical tools to diagnose, evaluate and monitor this disease. This paper presents a new approach to classify melanoma automatically using structural co-occurrence matrix (SCM) of main frequencies extracted from dermoscopy images.

The main advantage of this approach consists in transform the SCM in an adaptive feature extractor improving his power of discrimination using only the image as parameter. The images were collected from the International Skin Imaging Collaboration (ISIC) 2016, 2017 and Pedro Hispano Hospital (PH2) datasets. Specificity (Spe), sensitivity (Sen), positive predictive value, F Score, Harmonic Mean, accuracy (Acc) and area under the curve (AUC) were used to verify the efficiency of the SCM. The results show that the SCM in the frequency domain work automatically, where it obtained better results in comparison with local binary patterns, gray-level co-occurrence matrix and invariant moments of Hu as well as compared with recent works with the same datasets. The results of the proposed approach were: Spe 95.23%, 92.15% and 99.4%, Sen 94.57%, 89.9% and 99.2%, Acc 94.5%, 89.93% and 99%, and AUC 92%, 90% and 99% in ISIC 2016, 2017 and PH2 datasets, respectively.

Methodology Used : Machine learning

Paper 6 : Developing a Recognition System for Diagnosing Melanoma Skin Lesions Using Artificial Intelligence Algorithms

Published Year : 2021

Author Name : Fawaz Waselallah Alsaade,Theyazn H. H. Aldhyani, Mosleh Hmoud Al-Adhaileh

Journal Name : Hindawi Journal

Summary : In recent years, computerized biomedical imaging and analysis have become extremely promising, more interesting, and highly beneficial. They provide remarkable information in the diagnoses of skin lesions. There have been developments in modern diagnostic systems that can help detect melanoma in its early stages to save the lives of many people. There is also a significant growth in the design of computer-aided diagnosis (CAD) systems using advanced artificial intelligence. The purpose of the present research is to develop a system to diagnose skin cancer, one that will lead to a high level of detection of the skin cancer. The proposed system was developed using deep learning and traditional artificial intelligence machine learning algorithms. The dermoscopy images were collected from the PH2 and ISIC 2018 in order to examine the diagnose system. The developed system is divided into feature-based and deep leaning. The feature-based system was developed based on feature-extracting methods. In order to segment the lesion from dermoscopy images, the active contour method was proposed. These skin lesions were processed using hybrid feature extractions, namely, the Local Binary Pattern (LBP) and Gray Level Co-occurrence Matrix (GLCM) methods to extract the texture features. The obtained features were then processed using the artificial neural network (ANNs) algorithm. In the second system, the convolutional neural network (CNNs) algorithm was applied for the efficient classification of skin diseases; the CNNs were pretrained using large AlexNet and ResNet50 transfer learning models. The experimental results show that the proposed method outperformed the state-of-art methods for HP2 and ISIC 2018 datasets. Standard evaluation metrics like accuracy, specificity, sensitivity, precision, recall, and -score were employed to evaluate the results of the two proposed systems. The ANN model achieved the highest accuracy for PH2 (97.50%) and ISIC 2018 (98.35%) compared with the CNN model. The evaluation and comparison, proposed systems for classification and detection of melanoma are presented.

Methodology Used :Artificial intelligence