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Otoscopic Image Classification Using Deep Learning Algorithm

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A B S T R A C T:

Otoscopy is a crucial diagnostic method for examining the outside auditory canal and tympanic membrane. However, guide interpretation of otoscopic photographs is prone to subjectivity and error because of picture exceptional and lighting fixtures inconsistencies. This paper offers a DenseNet-based deep getting to know framework for classifying otoscopic pictures into normal and pathological classes, which include infections, inflammations, tumors, and structural abnormalities. The proposed machine makes use of superior photo preprocessing and augmentation strategies to enhance robustness and generalization. Performance evaluation the usage of metrics consisting of accuracy, precision, do not forget, F1-rating, and AUC-ROC demonstrates the effectiveness of the model. This work has implications for boosting diagnostic abilties in medical and remote settings.

Keywords: Otoscopy, Deep Learning, DenseNet, Image Classification, Medical Imaging, CNN

Introduction

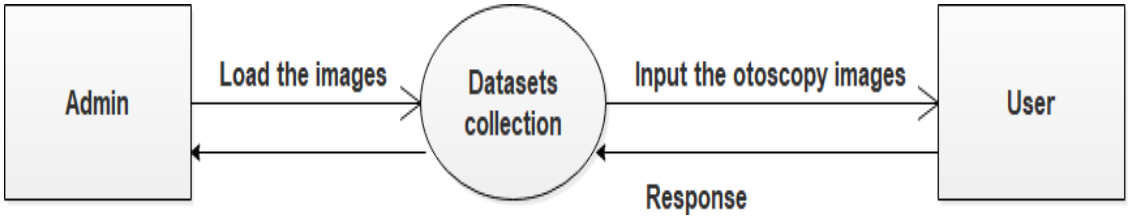
Otoscopy is an essential diagnostic tool used to take a look at the ear canal and tympanic membrane to hit upon infections, inflammations, wax accumulation, or structural defects. Despite its clinical relevance, the guide evaluation of otoscopic photographs may be inaccurate due to inconsistent lighting fixtures, varying angles, and picture noise. Recent improvements in deep studying, especially convolutional neural networks (CNNs), offer enormous capability in automating medical picture evaluation

Related work

Prior studies have explored deep gaining knowledge of methods like R-CNN, two-degree interest CNNs, CNN-LSTM hybrids, and bilateral photo comparisons for otoscopy classification. These strategies spotlight the developing attention on using AI to guide telemedicine and medical diagnostics.

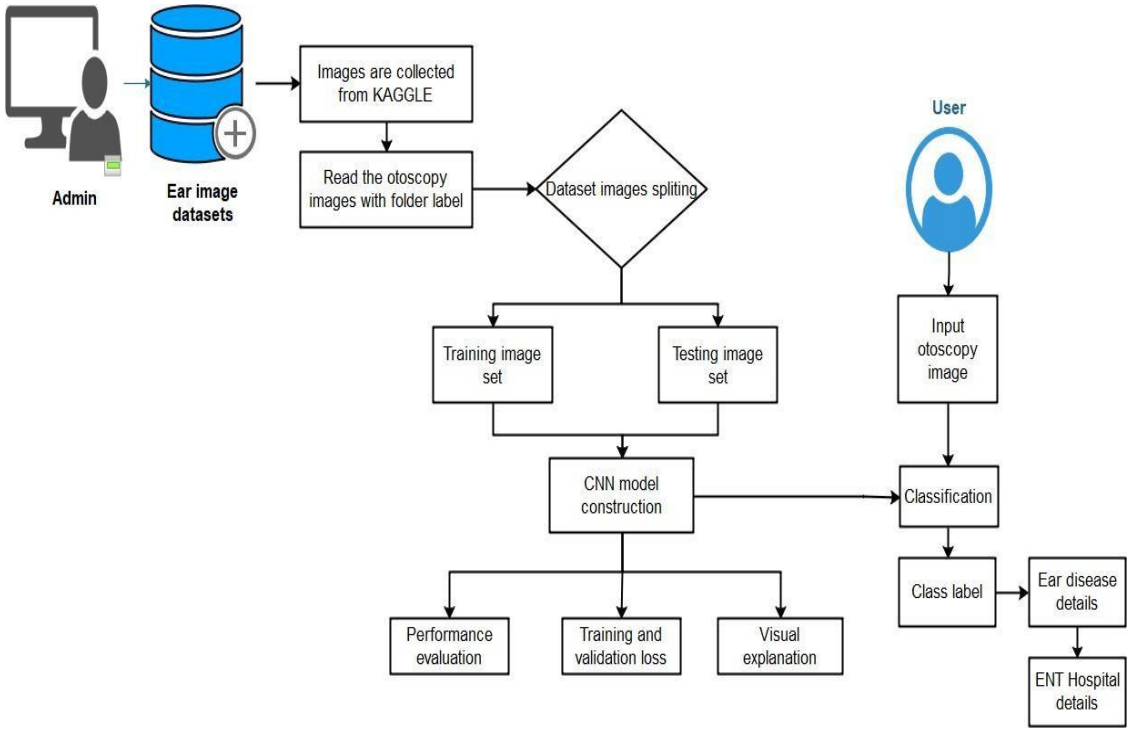
Methodology

The proposed gadget consists of photograph collection, preprocessing, DenseNet version education, and assessment. Image preprocessing consists of resizing, normalization, and augmentation. DenseNet's architecture allows for dense connections and characteristic reuse, lowering vanishing gradients. Categorical move-entropy changed into used as the loss function, and the version was optimized the usage of suitable hyperparameters



4. Results and Discussion

The model executed excessive overall performance throughout standard metrics. The use of DenseNet allowed powerful function extraction even in noisy or low-first-class photographs. Real-time inference changed into integrated to allow instant predictions in clinical settings. The system presents robust category, distinguishing among normal and pathological situations.



5.Conclusion And Future Work.

This research demonstrates the applicability of DenseNet for otoscopic photo classification with excessive accuracy and clinical relevance. Future improvements will include guide for multi-elegance class, integration with aspect devices, explainable AI capabilities, and real-global deployment across far off clinics.

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