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Computer-Aided Diagnosis of Oral Squamous Cell Carcinoma: A Feature-Based Transfer Learning Approach
(2024) *Lecture Notes in Networks and Systems*, 845, pp. 433-438.

DOI: 10.1007/978-981-99-8498-5_34

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Abstract
Oral cancer, particularly Oral Squamous Cell Carcinoma (OSCC), has a high mortality rate due to late detection. However, manual diagnosis is difficult and time-consuming. Hence, the employment of machine learning methods has been explored to aid diagnosis through automated image classification. This study aims to evaluate pipelines combining pre-trained VGG19 convolutional neural network (CNN) model that is used to extract discriminative features from normal and cancerous oral histopathology images. The extracted features were fed to different machine learning models, support vector machine (SVM), k-nearest neighbours (kNN), and random forest (RF) were trained to classify the images. It was demonstrated that the VGG199-RF yielded the best performance across the training, validation, and test dataset with a classification accuracy of 99%, 92%, and 90%, respectively, against other pipelines evaluated. The study demonstrates that feature-based transfer learning is an attractive and effective approach to be employed for computer-aided diagnosis. © The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2024.

Author Keywords
Computer-aided diagnosis; Deep learning; Feature-based transfer learning; Machine learning; Oral cancer; Oral squamous cell carcinoma

Index Keywords
Classification (of information), Computer aided instruction, Convolutional neural networks, Deep learning, Diseases, E-learning, Forestry, Learning systems, Nearest neighbor search, Pipelines, Statistical tests, Support vector machines; Deep learning, Feature-based, Feature-based transfer learning, Learning approach, Machine-learning, Mortality rate, Oral cancer, Oral squamous cell carcinomata, Random forests, Transfer learning; Computer aided diagnosis

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Editors: Tan A., Zhu F., Jiang H., Mostafa K., Yap E.H., Chen L., Olule L.J.A., Myung H.
Publisher: Springer Science and Business Media Deutschland GmbH

Conference name: International Conference on Intelligent Manufacturing and Robotics, ICIMR 2023
Conference date: 22 August 2023 through 23 August 2023
Conference code: 308779

ISSN: 23673370
ISBN: 9789819984978
Language of Original Document: English
Abbreviated Source Title: Lect. Notes Networks Syst.
2-s2.0-85187801208
Document Type: Conference Paper
Publication Stage: Final
Source: Scopus