**LITERATURE SURVEY**

**1) Journal of Medical Imaging and Health Informatics ISSN**

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Journal of Medical Imaging and Health Informatics (JMIHI) is a medium to disseminate novel experimental and theoretical research results in the field of biomedicine, biology, clinical, rehabilitation engineering, medical image processing, bio-computing, D2H2, and other health related areas. As an example, the Distributed Diagnosis and Home Healthcare (D2H2) aims to improve the quality of patient care and patient wellness by transforming the delivery of healthcare from a central, hospital-based system to one that is more distributed and home-based. Different medical imaging modalities used for extraction of information from MRI, CT, ultrasound, X-ray, thermal, molecular and fusion of its techniques is the focus of this journal.

2)**Computer-aided diagnosis of malignant or benign thyroid nodes based on ultrasound images.**

**AUTHORS**: **Qin Yu, Tao Jiang, Aiyun Zhou, Lili Zhang, Cheng Zhang & Pan Xu**

The objective of this study is to evaluate the diagnostic value of combination of artificial neural networks (ANN) and support vector machine (SVM)-based CAD systems in differentiating malignant from benign thyroid nodes with gray-scale ultrasound images. Two morphological and 65 texture features extracted from regions of interest in 610 2D-ultrasound thyroid node images from 543 patients (207 malignant, 403 benign) were used to develop the ANN and SVM models. Tenfold cross validation evaluated their performance; the best models showed accuracy of 99% for ANN and 100% for SVM. From 50 thyroid node ultrasound images from 45 prospectively enrolled patients, the ANN model showed sensitivity, specificity, positive and negative predictive values, Youden index, and accuracy of 88.24, 90.91, 83.33, 93.75, 79.14, and 90.00%, respectively, the SVM model 76.47, 90.91, 81.25, 88.24, 67.38, and 86.00%, respectively, and in combination 100.00, 87.88, 80.95, 100.00, 87.88, and 92.00%, respectively. Both ANN and SVM had high value in classifying thyroid nodes. In combination, the sensitivity increased but specificity decreased. This combination might provide a second opinion for radiologists dealing with difficult to diagnose thyroid node ultrasound images.

# 3)Liver segmentation from CT images using a sparse priori statistical shape model (SP-SSM)

**AUTHORS**: Xuehu Wang ,Yongchang Zheng ,Lan Gan,Xuan Wang,Xinting Sang,Xiangfeng Kong,Jie Zhao

This study proposes a new liver segmentation method based on a sparse a priori statistical shape model (SP-SSM). First, mark points are selected in the liver a priori model and the original image. Then, the a priori shape and its mark points are used to obtain a dictionary for the liver boundary information. Second, the sparse coefficient is calculated based on the correspondence between mark points in the original image and those in the a priori model, and then the sparse statistical model is established by combining the sparse coefficients and the dictionary. Finally, the intensity energy and boundary energy models are built based on the intensity information and the specific boundary information of the original image. Then, the sparse matching constraint model is established based on the sparse coding theory. These models jointly drive the iterative deformation of the sparse statistical model to approximate and accurately extract the liver boundaries. This method can solve the problems of deformation model initialization and a priori method accuracy using the sparse dictionary. The SP-SSM can achieve a mean overlap error of 4.8% and a mean volume difference of 1.8%, whereas the average symmetric surface distance and the root mean square symmetric surface distance can reach 0.8 mm and 1.4 mm, respectively.

4)**Automatic Detection of Cerebral Microbleeds From MR Images via 3D Convolutional Neural Networks**

**AUTHORS:Qin Yu, Tao Jiang, Aiyun Zhou, Lili Zhang, Cheng Zhang & Pan Xu**

Cerebral microbleeds (CMBs) are small haemorrhages nearby blood vessels. They have been recognized as important diagnostic biomarkers for many cerebrovascular diseases and cognitive dysfunctions. In current clinical routine, CMBs are manually labelled by radiologists but this procedure is laborious, time-consuming, and error prone. In this paper, we propose a novel automatic method to detect CMBs from magnetic resonance (MR) images by exploiting the 3D convolutional neural network (CNN). Compared with previous methods that employed either low-level hand-crafted descriptors or 2D CNNs, our method can take full advantage of spatial contextual information in MR volumes to extract more representative high-level features for CMBs, and hence achieve a much better detection accuracy. To further improve the detection performance while reducing the computational cost, we propose a cascaded framework under 3D CNNs for the task of CMB detection. We first exploit a 3D fully convolutional network (FCN) strategy to retrieve the candidates with high probabilities of being CMBs, and then apply a well-trained 3D CNN discrimination model to distinguish CMBs from hard mimics. Compared with traditional sliding window strategy, the proposed 3D FCN strategy can remove massive redundant computations and dramatically speed up the detection process. We constructed a large dataset with 320 volumetric MR scans and performed extensive experiments to validate the proposed method, which achieved a high sensitivity of 93.16% with an average number of 2.74 false positives per subject, outperforming previous methods using low-level descriptors or 2D CNNs by a significant margin. The proposed method, in principle, can be adapted to other biomarker detection tasks from volumetric medical data.

**5)Automatic Classification of Specific Melanocytic Lesions Using Artificial Intelligence**

**AUTHORS:Joanna Jaworek-Korjakowska 1 and Paweł Kłeczek 1.**

*Background*. Given its propensity to metastasize, and lack of effective therapies for most patients with advanced disease, early detection of melanoma is a clinical imperative. Different computer-aided diagnosis (CAD) systems have been proposed to increase the specificity and sensitivity of melanoma detection. Although such computer programs are developed for different diagnostic algorithms, to the best of our knowledge, a system to classify different melanocytic lesions has not been proposed yet. *Method*. In this research we present a new approach to the classification of melanocytic lesions. This work is focused not only on categorization of skin lesions as benign or malignant but also on specifying the exact type of a skin lesion including melanoma, Clark nevus, Spitz/Reed nevus, and blue nevus. The proposed automatic algorithm contains the following steps: image enhancement, lesion segmentation, feature extraction, and selection as well as classification. *Results*. The algorithm has been tested on 300 dermoscopic images and achieved accuracy of 92% indicating that the proposed approach classified most of the melanocytic lesions correctly. *Conclusions*. A proposed system can not only help to precisely diagnose the type of the skin mole but also decrease the amount of biopsies and reduce the morbidity related to skin lesion excisio**n.**