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Globallashuv sharoitida davlatimizni yanada barqaror va jadal sur’atlar bilan rivojlantirish bo‘yicha amalga oshirilayotgan islohotlar samarasini yaxshilash sohasidagi ilmiy-tadqiqot ishlariga alohida e’tibor qaratilgan. Zero iqtisodiyotning, ijtimoiy sohalarni qamrab olgan modernizatsiya jarayonlari, hayotning barcha sohalarini liberallashtirishni talab qilmoqda.

Ushbu ilmiy ma’ruza tezislari to‘plamida mamlakatimiz va xorijlik turli yo‘nalishlarda faoliyat olib borayotgan mutaxassislar, olimlar, professor-o‘qituvchilar, ilmiy tadqiqot institutlari va markazlarining ilmiy xodimlari, tadqiqotchilari, magistr va talabalarning ilmiy-tadqiqot ishlari natijalari mujassamlashgan.

Mas’ul muharrirlar: DSc.prof. Turakulov O.X., PhD. O‘ralov A.I.

Tahrir hay’ati a’zolari: p.f.d.(DSc), prof. Turakulov O.X., b.f.f.d. (PhD) O‘ralov A.I., t.f.f.d.(PhD), dotsent Abdumalikov A.A., t.f.n., dots. Baboyev A.M., t.f.f.d.(PhD), dots. Abduraxmanov R.A., p.f.f.d.(PhD) Eshankulov B.S., p.f.n., dots. Alimov N.N., p.f.f.d.(PhD), dotsent Alibayev S.X., p.f.f.d. (PhD) Halimov O‘.H., p.f.f.d.(PhD), dotsent Karshiyev A.A., f.f.f.d.(PhD), dotsent Sindorov L.K., t.f.f.d.(PhD), dotsent Nasirov B.U., b.f.f.d. (PhD), dotsent Mustafaqulov M.A., f.f.f.d. (PhD) Alibekov D.A.., f-m.f.f.d. (PhD) Sharipov X.F., ps.f.f.d.(PhD) Norbekova B.Sh., i.f.n., dots. Tsoy M.P., Qayumov O.A., Jo‘rayev M.M.

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EFFECTIVE MODELS FOR DETECTION OF VIRAL HEPATITIS B BY COMPUTER VISION

PhD., Turgunov Abrorjon, Xolmuminov Yusuf, Abdulxamidov Abrorbek, Berdiqulov Abdulaziz, Abdullaev Hayotjon, Rahmatullaev Jasurbek
Tashkent University of Information Technologies
abrorjon26@mail.ru

Abstract - Viral hepatitis B is a significant global health concern, affecting millions of individuals worldwide. Timely and accurate detection of hepatitis B is crucial for effective disease management and prevention of its complications. In recent years, computer vision techniques have emerged as powerful tools for medical diagnostics, offering automated and objective analysis of medical images. This article explores the effectiveness of various computer vision models in the detection of viral hepatitis B. Convolutional Neural Networks (CNNs) have demonstrated remarkable performance in medical image analysis tasks. By training CNNs on liver images obtained from ultrasound, CT scans, or MRI scans, specific patterns and features associated with hepatitis B can be identified. Transfer learning with pre-trained models, such as VGG, ResNet, or Inception, enhances detection performance by leveraging learned features from general image recognition tasks. Image segmentation models, including U-Net, Mask R-CNN, and FCN, play a pivotal role in localizing and identifying affected areas within liver images. These models enable precise identification of hepatitis B-related lesions and provide crucial information for accurate diagnosis. Ensemble models, which combine predictions from multiple individual models, further improve the overall detection performance. This article discusses the architecture, training process, and performance evaluation of these computer vision models.

Keywords - Convolutional neural networks, computer vision, viral hepatitis B, transfer learning, image segmentation, ensemble models, medical image analysis.

Introduction

Viral hepatitis B is a serious global health issue, with an estimated 257 million people living with chronic hepatitis B infection worldwide. Timely and accurate detection of hepatitis B is crucial for effective disease management, prevention of transmission, and reduction of associated complications such as cirrhosis and hepatocellular carcinoma. Traditional diagnostic methods, such as serological tests and liver biopsy, have limitations in terms of cost, invasiveness, and subjectivity. In recent years, computer vision techniques have emerged as promising tools for automated and objective analysis of medical images, offering new possibilities for the detection and diagnosis of hepatitis B. Computer vision, a subfield of artificial intelligence, focuses on training algorithms to extract meaningful information from visual data. By applying computer vision techniques to medical imaging, researchers and practitioners can leverage the power of machine learning algorithms to detect patterns, anomalies, and specific features associated with hepatitis B in liver images obtained from ultrasound, CT scans, or MRI scans. This enables faster and more accurate diagnosis, leading to

improved patient outcomes. In this article, we explore the effectiveness of various computer vision models in the detection of viral hepatitis B. We delve into the architecture, training process, and performance evaluation of these models, with a focus on their application to liver image analysis. Specifically, we investigate the performance of Convolutional Neural Networks (CNNs), which have demonstrated remarkable success in medical image analysis tasks. CNNs are trained to recognize complex patterns and features in images, enabling them to identify hepatitis B-related abnormalities in liver scans. Additionally, we explore the benefits of transfer learning with pre-trained models, where models initially trained on large-scale datasets for general image recognition tasks are fine-tuned on hepatitis B-specific datasets. This approach leverages the learned features of pre-trained models, enhancing the detection performance with limited labeled data. Furthermore, we discuss image segmentation models, such as U-Net, Mask R-CNN, and FCN, which enable precise localization and identification of hepatitis B-related lesions within liver images. These models assign labels to each pixel, providing valuable information for accurate diagnosis and treatment planning. Ensemble models, which combine predictions from multiple individual models, are also examined in this article.

Convolutional Neural Networks (CNN).

CNNs have shown remarkable performance in various computer vision tasks, including medical image analysis. These models can be trained on liver images such as ultrasound, CT scans, or MRI scans to identify specific patterns and features associated with hepatitis B. CNNs have been used for liver segmentation, lesion detection, and classification of hepatitis B-related liver abnormalities [1].

CNNs are composed of multiple interconnected layers, including convolutional layers, pooling layers, and fully connected layers. The convolutional layers perform the key operation of convolving input images with learnable filters, also known as kernels or feature detectors. These filters extract local patterns and features from the input images. The pooling layers reduce the spatial dimensions of the extracted features while preserving their essential characteristics, aiding in translation invariance and reducing computational complexity. The fully connected layers at the end of the network combine the high-level features to make predictions or classifications.

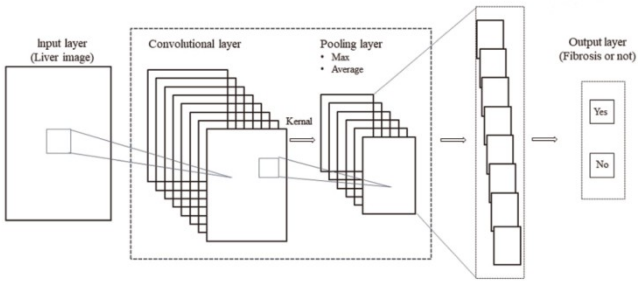


Figure 1. Convolutional algorithm

Transfer learning with pre-trained models.

Transfer learning involves leveraging pre-trained models that have been trained on large-scale datasets. These models, such as VGG, ResNet, or Inception, are initially trained on general image recognition tasks. By fine-tuning these models on hepatitis

B-specific datasets, you can benefit from their learned features and achieve good detection performance with limited labeled data. Transfer learning involves leveraging the knowledge and representations learned by a pre-trained model and applying it to a new task. The pre-trained model, typically a deep neural network, has already learned to recognize general features and patterns from a large dataset, such as ImageNet, which contains millions of labeled images. Instead of training a model from scratch on a new dataset, transfer learning involves reusing the pre-trained model's learned weights and fine-tuning certain layers or adding new layers to adapt the model to the new task [2].

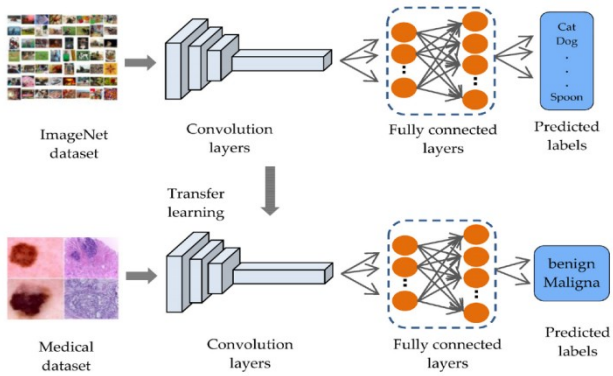


Figure 2. Transfer Learning with Pre-trained Model

Image segmentation models.

Image segmentation is crucial for localizing and identifying affected areas within liver images. Models like U-Net, Mask R-CNN, or FCN (Fully Convolutional Network) can be employed for liver segmentation and identification of hepatitis B-related lesions. These models assign labels to each pixel, enabling precise localization of regions of interest.

Image segmentation models aim to assign a label or class to each pixel in an image, thereby dividing the image into distinct regions or segments. These models typically employ convolutional neural networks (CNNs) as their backbone architecture. The CNNs are used to extract hierarchical features from the input image, and then additional layers are employed to perform pixel-level classification [3].

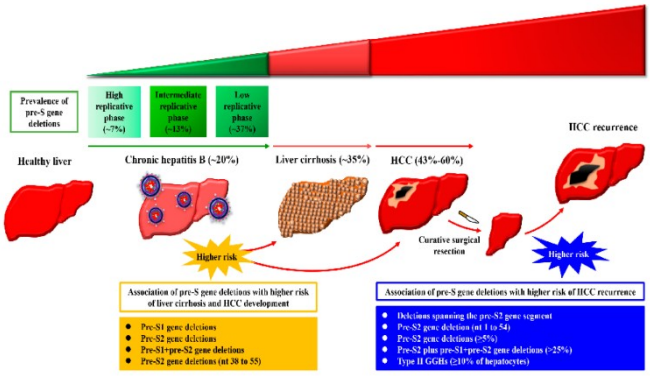


Figure 3. Image Segmentation Models

Image segmentation models have revolutionized various computer vision tasks by providing detailed and accurate pixel-level segmentation. Their ability to recognize

and localize objects within images has opened up new possibilities in understanding and processing visual data.

It's important to note that image segmentation models can be computationally intensive and require substantial computational resources for training and inference. Additionally, large amounts of labeled training data are typically required to achieve good performance. However, advancements in deep learning frameworks and the availability of pre-trained models have made image segmentation more accessible and achievable in various applications.

Ensemble models.

Ensemble models combine predictions from multiple individual models to improve overall performance. By combining the outputs of different models, such as CNNs, SVMs, or decision trees, you can leverage the strengths of each model and achieve better detection results. Ensemble models work by training multiple individual models, often referred to as base models or weak learners, and then combining their predictions to make a final decision. Each individual model is trained on the same dataset using a different algorithm, a different subset of the data, or different feature representations. The ensemble then aggregates the predictions of these models using various techniques, such as voting, averaging, or weighted averaging, to reach a final prediction [4].

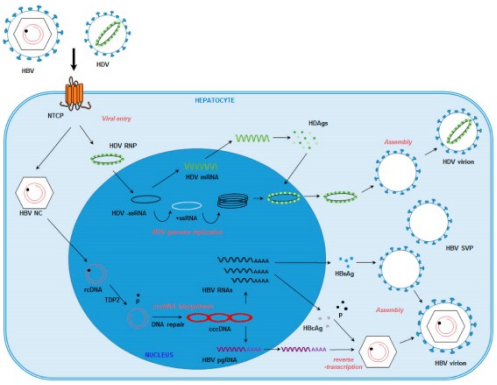


Figure 4. Algorithm of ensemble Models

Ensemble models have been successfully applied in various domains, including classification, regression, and anomaly detection. They are widely used in competitions and real-world applications due to their ability to significantly improve performance and robustness.

It's important to note that ensemble models can be computationally more expensive than individual models, as they require training and combining multiple models. Additionally, building an effective ensemble requires careful consideration of model diversity, model selection, and ensemble combination techniques. However, the advantages of ensemble models often outweigh the increased complexity and computational requirements, making them a valuable tool in machine learning.

Conclusion

In conclusion, the use of ensemble models, image segmentation models, transfer learning with pre-trained models, and convolutional neural networks (CNNs) in various applications has significantly advanced the field of machine learning and

computer vision. Each of these models brings unique advantages and disadvantages that should be considered when selecting the appropriate approach for a given task. Ensemble models offer improved accuracy and generalization by combining the predictions of multiple individual models. However, they introduce increased complexity and computational requirements, and careful consideration of model diversity and combination techniques is necessary to avoid potential overfitting. Image segmentation models excel in pixel-level classification and provide fine-grained localization and object recognition. They offer detailed understanding of spatial relationships and have a wide range of applications. However, they can be computationally intensive, require large amounts of labeled training data, and may lack flexibility for significant model modifications. Transfer learning with pre-trained models has emerged as a powerful technique for leveraging existing knowledge in new tasks. It reduces training time and data requirements while improving generalization.

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VIDEOKUZATUV MAYDONINI AVTOMATIK TAHLIL QILISH

Aliboyev S.X., Mardiyev A.S.
O‘zbekiston Milliy universitetining Jizzax filiali

Annotatsiya. Ushbu maqolada jamoat joylariga kuzatuv maydon xuxusiyatidan kelib chiqib videokuzatuv moslamalarini o‘rnatish haqida so‘z boradi.

Kalit so‘zlar. Videokuzatuv, monitoring, maydon, kamera.

Sun’iy intellekt olamida videokuzatuv maydonini avtomatik tahlil qilish muhim o’rin egallaydi. Bir tomondan, videoserverlar va videokameralar qayta ishlash quvvatining oshishi tufayli tobora aqlli bo'lib bormoqda, ikkinchi tomondan, videokuzatuv tizimlarini joylashtirishning ortishi videotahlilni operatorning ajralmas