SKIN TUMOR CLASSIFICATION USING CNN

M. Sumithra[1*], Swathyshree P[2a], Yuvarani K[3a], Sneha PD[4a], Shafinian Aro A[5a]

[*]Associate Professor, Department of Information Technology, Panimalar Engineering College
[a]Student, B.Tech. IT, Panimalar Engineering College

ABSTRACT

Skin tumor is one of the most fatal diseases that can occur to the human beings. Detecting and treating a tumor almost concedes most of the doctor's time. Tumor which could occur in a Skin may leads to death without any proper medications. And it is incurable. In today's modern world science has evolved along with the technology. Here we are Proposing the system in which is used to classifying the grades of the tumor with the help of the MRI (Magnetic Resonance Imaging). In normally tumor can be detected as (Beningn) which has slow death rate and 50% chance of survival. And the other one is (Malignant) which has higher chance of death rate. But we propose a new technique which can be used to identity the GRADES of tumor such as (Basal Cell Carcinoma (BCC), Squamous Cell Carcinoma (SCC), and melanoma). Here weare using CONVOLUTION NEURAL NETWORK to classify the grades of tumor.

KEYWORDS: Computer vision, Data Augmentation, Convolution neural network, classifying grades of tumor.

1. INTRODUCTION

We are developing a model which is using convolution neural networks (Deep Learning). CNN contains three specified layers combined with the Artificial Neual Networks. The challenging task was to collect a perfect datasets for our model. It's because collecting a datasets especially when it comes to image datasets it's not a quite easy task. The datasets which are used to build this model were taken from Kaggle(A Machine learning Repository). At first after collecting our datasets, we enter into the coding part. TENSORFLOW2.0 were used. Initially we used Data Augmentation in order to provide more datasets to our model. The more data it reads, the more accuracyit shall provide. MRI images are a Greyscale images. So the pixel color will either be white or black. And then we comes into convolution part. While working with the images, convolution takes big part of it. The whole step of convolution is making an image smaller and faster. It's because images would have high size of length and width,so it is not an easy job to compute these high pixel value images even if we use GPU or TPU it would take lot more time to compute. In order to avoid these we are using convolution (CONV2D) layer. In convolution we feed an image with resized shape and there (FEATURE DETECTOR) alias Filters are used to smaller the image size and reserve its pixel values into a newly created(Feature map). After, the feature map (image) goes into the next layer which is called as (MaxPooling2D). Maxpooling layeris used to take the maximum pixel value in the feature map and form a Pooled Feature.Flatten layer is to align the output from the Maxpooling layer into a single column. So that it can be inputted into a Dense layer and in activation.

2. LITERATURE SURVEY

SI NO	TITLE &AUTHOR	AUTHOR	YEAR	METHOD	ADVANTAGE
1	Skin Cancer Classification Using Deep Cnn	Ulzii-orshikh dorji, Kewn-kwanglee, Jae-Young choi, Malarey Lee	2018	Pretrained alex net Convolutional neural network used in extracting training features. Skin cancer are classified using Ecoc SIM lesion classification	It provide more accuracy,sensitivity and specificity. Apporoach using.

2	A Multiclass Skin Lesion Classification Apporoach Using Transfer Learning Based Cnn	Cauvayk, Pc siddalingarwamy, Sameena patham,noel D , Sowza.	2021	Pre-processing methods,it perform multilevel feature extraction, blending technique proposed , stacking or stacked generalization can also be used with k-fold validation.	It performs reasonably good on the user on test images than the base models
3	Skin Cancer Detection And Classification	Nourtaz rezaoama, Mohammad shahadat Hossain, karl Andersson	2021	Activation map function is used, multi-layer perceptions, software activation function are used to classify the skin cancer.	Very good image clarity
4	Skin cancer detection &classification	Pratik dual, sankintan bhatt, Chaitanya Joglekar, Dr.sonali patil	2017	MATLAB platform neural network Toolbox used Neural network toolbox used to Train a Modal feedforward neural network used to classify images. The image is segmented otru's thresholding algorithms.	It provides high degree of accuracy.overall accuracy rate and performance of the system in large.
5	Skin Lesion Classification Using Deep Learning And Image Processing	Atharva jibhakate, pranav parnnerkar,sahil mondal, vartav bharambe	2020	Pytorch method, wide resnet5D ,Densenet 121 and VGG 19 Network are used.	It provides with modified networks, better diagnostic precision is obtained state of art application for non-invasive skin cancer detection.

3. PROPOSED METHOD

In this project, we have described our objective in two parts, the first half deals with detection of Skin tumour that is the presence of the tumor in the provided MRI. The other part that is the second part contains the classification of the tumor. Here, we willanalyse the MRI images which will conclude the Grade of the tumor as (Pituitary,Meningioma,Gliomas). In general the diagram for our process. The input images will undergo various stages

1. MRI images
2. Pre-processing
3. Building a CNN model
4. Compiling a Model
5. Accuracy Metrics

3.1 MRI IMAGES

This is the first step of our proposed model. In this data is been provided withthe MRI (Magnetic Resonance Imaging) that has been collected from the open source Kaggle (A Machine Learning Repository). The images are in Greyscale Format. Here the Greyscale Images are inputted into the system.

3.2 PRE-PROCESSING

3.2.1 Data Augmentation

Data augmentation is a techniques are used to increase the amount of data by slightly modified copies of already existed data or newly created synthetic data from existing data. It acts as regularize and helps to avoid overfitting when training a machinelearning model.

For this model, we used data augmentation on the images to create a more copiesof it just to feed to our model. So that it can be precise at finding patterns and wont stuck with overfitting.

3.3 BUILDING A CNN MODEL

STEP1: Convolution

The whole step of convolution is to making an image smaller and faster in order to compute. A convolution is an operation that changes a function into somethingelse. We do convolutions so that we can transform the original function into a form to get more information. Convolutions have been used for a long time in image processingto blur and sharpen images, and perform other operations, such as, enhance edges and emboss.

A convolution operation is an element wise matrix multiplication operation. Where oneof the matrices is the image, and the other is the filter or kernel that turns the image intosomething else. The output of this is the final convoluted image. In CNN filters are notdefined, the values of each filter is learned during training process, the filter which endsub with the higher information again will be select by the model .CNN can find moremeaning from images that humans designed filters might be not able to find.

STEP2: Code

```
from tensorflow.keras.layers  import  Conv2

Conv2D (filters=32, kernel_size=3, input_shape=[64,64,2],activation='relu')
```

STEP 3: Maxpooling 2D

In this layer we formally use Matrix (Pool_size) to obtain the maximum values from the resulted feature map from the convolution layer. We can set the strides to move along the feature map. By doing this we just end up with smaller minimized matrix, sothat our model won't stuck with overfitting.

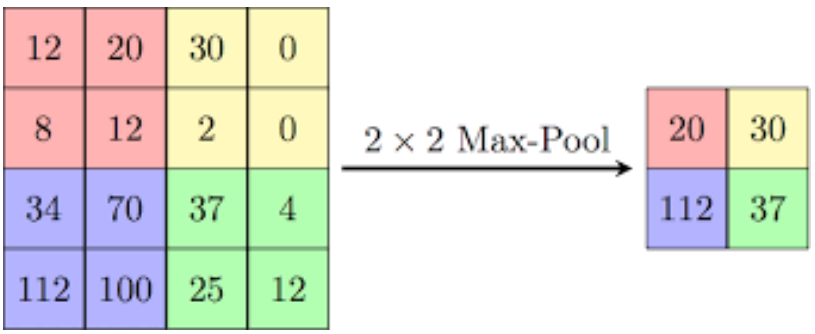

Figure 1: Max pooling 2D Matrix

STEP4: Flattening

After convolution and pooling process, we end up with Pooled feature map. In flattenlayer is used to transform a resulted matrix into a single column, in order to pass it as input to the next fully connected layer (ANN).

STEP 5: Fully Connected Layers

We enter into a fully connected layers as we completed our preprocessing processes.

3.4 COMPILING THE CNN

Here, we are going to compile the model to get images to be trained by our model. (SGD) optimizer is used to optimize and loss can be calculated by using (categorical_crossentropy).

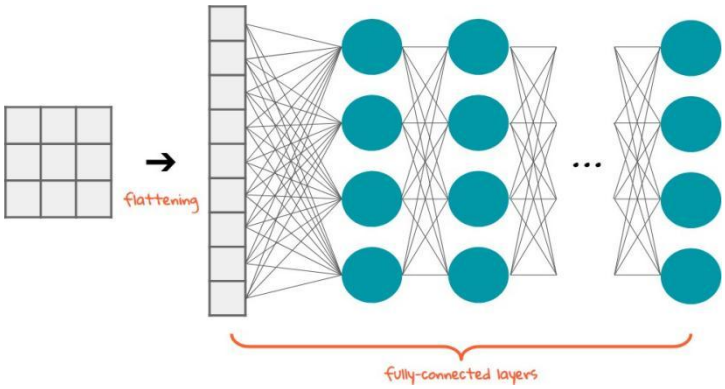

Figure 2: Fully Connected Layers

3.5 ACCURACY METRICS

Accuracy of the model can be evaluated by using three methods that are:- Classification Report, Accuracy score, Confusion Matrix

From sklearn.metrics import Classification Report,Confusion_Matrix,Accuracy_score

3.6 MAIN THREE STAGES

1. Basal Cell Carcinoma (BCC),
2. Squamous Cell Carcinoma (SCC),
3. Melanoma.

4. CONCULSION

Nowadays the artificial intelligence is a revolutionary thing its plays a vital role for treating and detecting such disease. For using this system, along with human expertise It could be more easy to identify the tumor for treating the patient. Tensorflow2.o library are used to develop the model .we are using Data Augmentation order to obtaina higher accuracy while testing MRI (Magnetic Resonance Imaging) images. In this proposed paper we used a CNN model to predict a stage of tumor. We notched up with 95 accuracy on testing a MRI images. Finally the MRI image is processed and the output of the scanned image (tumor detection/ stage of the tumor) is obtained.

REFERENCES

[1] Heimans, J. J., et al. "Paclitaxel (TAXOL®) concentrations in SKIN tumor tissue", Annals of Oncology 5.10, pp.951-953, 1994.

[2] M. Sumithra and Dr. S. Malathi, "A Novel Distributed Matching Global and Local Fuzzy Clustering (DMGLFC) FOR 3D Brain Image Segmentation for Tumor Detection", IETE Journal of Research, doi.org/10.1080/03772063.2022.2027284, 2021

[3] B.Buvanswari and T.Kalpalatha Reddy, "A Review of EEG Based Human Facial Expression Recognition Systems in Cognitive Sciences" International Conference on Enenrgy, Communication,Data analytics and SoftComputing(ICECDS),CFP17M55-PRJ:978-1-5386-1886-8",August 2017.

[4] Chethana, C., Subbiah Swaminathan, S. Sharanyaa, E. Sathish, R. Prathipa, and Anuradha Thakare. "Application Of Reverse Engineering in the Process of Utilization of Human Brain in Artificial Intelligence." Journal of Optoelectronics Laser 41, no. 3 (2022): 89-93.

[5] M. Sumithra and Dr. S. Malathi, " Modified Global Flower Pollination Algorithm-based image fusion for medical diagnosis using computed tomography and magnetic resonance imaging", International Journal of Imaging Systems and Technology, Vol. 31, Issue No.1, pp. 223-235, 2021

[6] K. Sridharan , and Dr. M. Chitra "SBPE: A paradigm Approach for proficient Information Retrieval , Jokull Journal" , Vol 63, No. 7;Jul 2013

[7] Prastawa Marcel, Bullitt Elizabeth, Ho Sean,Gerig Guido, "A Skin tumor segmentation framework based on outlier detection", Medical image analysis 8.3, pp. 275-283, 204.

[8] Sharanyaa, S., P. N. Renjith, and K. Ramesh. "Classification of Parkinson's disease using speech attributes with parametric and nonparametric machine learning techniques." 2020 3rd International Conference on Intelligent Sustainable Systems (ICISS). IEEE, 2020.

[9] M. Sumithra and Dr. S. Malathi, "3D Densealex NET Model with Back Propagation for Brain Tumor Segmentation", International Journal OfCurent Research and Review, Vol. 13, Issue 12, 2021.

[10] B.Buvaneswari and Dr.T. Kalpalatha Reddy,"EEG signal classification using soft computing techniques for brain disease diagnosis",Journal of International Pharmaceutical Research ,ISSN : 1674-0440,Vol.46,No.1,Pp.525-528,2019.

[11] Sharanyaa, S., P. N. Renjith, and K. Ramesh. "An Exploration on Feature Extraction and Classification Techniques for Dysphonic Speech Disorder in Parkinson's Disease." In Inventive Communication and Computational Technologies, pp. 33-48. Springer, Singapore, 2022.

[12] K. Sridharan , and Dr. M. Chitra "Web Based Agent And Assertion Passive Grading For Information Retervial", ARPN Journal of Engineering and Applied Sciences, VOL. 10, NO. 16, September 2015 pp:7043-7048

[13] Kienast, Yvonne, et al., "Real-time imaging reveals the single steps of Skin metastasis formation", Nature medicine 16.1, pp. 116-122, 2010.

[14] M. Sumithra and Dr. S. Malathi, "Segmentation Of Different Modalitites Using Fuzzy K-Means And Wavelet ROI", International Journal Of Scientific & Technology Research, Vol. 8, Issue 11, pp. 996-1002, November 2019.

[15] Sharanyaa, S., S. Lavanya, M. R. Chandhini, R. Bharathi, and K. Madhulekha. "Hybrid Machine Learning Techniques for Heart Disease Prediction." International Journal of Advanced Engineering Research and Science 7, no. 3 (2020).

[16] M. Sumithra and S. Malathi, " A Survey of Brain Tumor Segmentation Methods with Different Image Modalitites", International Journal of Computer Science Trends and Technology (IJCST) – Vol. 5 Issue 2, Mar – Apr 2017

[17] B.Buvaneswari and Dr.T. Kalpalatha Reddy, "High Performance Hybrid Cognitive Framework for Bio-Facial Signal Fusion Processing for the Disease Diagnosis", Measurement,ISSN: 0263-2241, Vol. 140, Pp.89-99,2019.

[18] Sharanyaa, S., and M. Shubin Aldo. "Explore places you travel using Android." In 2016 International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT), pp. 4796-4799. IEEE, 2016.

[19] M. Sumithra and Dr. S. Malathi, "A Brief Survey on Multi Modalities Fusion", Lecture Notes on Data Engineering and Communications Technologies, Springer, 35, pp. 1031-1041,2020.

[20] Kharrat Ahmed, Benamrane Nacera, Messaoud Mohamed Ben, Abid Mohamed, "Detection of Skin tumor in medical images", Signals, Circuits and Systems (SCS), 2009 3rd International Conference on. IEEE, 2009.

[21] Sharanyaa, S., and Madhumitha RP. "Eyeball Cursor Movement Detection Using Deep Learning." RP, Madhumitha and Rani. B, Yamuna, Eyeball Cursor Movement Detection Using Deep Learning (July 12, 2021) (2021).

[22] M. Sumithra and S. Malathi, "A survey on Medical Image Segmentation Methods with Different Modalitites", International Journal of Engineering Research and Technology (IJERT) – Vol. 6 Issue 2, Mar 2018.

[23] B.Buvaneswari and Dr.T. KalpalathaReddy,"ELSA- A Novel Technique to Predict Parkinson's Disease in Bio-Facial",International Journal of Advanced Trends in Computer Science and Engineering, ISSN 2278-3091,Vol.8,No.1,Pp. 12-17,2019

[24] K. Sridharan , and Dr. M. Chitra , Proficient Information Retrieval Using Trust Based Search On Expert And Knowledge Users Query Formulation System, Australian Journal of Basic and Applied Sciences, 9(23) July 2015, Pages: 755-765.

[25] Sharanyaa, S., and K. Sangeetha. "Blocking adult account in osn's using iterative social based classifier algorithm." International Journal of Scientific Engineering and Science 2, no. 1 (2018): 33-36.

[26] B.Buvaneswari and Dr.T. Kalpalatha Reddy, "ACPT- An Intelligent Methodology for Disease Diagnosis",Journal of Advanced Research in Dynamical and Control Systems,ISSN : 0974-5572,Vol.11,No.4,Pp.2187-2194,2019.

[27] Sumithra, M., Shruthi, S., Ram, S., Swathi, S., Deepika, T., "MRI image classification of brain tumor using deep neural network and deployment using web framework", Advances in Parallel Computing, 2021, 38, pp. 614–617.

[28] K. Sridharan , and Dr. M. Chitra "RSSE: A Paradigm for Proficient Information Retrieval using Semantic Web" , Life Science Journal 2013;10(7s), pp: 418-425

[29] Sharanyaa, S., S. Vijayalakshmi, M. Therasa, U. Kumaran, and R. Deepika. "DCNET: A Novel Implementation of Gastric Cancer Detection System through Deep Learning Convolution Networks." In 2022 International Conference on Advanced Computing Technologies and Applications (ICACTA), pp. 1-5. IEEE, 2022.