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Accurate Methods for Diagnosing Digestive Disorders

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ABSTRACT: For gastrointestinal diseases to be effectively treated and managed, an accurate diagnosis of digestive disorders is crucial. The accuracy and clinical applicability of the numerous techniques used to diagnose digestive diseases are the main topics of this review. The advantages and disadvantages of several diagnostic modalities—including endoscopy, imaging methods, lab testing, and developing technologies—are thoroughly covered. Furthermore, developments in genetic and molecular testing for accurate diagnosis of gastrointestinal disorders are reviewed. Additionally covered are methods for combining various diagnostic modalities to increase precision and optimize patient outcomes. This review attempts to give physicians and researchers useful insights into choosing acceptable diagnostic tactics catered to specific patient demands by thoroughly analyzing the existing landscape of diagnostic procedures.

KEYWORDS: Digestive disorders, Diagnosis, Gastrointestinal diseases, Endoscopy, Imaging techniques.

I. INTRODUCTION

Conditions affecting the gastrointestinal tract, which includes the esophagus, stomach, intestines, liver, pancreas, and gall bladder, are together referred to as digestive disorders. These conditions contribute to morbidity, mortality, and health care expenditures while posing serious global health concerns. Although it's still a complicated and developing procedure, accurate diagnosis is essential for efficient management and treatment planning. In the past, the clinical history, physical examination, and simple laboratory testing played a major role in the diagnosis of digestive problems. But new developments in medical technology have completely changed the way that diagnostic methods are carried out, providing doctors with an abundance of advanced instruments and methods. In order to gain insight into the structural, functional, and molecular features of gastrointestinal pathology, endoscopic procedures, imaging modalities, laboratory assays, and molecular testing have become essential parts of the diagnostic arsenal.

II. LITERATURE SURVEY

A technique for gathering color characteristics based on wavelet decomposition was presented by Karkanis et al. [1] in order to diagnose colon polyps. To diagnose gastrointestinal pictures, machine learning techniques have been used in numerous studies. The approaches employed in these methods of feature extraction include wavelets, polyp-based local binary, grey-level co-occurrence matrices (GLCMs), edge shape, and valley information [2]. Compared to alternative approaches, the strategy suggested by Tajbakhsh et al. [3] has produced better results. Removing handcrafted features such as camera angle, light reflection, and structural polyps is still difficult. CNN's ability to extract deep qualities has been demonstrated in recent years, with promising results in the diagnosis of medical pictures. An approach to polyp identification based on the Single Shot MultiBox Detector (SSD) [4].

In order to locate polyps from CT colonography images, Godkhindi and Gowda [5] published a CNN approach. By using their method, the colon is isolated from the other organs and separated from the CT image. Then, by eliminating the form traits, it establishes whether a colon polyp is present. A method for locating colorectal polyps using SSD was presented by Ozawa et al. [6], who also showed promising results in the diagnosis of these polyps. An automated two-stage method for polyp segmentation and classification was presented by Pozdeev et al. [7].

While the global properties of endoscopic images are employed in the first stage to classify the presence or absence of a tumor, CNN segmentation is used in the second stage.

Biomedical optical spectroscopy techniques were presented by Wan et al. [8] as a means of early detection of gastrointestinal malignancies. This kind of spectroscopy has several benefits, including nondestructiveness, noninvasiveness, and reagent-free techniques. It may yield structural and chemical information. Ribeiro et al. [9] have proposed CNNs for colon mucosa diagnostics, which aim to identify colon polyps and categorize colon cancer in its early stages.

III. HARDWARE/SOFTWARE DESIGNING

HARDWARE SPECIFICATION:

Table 3.1 Hardware Specification

Processor	AMD Ryzen 5 5600H with Radeon Graphics 3.30 GHz
RAM	4 GB.
HDD/SSD	512GB SSD
Monitor type	15 Inch VGA.
Keyboard	110 Keys Keyboard

SOFTWARE SPECIFICATION

Table 3.2 Software Specification

Operating system	Windows 11
Web Browser	Chrome, Mozilla firefox
Open Source Distribution	Anaconda Navigator
Language	Python
Development	Google Colab
Packages Required	Numpy, Pandas, Tensor Flow.
Editor	VS Code
Web Application Tool	Python Flask
Front End Designing	HTML, Java Script and CSS.

IV. THEORETICAL ANALYSIS

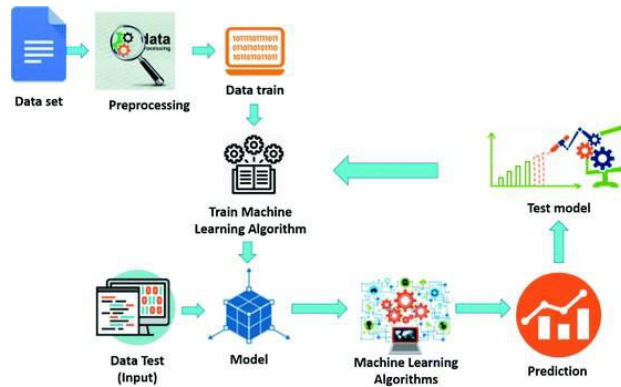


Figure 4.1 Block Diagram

V. EXPERIMENTAL INVESTIGATIONS

5.1. DATASET:

Images from courses covering gastrointestinal endoscopy procedures and anatomical landmarks are included in this Kaggle dataset, which has been expertly analyzed. There are several hundred images in the data set that can be used for deep learning as well as transfer learning. The collection's photos are stored in RGB color format and range in resolution from 720 × 576 to 1920 × 1072 pixels. Within our collection of 4,000 photos, there is a balanced representation of five disorders: polyps, ulcerative colitis, normal cecum, normal pylorus, and dyed-lifted polyps, dyed-resection-margins, esophagitis. There were 3200 photos used for training and 800 images left for testing. Kvasir dataset samples are displayed in Figure 5.1.

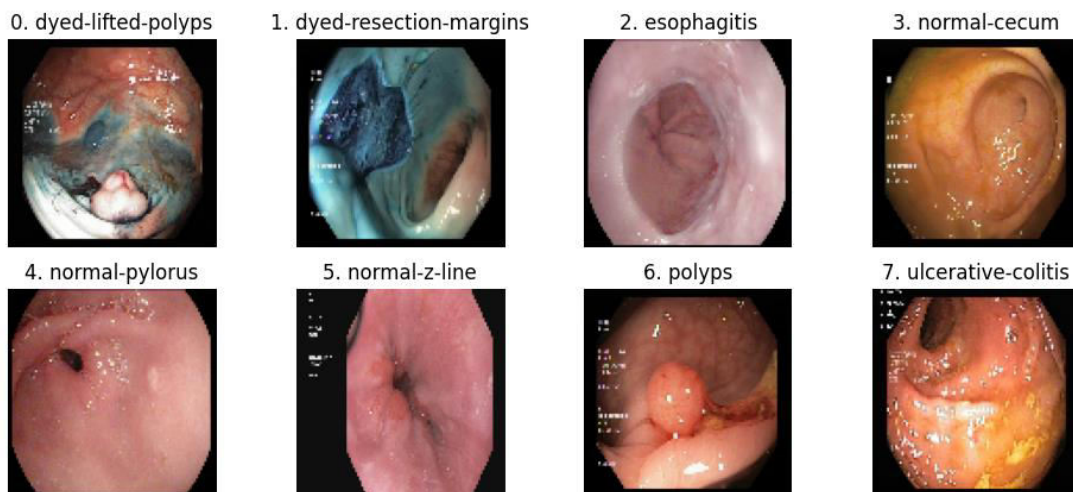


Figure 5.1: A sample view of the dataset

Categories	Number of images
dyed-lifted-polyps	500
dyed-resection-margins	500

Categories	Number of images
esophagitis	500
normal-cecum	500
normal-pylorus	500
normal-z-line	500
polyps	500
ulcerative-colitis	500

Table 5.1: Number of images

5.2. WEB APPLICATION FRAMEWORK

FLASK

Flask is a Python framework that is licensed under a BSD license and is based on Werkzeug, Jinja2, and the Sinatra Ruby framework. Armin Ronacher created it at Poccoo. Despite being relatively new in comparison to other Python frameworks, Flask has already been well-liked by Python web developers and has a lot of promise. Let's examine Flask, the purported "micro" Python framework, in more detail.

HTML

For HyperText Markup Language, see HTML. The standard markup language for building webpages is called HTML, and it defines the page's structure. In order to enable user structure parts, block quotes, paragraphs, headings, and links to applications and online sites, HTML was designed. They serve to enhance the visual appeal of web pages and are utilized for the display of data online.

CSS

The fact that style information for a webpage can be defined in any one of three locations—also referred to as style levels—is what causes CSS files to cascade. It is recommended to store style information in a different file with a.css extension. Using an external cascading style sheet's formatting information is done through the HTML link tag. A webpage can use multiple link tags to link to zero, one, or more external CSS files.

JS

Programming languages such as JavaScript are lightweight scripting languages that are mostly used to create interactive front-end web applications. Developed by Brendan Eich during his tenure at Netscape Communications Corporation in 1995, it is currently among the most widely used programming languages globally. Data visualization, user authentication, form validation, interactive maps, dynamic forms and menus, animation, and more may all be produced with JavaScript.

5.3. RESEARCH STEPS

Image Processing with OpenCV

An open source, cross-platform computer vision and image processing library is called OpenCV (Open Source Computer Vision Library). Python, C++, and Java can all be utilized with OpenCV. Intel was the company behind its development. With the help of the library's more than 2500 optimized algorithms, users can find similar images from an image database, detect and recognize faces, identify objects, classify human actions in videos, track camera movements, track moving objects, extract 3D models of objects, and produce 3D point clouds from stereo cameras.

Numpy

A Python package called NumPy is used to work with arrays. It also includes functions for working with matrices, the Fourier transform, and linear algebra. NumPy arrays for machine learning framework compatibility and effective numerical computations.

Pandas

A Python library is called Pandas. Pandas is a tool for data analysis. Using statistical theories, pandas enables us to analyze large amounts of data and draw conclusions. Pandas can tidy up unstructured data sets, making them more meaningful and readable. In data science, pertinent data is crucial.

Splitting dataset

Split the dataset into two parts. Training dataset and Testing dataset are the important step in this project.

One hot encoding

The technique of transforming category labels into a binary matrix representation is called one-hot encoding. Class labels are transformed into a format appropriate for categorical classification issues using this technique. A vector with a length equal to the number of classes is used to represent each label; all other indices are set to 0, with the exception of the label's corresponding index, which is set to 1.

Data augmentation

Through the creation of altered versions of the dataset's photos, a technique known as "data augmentation" makes the training dataset artificially larger. More diversified examples are provided during training, which helps to improve the robustness and generalization capabilities of machine learning models. As demonstrated in the code, common augmentation techniques include flipping, rotating, and zooming.

Transfer learning

Using Pre-Trained Models: A pre-trained VGG19 model can benefit from the information gained on a big dataset (ImageNet) by being loaded with weights="imagenet". This can shorten training time and increase performance. Tailoring the Shape and Classes of Input: It is possible to modify the pre-trained model to fit the particular dataset by modifying input_shape and classes.

Image data generator

A true gem is Keras ImageDataGenerator. While your model is still training, it allows you to add real-time augmentation to your photographs! Every training image can have any random transformation applied to it before it is fed into the model. This will reduce overhead memory use and increase the robustness of your model.

Matplot

matplotlib. A set of command-style utilities called pyplot enable matplotlib to behave similarly to MATLAB. Every pyplot function modifies a figure in some way. For example, it can build a figure, a plotting region within a figure, plot certain lines within a plotting area, label the plot, etc.

Visualization:

A confusion matrix is a particular kind of table arrangement that makes it possible to visualize how well an algorithm performs, usually one that involves supervised learning. It is employed to characterize a classification model's performance. Color Chart makes it simpler to spot patterns and differences by using color gradients to represent various values.

Model Prediction:

It makes use of a trained model to forecast the input image's class probabilities. Using np.argmax, determines which class has the highest probability.

5.4. FLOW CHART

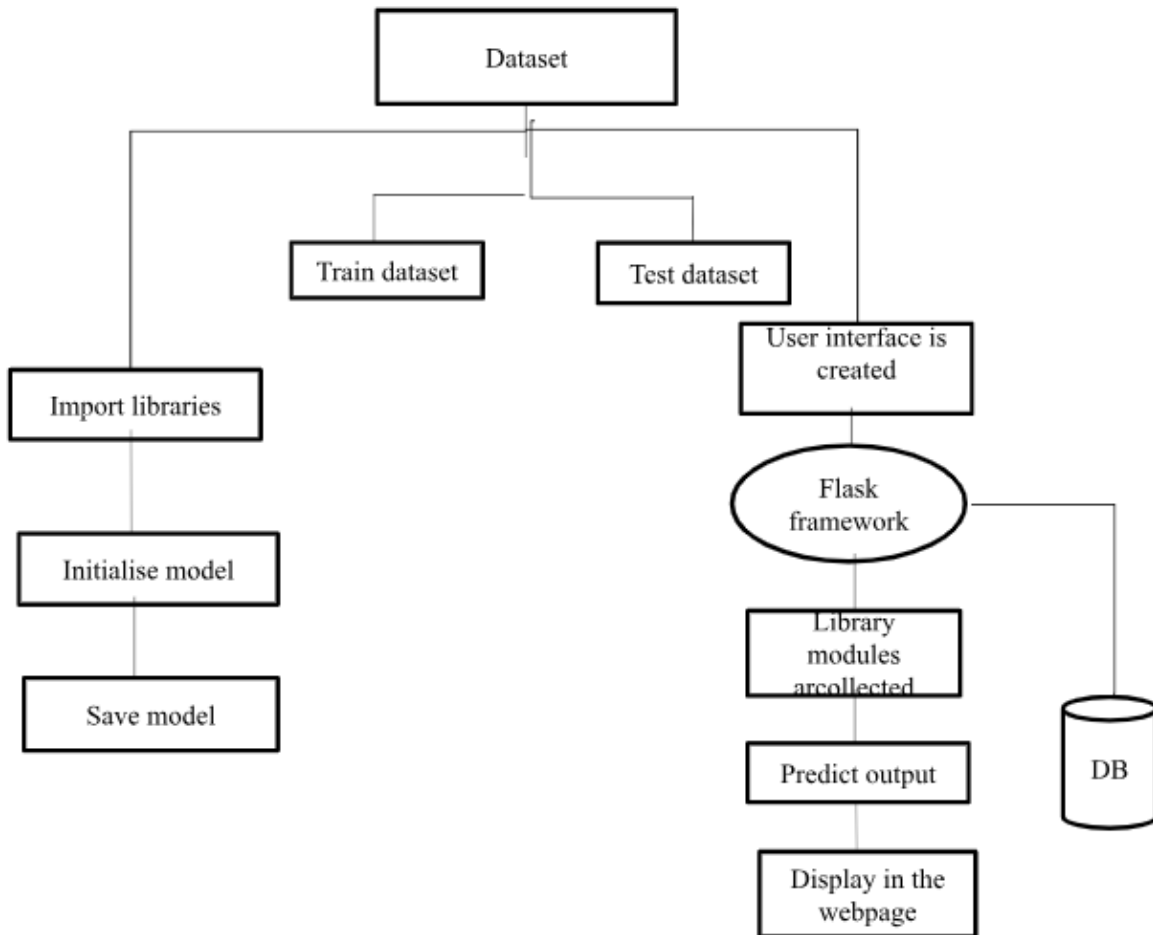


Figure 5.2 Flow diagram

VI. EXPERIMENTED RESULTS

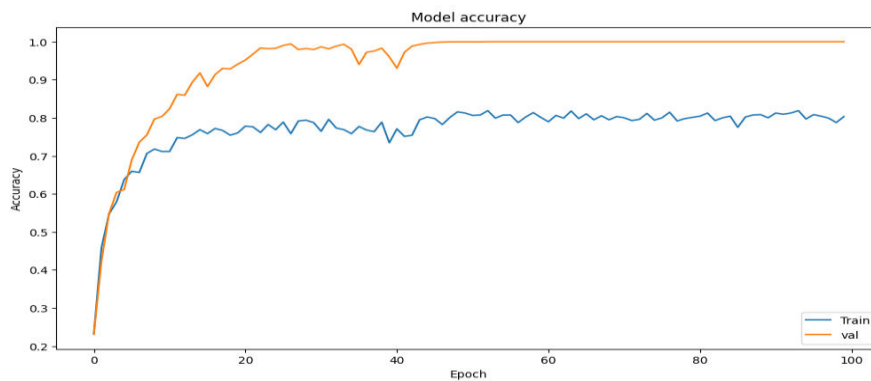


Figure 6.1: Model Accuracy in graph format

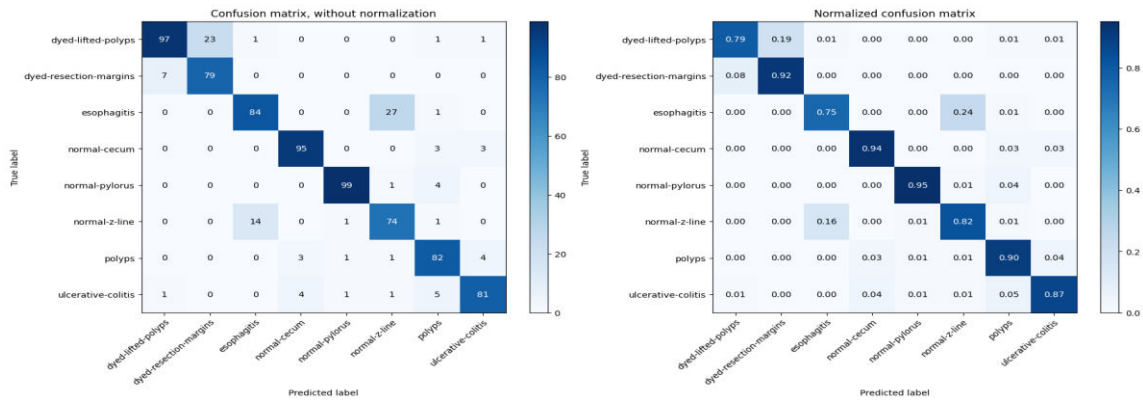


Figure 6.2: Predicted

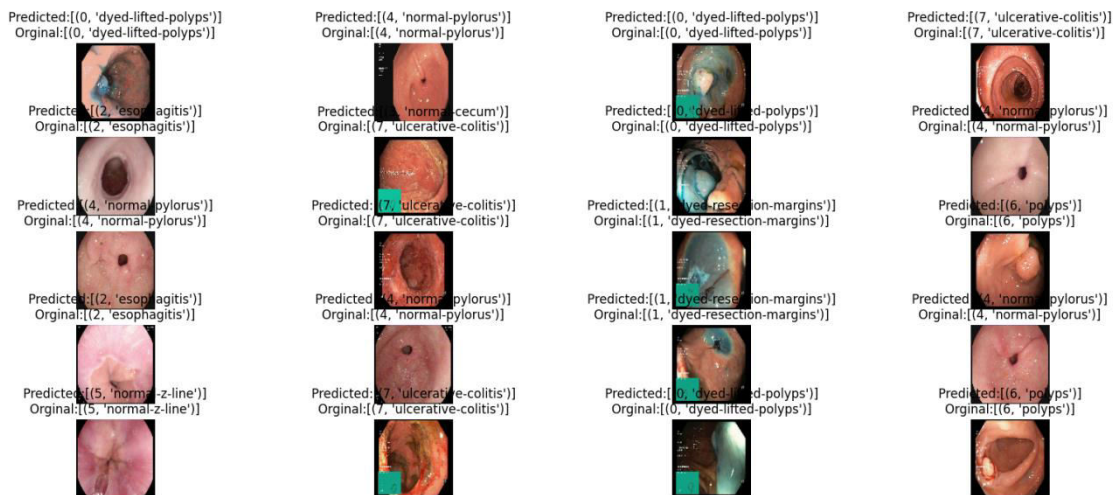


Figure 6.3: Final prediction

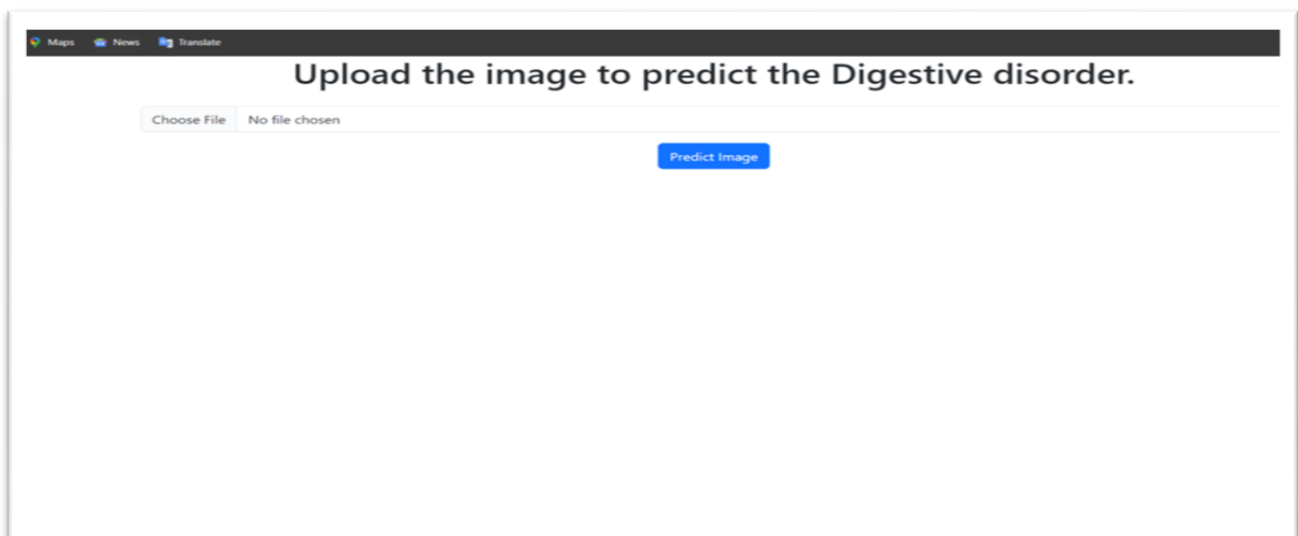


Figure 6.4: Flask web application.

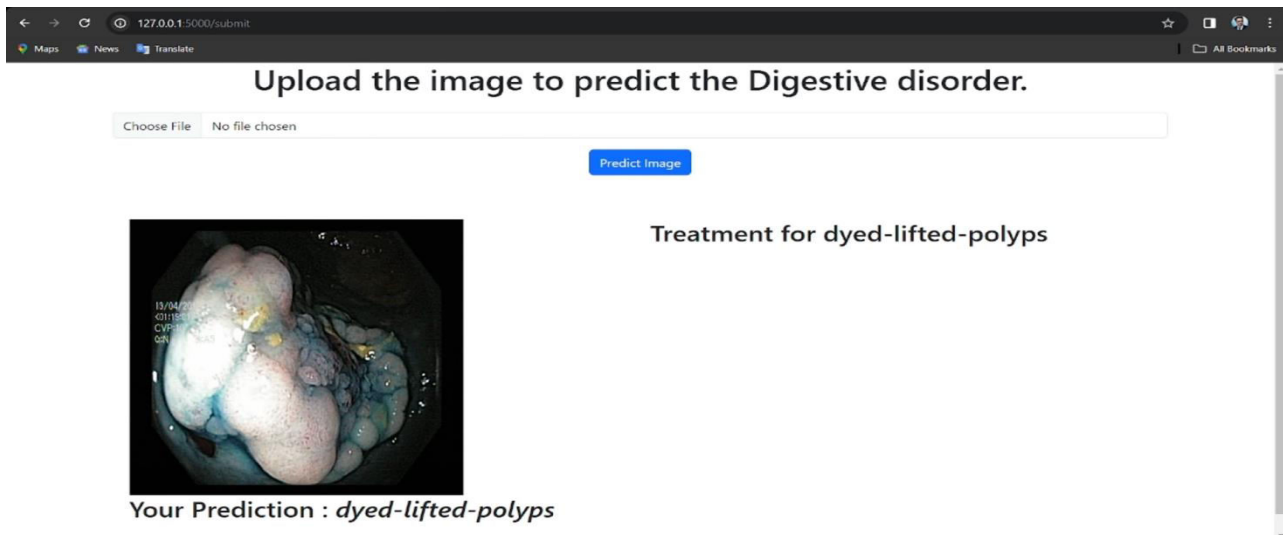


Figure 6.5: Final prediction of Flask App.

VII. CONCLUSION

This study emphasizes the significance of integrating powerful visualization strategies with reliable prediction approaches when assessing picture categorization models. The approach provides continuous enhancements in model correctness as well as a more profound comprehension of model performance. The results highlight the usefulness of visualizing model predictions, which recommends this method as a useful resource for machine learning and image classification practitioners and researchers.

REFERENCES

- [1] J.-B. Liu and X.-F. Pan, "Minimizing Kirchhoff index among graphs with a given vertex bipartiteness," *Applied Mathematics and Computation*, vol. 291, pp. 84–88, 2016.
- [2] J.-B. Liu and J. Cao, "Applications of Laplacian spectra for n-prism networks," *Neurocomputing*, vol. 198, pp. 69–73, 2016.
- [3] A. Khan, M. A. Gul, A. Alharbi, M. I. Uddin, S. Ali, and B. Alouffi, "Impact of lexical features on answer detection model in discussion forums," *Complexity*, vol. 2021, no. 4, 8 pages, 2021.
- [4] Y. Sasaki, R. Hada, and A. Munakata, "Computer-aided grading system for endoscopic severity in patients with ulcerative colitis," *Digestive Endoscopy*, vol. 15, no. 3, pp. 206–209, 2003.
- [5] P. Wang, T. M. Berzin, J. R. Glissen Brown et al., "Real-time automatic detection system increases colonoscopic polyp and adenoma detection rates: a prospective randomised controlled study," *Gut*, vol. 68, no. 10, pp. 1813–1819, 2019.
- [6] J.-B. Liu, X.-F. Pan, J. Cao, and F.-F. Hu, "A note on "some physical and chemical indices of clique-inserted lattices"," *Journal of Statistical Mechanics: Theory and Experiment*, vol. 2014, no. 6, Article ID P06006, 2014.
- [7] J.-B. Liu, X.-F. Pan, F.-T. Hu, and F.-F. Hu, "Asymptotic Laplacian-energy-like invariant of lattices," *Applied Mathematics and Computation*, vol. 253, pp. 205–214, 2015.
- [8] J.-B. Liu and X.-F. Pan, "A unified approach to the asymptotic topological indices of various lattices," *Applied Mathematics and Computation*, vol. 270, pp. 62–73, 2015.
- [9] J.-B. Liu and X.-F. Pan, "Asymptotic incidence energy of lattices," *Physica A: Statistical Mechanics and its Applications*, vol. 422, pp. 193–202, 2015.
- [10] Y. Sasaki, R. Hada, T. Yoshimura, N. Hanabata, T. Mikami, and S. Fukuda, "Computer-aided estimation for the risk of development of gastric cancer by image processing," in *Artificial Intelligence in Theory and Practice III*, pp. 197–204, Springer, Berlin, Germany, 2010.
- [11] S. Amin, M. Irfan Uddin, H. Al-Baity, M. Ali Zeb, M. Abrar Khan, and M. Abrar Khan, "Machine learning approach for covid-19 detection on twitter," *Computers, Materials & Continua*, vol. 68, no. 2, pp. 2231–2247, 2021.



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