CAPSTONE PROJECT

ITA0516 – CV

Identification of Hyperthyroidism Using Convolutional Neural Network

Team Members

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Guide – Dr.Christy

Project Plan

- To Use
  - **Convolutional Neural Network**
- to identify Hypothyroidism in Goiter from various images.

Requirements

- Google Collab
- AMD Ryzen 7 4800H processor
- 16Gb RAM
- 1 TB SSD storage
- NVIDIA RTX 3050 graphics card
- Python IDLE 3.12
- Dataset – Kaggle.com
- Windows 11

Concepts Incorporated

- Image preprocessing
- Data augmentation
- Transfer learning
- Object detection

ABSTRACT

Detecting thyroid abnormalities using Convolutional Neural Networks (CNNs) involves leveraging deep learning techniques for image analysis. Key concepts include CNN architecture for feature extraction, image preprocessing, data augmentation to enhance model robustness, transfer learning for leveraging pre-trained models, object detection for localizing thyroid nodules, and evaluation metrics to assess model performance. By integrating these concepts, CNN-based models can effectively identify and classify thyroid abnormalities in medical images, aiding healthcare professionals in diagnosis and treatment planning.

STEPS INVOLVED

- Import The Required Libraries
- Import The Dataset
- Data Preprocessing
- Model Building
- Data Augmentation
- Transfer Learning
- Object Detection
- Evaluation
- Prediction on User Data

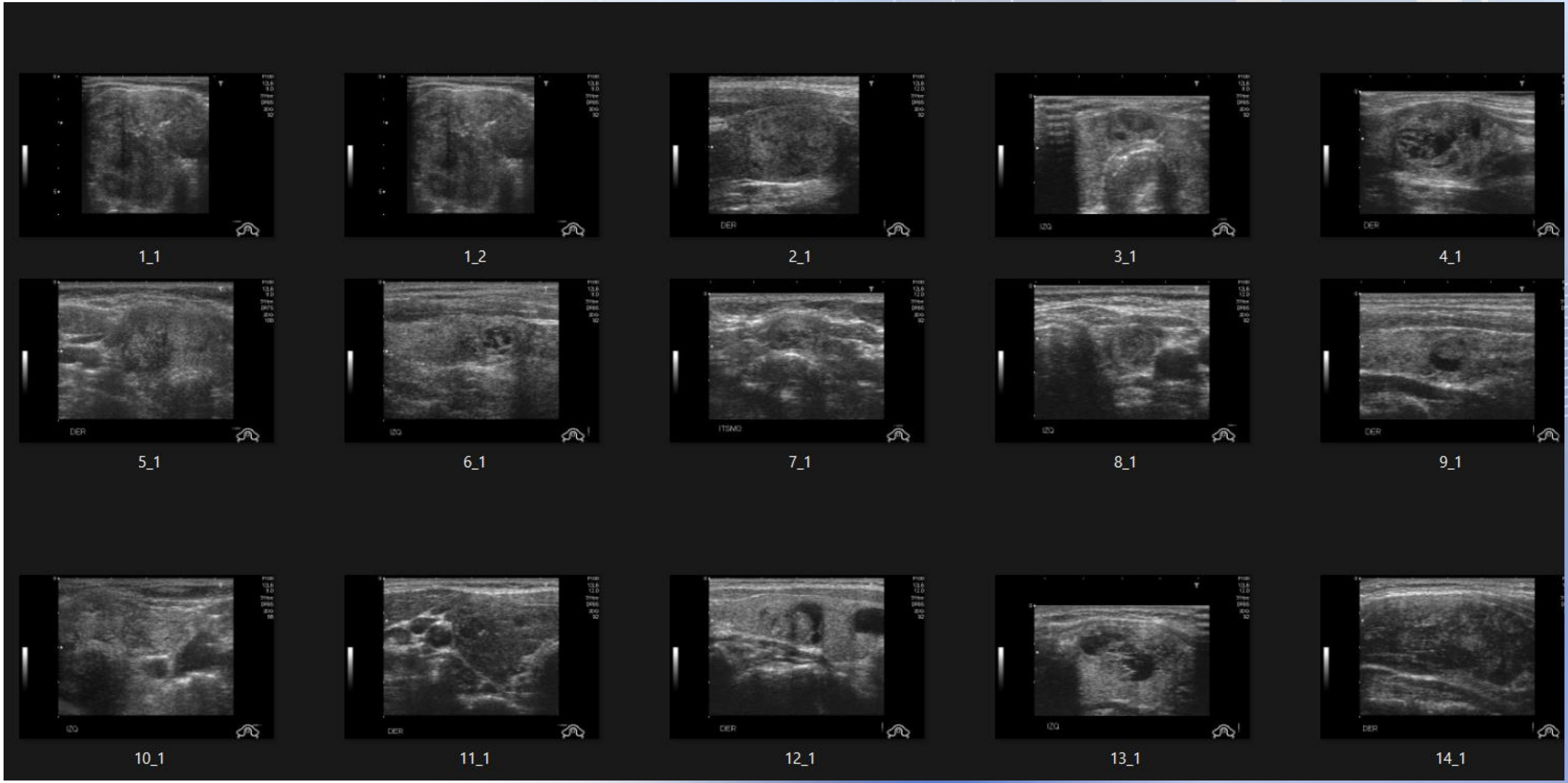
MODULES USED

- numpy
- sklearn
- cv2
- os
- pandas

CORPUS

- Corpus is collected from Kaggle.com.
- Corpus is named as DDTI: Thyroid Ultrasound.
- It is a set of hyperthyroid images.
- It contains 99sets of hyperthyroid images, classfied as two parts : Positive & Negative

CORPUS



CONCLUSION

- **Methodology Utilization:** Utilizing Convolutional Neural Networks (CNNs), the research aimed to detect thyroid abnormalities in medical images. The approach encompassed preprocessing data, designing CNN architectures, training models, and evaluating performance.
- **Evaluation of Techniques**: Effectiveness of CNNs was gauged using metrics like accuracy, precision, recall, and F1-score. Various CNN architectures and hyperparameters were tested, comparing results against traditional machine learning methods to establish benchmarks.
- **Effectiveness of CNN**: CNNs proved highly effective in detecting thyroid abnormalities, outperforming conventional techniques by directly learning features from images. Integration of transfer learning with pre-trained models further enhanced accuracy, especially with limited training data.
- **Challenges and Limitations**: Challenges included dataset imbalance, model interpretability, and computational demands. CNNs may struggle with rare or subtle abnormalities, necessitating refinement and validation.
- **Recommendations for Future Research**: Research avenues include dataset augmentation to address imbalance, interpretability methods for transparency, and optimization strategies for efficiency. Exploring advanced CNN architectures and multi-modal data integration could advance diagnostic capabilities and clinical outcomes.