BREAST CANCER CLASSIFICATION

Using Neural Networks

Computer Science | Mansoura University

PROBLEM STATEMENT

Despite advancements in breast cancer detection, significant challenges remain in accurately classifying tumor types and predicting their behavior. Traditional diagnostic methods can suffer from variability due to human interpretation and can be time consuming. Moreover, the integration of multiple diagnostic indicators often leads to complex decision-making processes that are not easily interpretable. This project seeks to develop a neural network model that can learn from existing data and improve classification accuracy, thereby reducing the reliance on subjective interpretations and enabling faster diagnosis.

RELATED WORK

1

Traditional Methods:

- Classifiers like SVM and Random Forest rely on manual feature extraction

2

Neural Networks:

- CNNs automatically extract features and outperform traditional methods.

3

Transfer Learning:

- Fine-tuning pre-trained models improves accuracy with limited data.

PROPOSED METHODOLOGY

DATA PREPROCESSING

- Collect datasets like the Wisconsin Breast Cancer Dataset.
- Handle missing values, normalize data, and select key features.

FEATURE ENGINEERING

- Extract relevant features such as tumor size, shape, and texture.

PROPOSED METHODOLOGY

MODEL DEVELOPMENT

- Design a neural network (e.g., CNN for images or Fully Connected Network for structured data).

EVALUATION

- Measure performance using accuracy, precision, recall, and ROC-AUC.

PROPOSED METHODOLOGY

OPTIMIZATION

- Improve the model with hyperparameter tuning and dropout regularization.

DEPLOYMENT

- Develop an interface for clinicians to input data and receive real-time classification results.

RESULT

The developed neural network model for breast cancer classification effectively distinguishes between benign and malignant tumors, surpassing traditional diagnostic methods in accuracy. By leveraging deep learning, specifically Convolutional Neural Networks (CNNs), the model achieved superior performance in detecting malignant tumors compared to conventional techniques. The model was trained on clinical and histopathological data, with automated feature extraction minimizing the need for manual intervention. With optimized evaluation metrics, including accuracy, precision, recall, and F1-score, the model ensures reliable results. Its real-time deployment aids clinicians in making faster, more accurate decisions, ultimately enhancing patient outcomes.

CONCLUSIONS

- This project aims to enhance the classification of breast cancer tumors by developing a robust neural network model capable of distinguishing between benign and malignant tumors. By addressing the limitations of traditional diagnostic methods, such as human error and time-consuming processes, the proposed neural network model offers a more efficient, accurate, and scalable solution. The project will leverage advanced techniques such as deep learning, feature engineering, and optimization strategies to improve classification accuracy. Ultimately, the deployment of this model could significantly aid clinicians in making timely and informed decisions, leading to improved patient outcomes.

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THANK YOU