Tittle: Identification of Iris Flower Varieties Through Machine Learning Techniques.

Presented by- Team-04

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Overview

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- Introduction
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Abstract

- Classification in Machine Learning:
  - Crucial for analyzing data.
  - Involves a diverse range of algorithms.
- Algorithms for Classification:
  - Decision trees, Naive Bayes, backpropagation, neural networks.
  - Artificial neural networks, multi-layer perceptrons.
  - Multi-class classification, Support Vector Machines (SVM), K-nearest neighbors (KNN).
- Research Focus:
  - Elaborated on three specific classification methods.
  - Implementation using the iris dataset and Scikit-learn toolkit.

- Dataset and Process:
  - Iris dataset used for implementation.
  - Scikit-learn toolkit employed for implementation.
- Paper's Objective:
  - Employing classification and regression algorithms on the IRIS dataset.
  - Identification and examination of patterns based on sepals and petals sizes.
- Key Finding:
  - SVM classifier outperforms KNN and logistic regression models.
  - Higher accuracy achieved with the SVM classifier.

Introduction

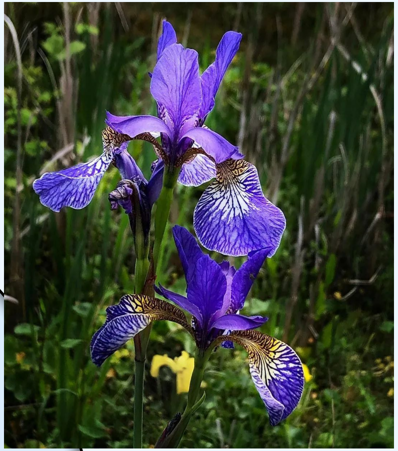

Figure : setosa flower

Machine Learning Overview:

- Subset of computer science focused on creating adaptable programs through self-improvement when exposed to new data. Broadly categorized into supervised and unsupervised learning, with an emphasis on supervised learning involving classification and regression.

Iris Species Identification Study:

- Utilizes Fisher's Iris dataset for identifying Iris flower species. Aiming for high accuracy in predicting unseen data, the study employs supervised learning techniques, particularly classification. The Scikit-learn toolkit is used to implement various machine learning algorithms, including Support Vector Machine (SVM), K-Nearest Neighbor (KNN), and Logistic Regression classifiers.

Methodology

- Implemented three key machine learning algorithms: Support Vector Machine (SVM), Logistic Regression, and K-Nearest Neighbor (KNN) classifiers.
- Employed four essential features from the iris dataset to train and test the classification models.
- Utilized the Python-based scikit-learn toolkit for seamless implementation and execution of the chosen algorithms.
- Conducted a comprehensive comparative analysis of the accuracy of SVM, Logistic Regression, and KNN models.

Dataset

- Flower Species: i. Iris-setosa, ii. Iris-versicolor, iii.Iris-virginica.
- Sample Size: i.150 individual samples, ii.50 samples per species
- Each sample includes measurements of four distinct features, capturing the morphological differences.
- Graphical illustration of iris flower samples and their measured features.
- A comprehensive dataset providing valuable insights into the morphological variations among Iris-setosa, Iris-versicolor, and Iris-virginica.

Literature Review

Technological Advances and Methodologies:

- Infrared Illumination (Stephen et al.): This study focused on a dataset comprising 1200 feature vectors from Asian and Caucasian iris images, using the LG 4000 sensor. The high resolution and near-infrared illumination of this sensor enhanced iris texture details essential for ethnicity classification.

- Use of 2D Gabor Filters (Qui et al.): Employing databases from three science institutes, this research utilized 2D Gabor filters along with the AdaBoost algorithm for feature classification, achieving around 85% accuracy. Gabor filters were effective in texture analysis due to their spatial localization and orientation selectivity.

Literature Review

- Advanced Texture Descriptors (Ross A. and Bobeldyk D.): This study used texture descriptors like Local Binary Pattern (LBP), Binarized Statistical Image Features (BSIF), and Local Phase Quantization (LPQ) for extracting iris texture features from datasets like BioCOP2009 and Cosmetic Contact. An average race prediction accuracy of 87% was achieved.
- Deep Class Encoder and Neural Networks: The Deep Class-Encoder, using ND-Iris-0405 and Multi-ethnicity Iris Dataset, showed high efficacy in classifying both gender and ethnicity. Similarly, artificial neural networks trained on iris textures from the University of Notre Dame's database indicated the potential of neural networks in this field.

Literature Review

Results and Implications for Biometric Security:

- Accuracy and Effectiveness: Studies demonstrated high accuracy rates in ethnicity classification, with Stephen et al. achieving 90.58% accuracy using the SMO algorithm. Qui et al. reported around 85% accuracy, and Ross A. and Bobeldyk D. achieved 87% accuracy. These results highlight the effectiveness of combining high-resolution imaging with advanced algorithms in ethnicity detection.
- Diverse Applications and Future Potential: The use of advanced machine learning techniques, including deep learning and neural networks, opens new avenues for application in biometric identification systems. The high level of accuracy obtained in these studies underscores the potential for enhanced biometric security and the need for continued research in diverse and complex datasets.

Literature Review

Results and Implications for Biometric Security:

- Variation in Techniques and Outcomes: The variation in methodologies, from Gabor filters to neural networks, and the diversity of datasets, including samples from various ethnicities, indicate the complexity of ethnicity classification. The highest reported accuracy was 93.33% using Gabor filters, emphasizing the potential and challenges in this research area.

- This summary encapsulates the key technological advancements and methodologies employed in the studies, as well as the significant results and implications these studies hold for the field of biometric security.

Thank You