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| **Batch Number** | **DB-4** |
| **Team Members** | K.John Wesley (21471A05N2)<br>V.Sunil(22475A0518)<br>V.Venu(21471A05O0) |
| **Guide** | N.Vijay Kumar.M.E., |
| **Title** | **Advanced Machine Learning Approaches for Infant Cry Classification Using Audio Feature Extraction** |
| **Domain/Technology** | MACHINE LEARNING |
| **Base Paper Link** | **https://www.researchgate.net/publication/377297400** |
| **Dataset Link** | **https://github.com/gveres/donateacry-corpus** |
| **Software Requirements** | Browser: Any latest browser like Chrome<br>Operating System: Windows 10 Server or later Python (COLAB) |
| **Hardware Requirements** | **Intel i5 or Ryzen 5 CPU, 16GB RAM, and a dedicated NVIDIA GPU (e.g., GTX 1660 or higher) is recommended.** |

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| **Abstract** | This study develops a machine learning framework to classify infant cries using 457 audio features, including time domain features like Zero-Crossing Rate (ZCR) for frequency analysis and Quadratic Mean RMS for power measurement. Frequency-domain features, notably Mel Frequency Cepstral Coefficients (MFCCs), alongside Mel spectrograms and Time Series Imaging (TSI) provide detailed visualization of audio signals. The data is split into 80% training and 20% testing sets with 10-fold cross-validation for tuning. Several machine learning models, including Logistic Regression, Support Vector Classifier, Decision Trees, Random Forests, and XGBoost, are evaluated. Hyperparameter tuning through grid search shows the Random Forest model with MFCC features achieves a peak accuracy of 98.03%. Evaluation using accuracy, confusion matrices, and feature importance highlights MFCC's role in classification. Results demonstrate the effectiveness of combining machine learning with classical feature extraction for infant cry classification, supporting early health monitoring. Future work includes ensemble techniques to boost performance. |

**Signature of the student(s)**   **Signature of the Guide**       **Signature of the project coordinator**