AUDIO BASED DRONE DETECTION AND IDENTIFICATION USING DEEP LEARNING

Department of CSE
Jyothi Engineering College
Thrissur

October 1, 2020

CREATING TECHNOLOGY LEADERS OF TOMORROW

Department Mission & Vision

Vision

- **Creating eminent and ethical leaders in the domain of computational sciences through quality professional education with a focus on holistic learning and excellence.**

Mission

- **To create technically competent and ethically conscious graduates in the field of Computer Science & Engineering by encouraging holistic learning and excellence.**
- **To prepare students for careers in Industry, Academia and the Government.**
- **To instill Entrepreneurial Orientation and research motivation among the students of the department**
- **To emerge as a leader in education in the region by encouraging teaching, learning, industry and societal connect.**

OUR TEAM

GROUP MEMBERS

1. **Akshaya Raj (JEC16CS006)**
2. **Alwin Joseph (JEC16CS014)**
3. **Archana Venugopal (JEC16CS031)**
4. **Jacob B Alappatt (JEC16CS053)**

Guide

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Drone Strikes

- **Drone attacks usually involves firing a missile or releasing a bomb at a target or spying over private properties**
- **What makes them lethal and effective for warfare are:**
  1. **advancements in video-camera techniques**
  2. **precision operations with improved GPS**
  3. **stealth operations and faster speed**

Audio Based Drone Detection and Identification using Deep Learning

1. **Drone identification - First step in securing physical infrastructure against this threat**
2. **Drone detection and Identification using deep learning techniques**
3. **Exploit unique acoustic features of flying drone**
4. **Deep neural networks identified- Convolutional Neural Network (CNN)**

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ADOPTED:CNN

1. **Conversion of audio signal into spectrogram.**
2. **Prediction of continuous values based on observations from the data.**
3. **Binary classification- Detection**
4. **Multi-Class Classification- Identification.**

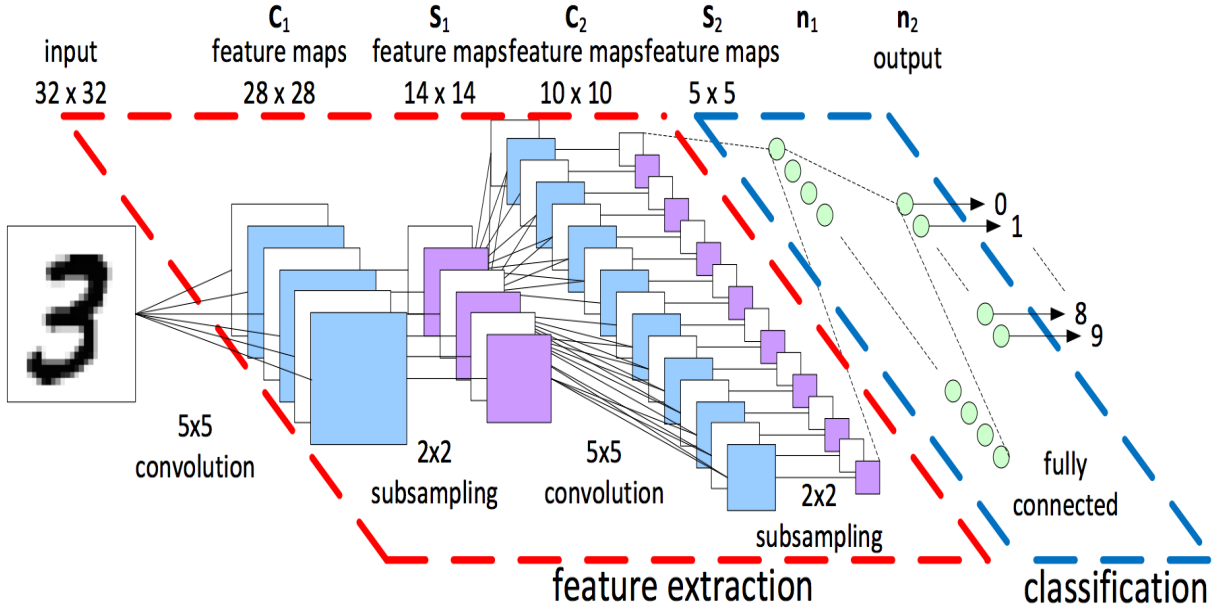

Figure: **CNN Architecture**

SOFTWARE REQUIREMENTS

1. **MATLAB**
2. **Scikit-learn**
3. **PyTorch**
4. **Jupyter Environment**
5. **Python 3**

HARDWARE REQUIREMENTS

1. 1.6GHz* dual-core Intel Core i5 processor
2. 8GB RAM
3. 128GB* PCIe-based flash storage
4. 14 inch, 1080*1920-pixel display
5. 4GB Graphics Card

MODULES

1. **Data acquisition module.**
2. **Data Pre-processing module.**
3. **Identification and Classification module**

DATA ACQUISITION MODULE

1. **Drone audio datasets**
2. **Sample-set of size 1300.**

DATA PRE-PROCESSING MODULE

1. Audio files in ’wav’ format converted to spectrograms
2. Spectrograms denoised using median filter
3. Denoised images then converted into ’PNG’ format and stored

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IDENTIFICATION AND CLASSIFICATION MODULE

1. **Artificial Neural Network used- Convolutional Neural Network (CNN).**
2. **Binary Classification- Drone and Not Drone.**
3. **Multiclass Classification- Bebop, Mambo and Unknown**

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CODE

Architecture

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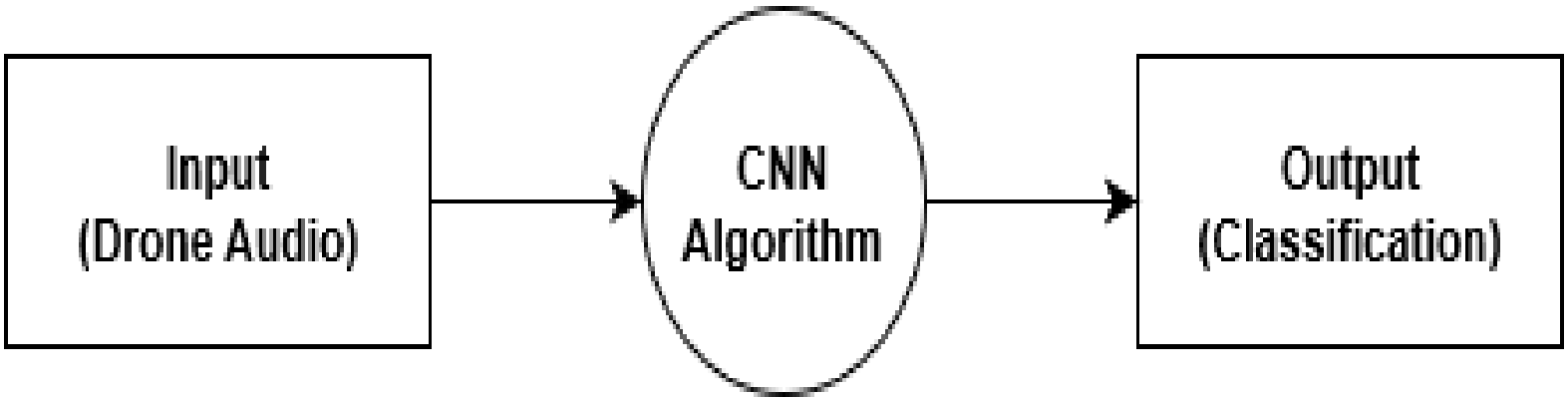
DFD



Level 0

DFD CONTD...

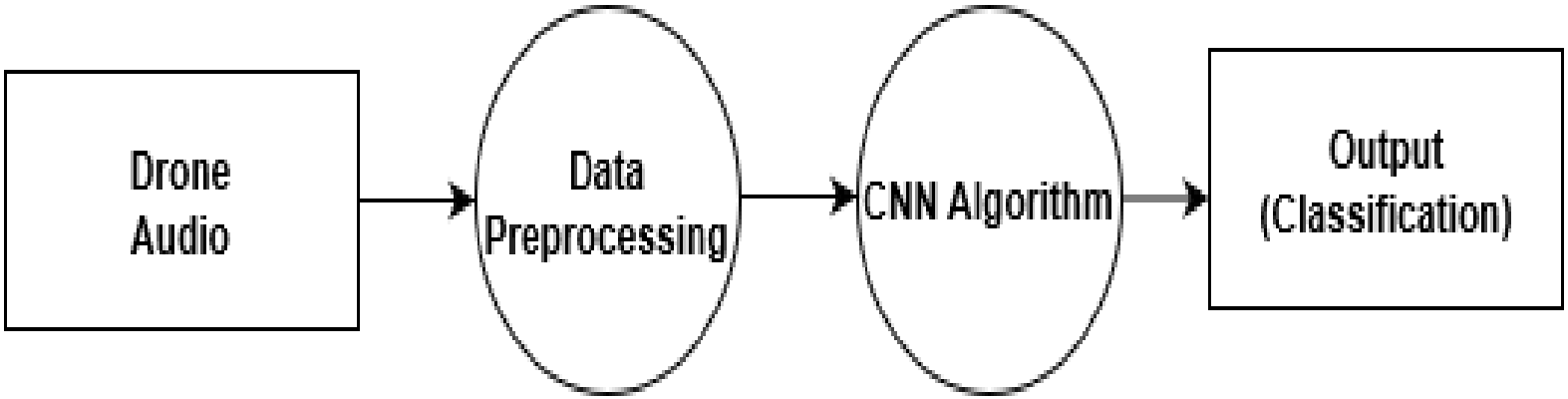


Figure: **Level 1**

DFD CONTD...

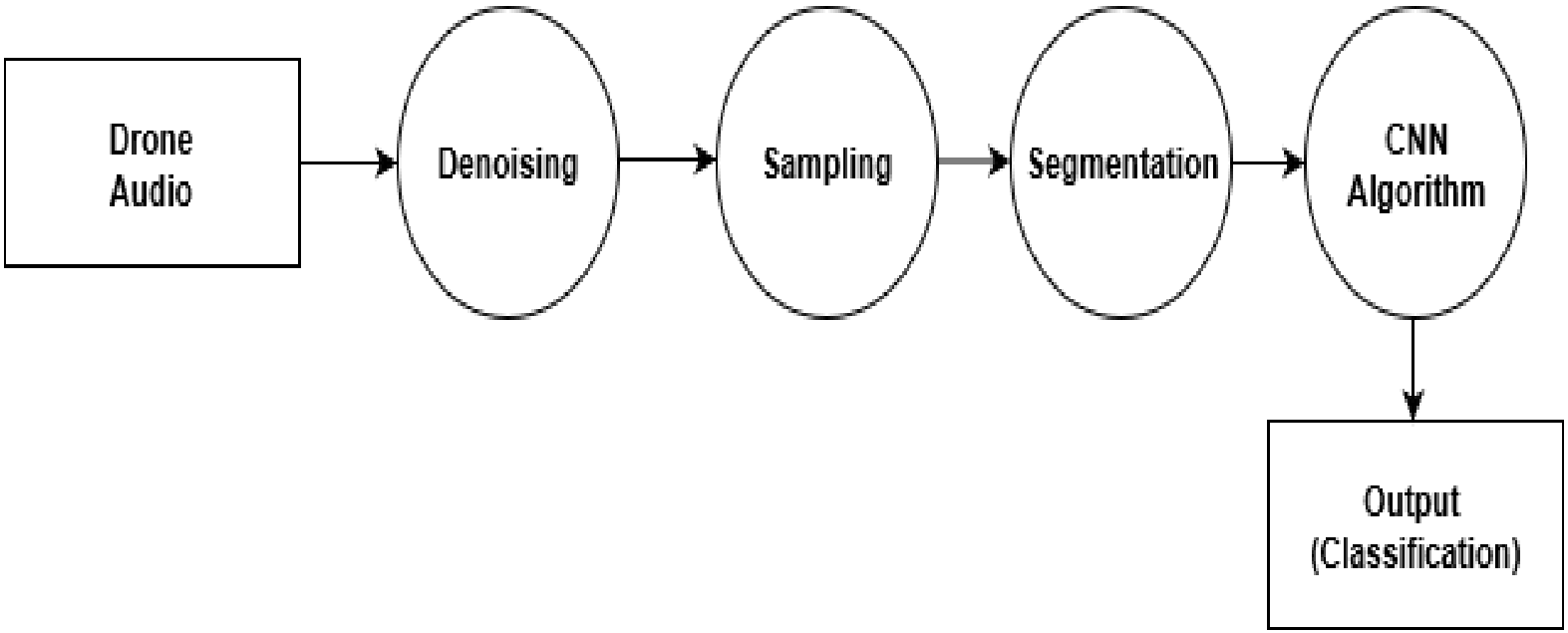
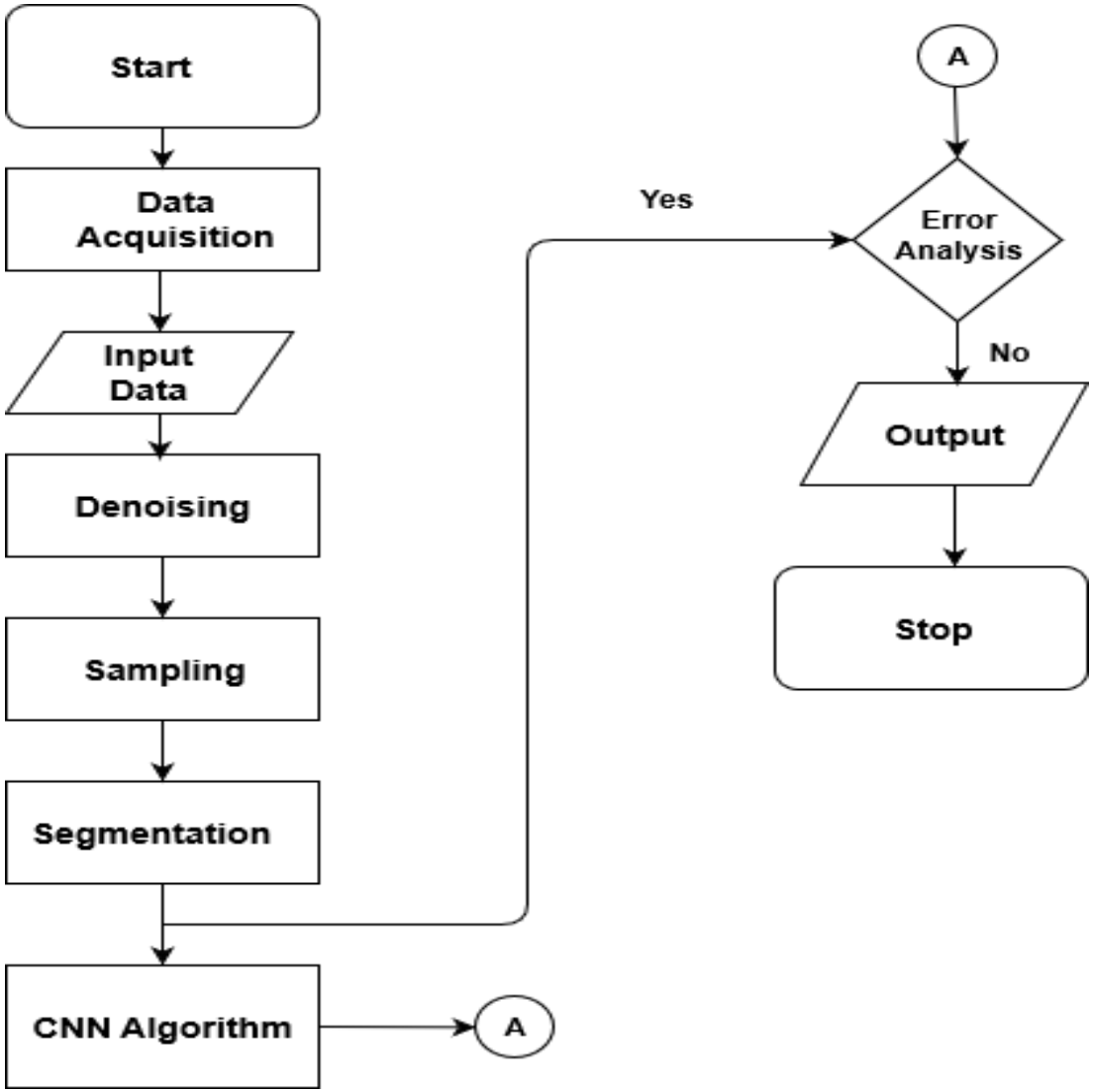


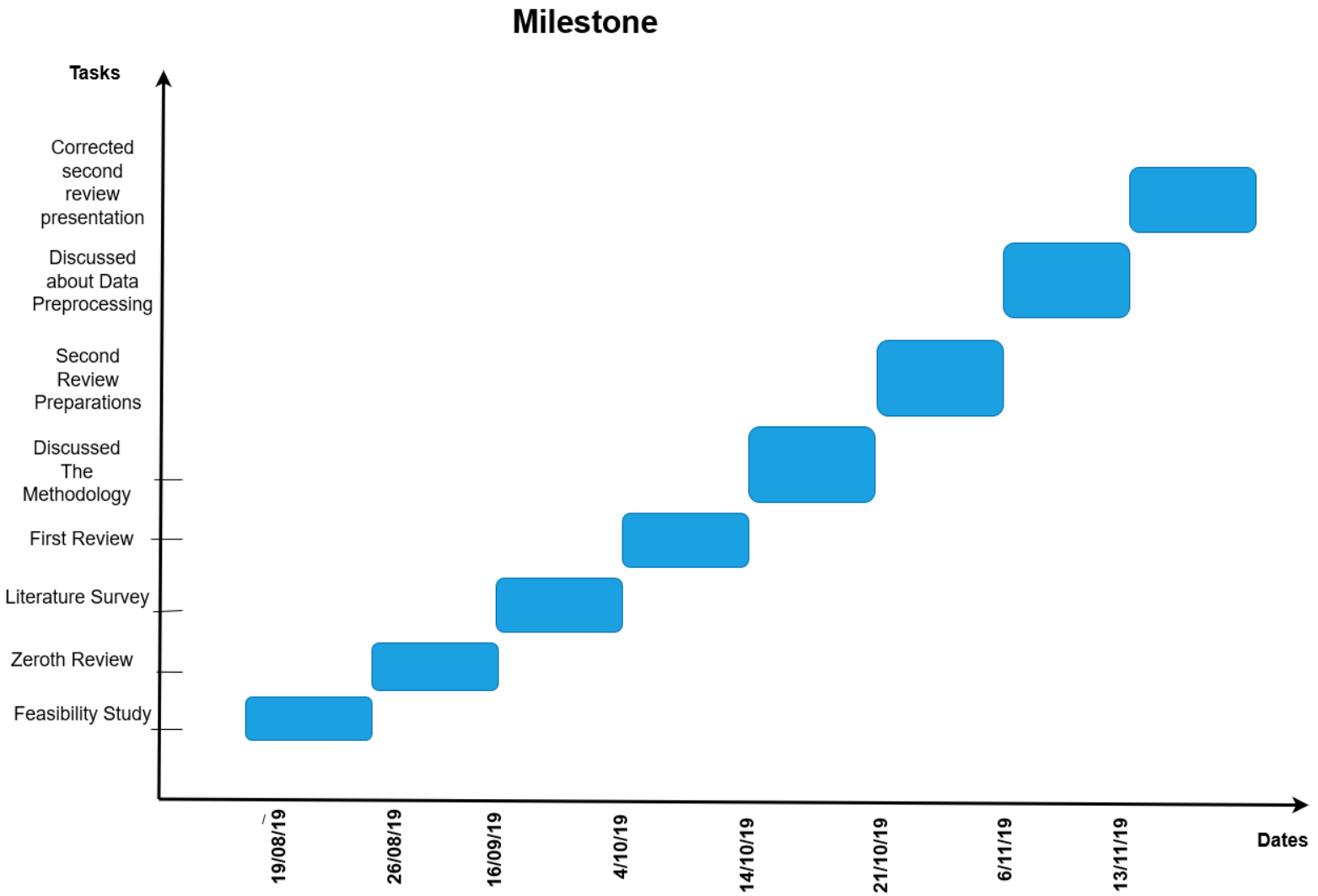
Figure: **Level 2**

METHODOLOGY FLOWCHART



Flowchart

MILESTONES



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ADVANTAGES

1. **Execution of feature engineering on its own**
2. **Less test time**
3. **Use of special convolution and pooling operations for more accurate results**

CONCLUSION

1. **Deep learning- an efficient solution to drone identification problem**
2. **Drone identification through image-classification better than Digital Signal Processing(DSP) methods**

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Thank You

Any Query?