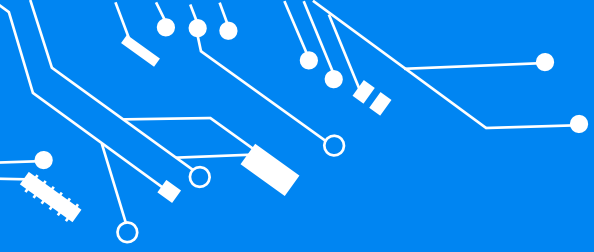


Revolutionizing Recycling: Smart Garbage Classification using oneDNN for Improved Efficiency and Sustainability.

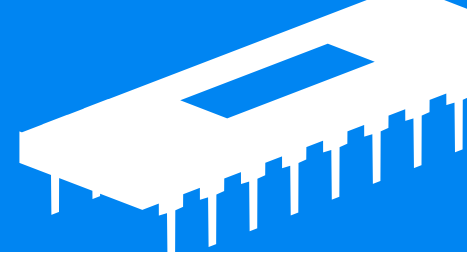
AGENDA ✓



- Introduction
- oneAPI and oneDNN
- Workflow
- Use of oneDNN and TensorFlow in project
- Future Enhancements
- Conclusion

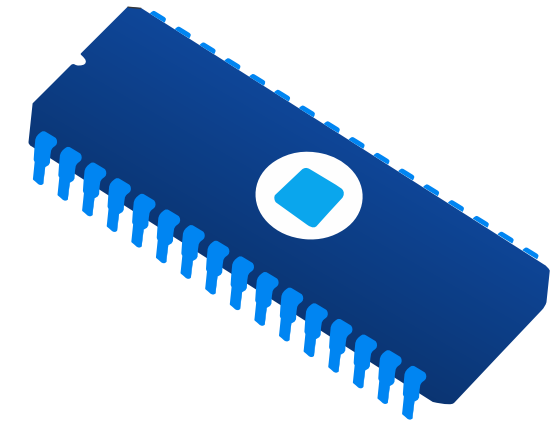
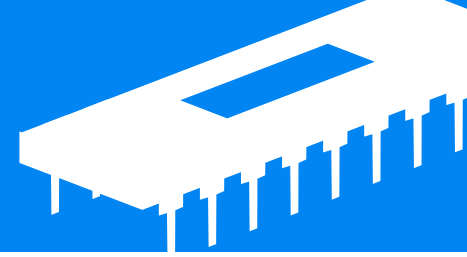
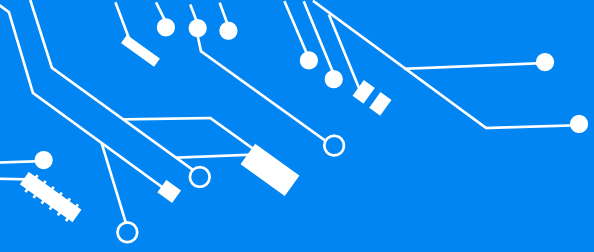


INTRODUCTION

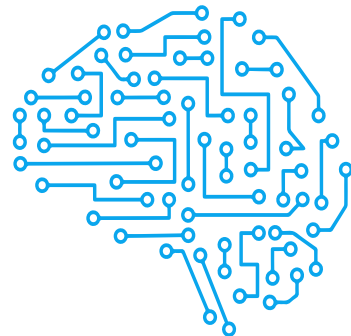


- Global waste management is a critical issue with billions of tons of municipal solid waste generated annually.
- A significant portion of this waste is not properly managed, leading to environmental consequences.
- Traditional manual sorting methods for garbage segregation are time-consuming and inefficient.
- AI/ML algorithms offer a solution by automating the garbage segregation process.
- In this project, we propose a system that utilizes AI/ML algorithms and oneApi for smart garbage classification.

oneAPI and oneDNN



- oneAPI is a unified programming model that supports heterogeneous computing systems, allowing code to run on different hardware architectures like CPUs, GPUs, and FPGAs.
- Benefits of oneAPI include code portability, ease of programming, and performance optimizations.
- oneDNN is a software library that provides optimized routines for deep learning operations and is compatible with different hardware architectures.





Workflow



Importing Libraires

Data Importing

Preparing the Data

**Generator for Training/
Testing**

**Model Creation
/Compilation**

**Training/Testing the
Model**

Saving model

Deploying the Model



Use of oneDNN and TensorFlow in project



- **`os.environ['TF_ENABLE_ONEDNN_OPTS'] = '1'` enables Intel's oneAPI Deep Neural Network Library (oneDNN) optimizations in TensorFlow.**
- oneDNN provides highly optimized routines for deep learning operations like convolution, pooling, normalization, and activation functions.
- Using oneDNN can result in faster execution times and better performance on CPUs, particularly those with Intel processors.
- The code snippet enables oneDNN optimizations for TensorFlow on the current system.
- The model created using `tensorflow.keras` is a convolutional neural network (CNN) for image classification.
- The architecture includes convolutional blocks, max pooling layers, and fully connected layers with dropout for regularization.
- The model is compiled using the Adam optimizer, sparse categorical cross-entropy loss function, and accuracy metric for evaluation.



Future Enhancements



Expansion of the Dataset: Continuously expanding and diversifying the dataset of waste material images will improve the model's ability to classify a wider range of garbage types accurately.

Multi-modal Classification: Combining image analysis with other data modalities, such as text or audio, can enhance the classification accuracy

Real-time Object Detection: Real-time identification and segregation of waste materials, improving the overall efficiency of the recycling process.

Sustainability Education and Awareness: Promoting education and awareness about the importance of waste management, recycling.

Conclusion

In conclusion, here are the key points regarding the use of oneDNN in smart garbage classification:

- AI/ML algorithms and oneDNN play a crucial role in automating the process of garbage segregation.
- Smart garbage classification using machine learning enables more efficient and accurate waste material classification.
- This approach has significant implications for improving recycling processes and promoting a more sustainable future.



The background features a dark blue, textured surface with a faint, glowing circuit board pattern. A central, square microchip is highlighted with a bright blue, glowing border. Numerous glowing blue lines of varying lengths and thicknesses extend from the chip and across the frame, some ending in small blue dots. The overall aesthetic is high-tech and digital.

THANK YOU