



CHILD LABOUR DETECTION

OneAPI powered by Intel

AGENDA

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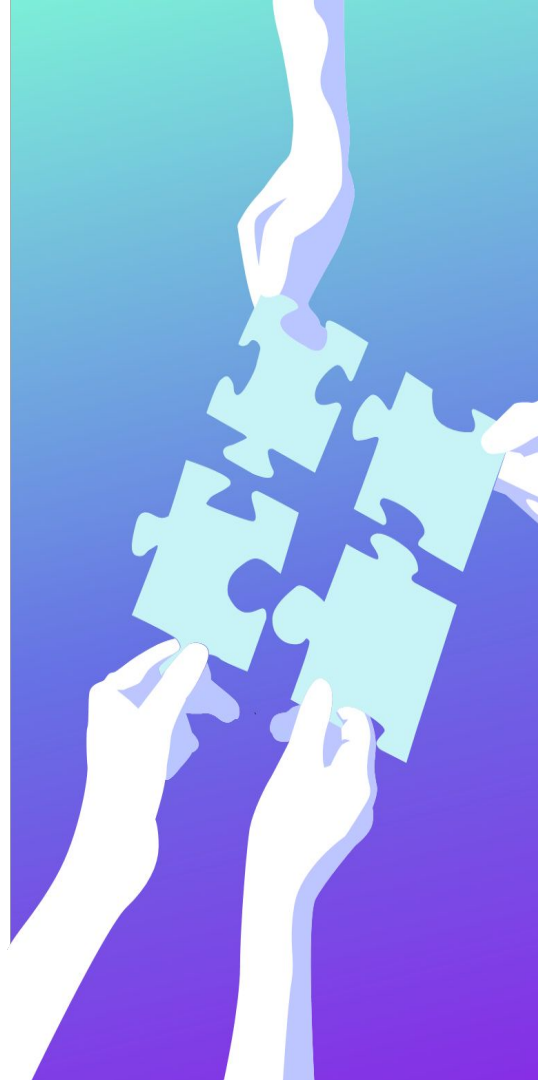
ABSTRACT

In Rural Areas, we have seen many children working to make their families financially stable. Across the globe, almost 160 million children are under child labour which is 2% of the world's population.

Child labour is mainly in South Asian countries due to poverty, financially unstable families, Loss/ illness of primary caregiver, or job loss of primary wage earner.

Many countries need to focus on eliminating child labour as it snatches the pretty childhood of their life and their potential and dignity. It also endangers their health which makes their life more risky.

Therefore, it is an essential need for a better solution to eliminate child labour and provide them with a better future. A child labour-recognizing model is being built using Deep Learning methods.



PROBLEM STATEMENT

Child labour is a significant problem in most developing countries, damaging, spoiling and destroying children's futures. Child labour can result in extreme bodily and mental harm and even death. It can lead to slavery and sexual or economic exploitation. And in nearly every case, it cuts children off from schooling and health care, restricting their fundamental rights.

Child labour often occurs when families face financial challenges or uncertainty – whether due to poverty, sudden caregiver illness, or job loss of a primary wage earner.

There is a need for an effective solution to detect and prevent child labour in industries such as construction, brickfields, coal mining fields, and make-up product mining fields in South Asian countries like Bangladesh, India, Pakistan, and Nepal.

SOLUTION

As an outcome due to the pandemic caused by COVID-19, the sudden redundancy of factory employment and the overall disruption in the economic sector has pushed 77.2% of previously non-poor people in rural areas down the poverty line. This hints at the increasing probability of child labour in the coming days.

To overcome the problem, we have approached a technical solution by creating a model using video classification techniques to detect child labour activities in industrial areas.

Since the dataset regarding child labour incidents in the context of South Asian countries like India and Bangladesh is not open-sourced yet, so we created a unique dataset by trimming videos of specific child labour incidents from YouTube.

To train and test the dataset, we built a Convolutional Neural Network (CNN) based model, and also we used transfer learning techniques to compare our model's accuracy with other distinguished models of Keras.

APPROACH

In this project an unique dataset has been created and has been proposed dedicatedly for child labour detection. This issue must be solved to ensure children's rights in developing countries like Bangladesh. To help the researchers in similar fields, we open-sourced the dataset.

Using deep learning techniques, image classification has brought massive effectiveness in human activity recognition and real-time video classification. In recent years, divergent activity detection from live video streams has become a vital research segment of Computer Vision. Transfer learning has become a convenient deep-learning technique in Computer Vision and NLP.

For this project, two approaches will be used to train and test the data. At first, a Convolutional Neural Network (CNN) model for our unique dataset will be built. Later, we will use the transfer learning technique, adopting two well-known models, VGG16 and Xception, to train and test the data and compare the performance with our model. However, we will focus on developing the models and getting good accuracy.

TECHNOLOGIES USED

1. Intel OneDNN

2. Open CV

3. Convolution neural networks(CNN)

4. Tensorflow

5. Flutter

6. Pandas

7. Keras

8. Jupyter Notebook

9. Scikit learn



USAGE OF ONEAPI

- *OneAPI is a cross-architectural programming(hardware architectures) model in which, with the same code, we can run on CPU, GPU, AI accelerators or FPGA (Field-programmable gate array) by changing only one line of code.*
- *OneDNN, a part of OneAPI, an open-source library developed by Intel, will be used in this project to optimize the performance and efficiency of the CNN model.*
- *Intel(R) Extension for Scikit-learn will be used, which provides a seamless way to speed up the Scikit-learn application.*
- *The TensorFlow framework, which is integrated with OneDNN, is used to achieve :*
 - a. *lower memory consumption*
 - b. *higher accuracy*
 - c. *faster training times*
 - d. *better utilization of hardware resource*

COMPARE ACCURACY

To compare the resulting accuracy of the CNN model with transfer learning methods, VGG16 and Xception.

BUILD A CNN MODEL

To build a child labour recognizing model based on Convolutional Neural Network (CNN) using the dataset.



ALARM THE AUTHORITIES

The government officials will be alerted regarding the incident with the captured video.

BUILD A DATASET

To create a novel dataset of child labourers in the context of South Asian countries.



COMPANION APP

An extensive app that shows the exact location of child labour incidents



PRIMARY GOALS

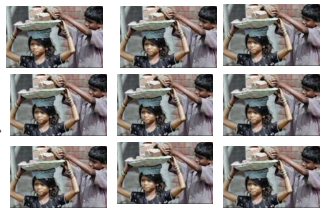
MODEL ARCHITECTURE

INPUT DATA



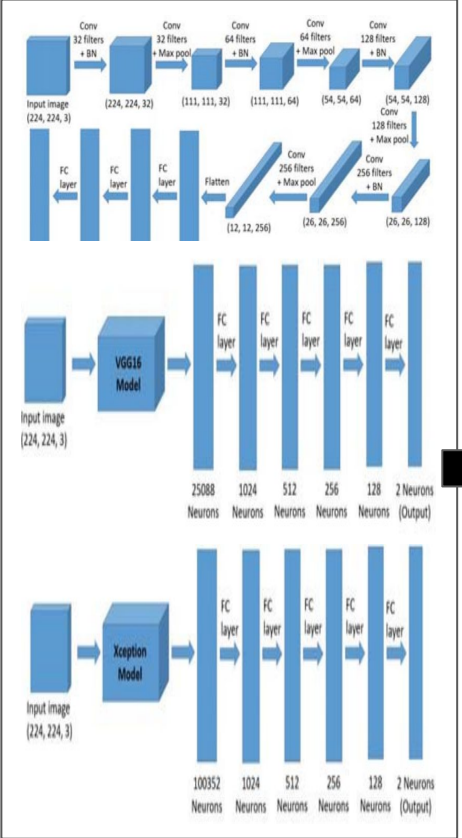
VIDEO(30fps)
3 fps = 7820 images

DATA PREPROCESSING

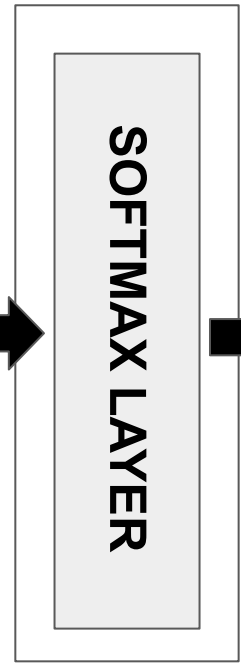


Resolution: 224*224

TRAINING AND TESTING



DECISION MAKING



OUTPUT

SCALABILITY

- **Data Collection**

- *Gathering sufficient labelled data, including videos encompassing different scenarios and contexts of child labour, is essential. Scaling up the data collection process may require collaboration with multiple organizations, leveraging crowdsourcing platforms, or utilizing automated data collection techniques.*

- **Deployment Infrastructure**

- *As the solution uses one API, i.e. a cloud-based solution, scaling up, the solution will be a seamless process as we can leverage the cloud services provided by Intel.*

- **Subscription based service**

- *By using a subscription based model we can generate a steady source of income.*

- **Collaboration and Integration**

- *Collaborating with relevant stakeholders, such as NGOs, governmental organizations, or social platforms.*
- *Integrating existing systems, such as reporting platforms, social media APIs, or communication channels, can help scale the project's impact by reaching a wider audience and leveraging existing infrastructure.*

BUSINESS MODEL AND EXISTING SOLUTION


1. **Grants and Donations:**

- a. *Given the social impact nature of a child labour detection project, securing grants or donations from philanthropic organizations, governmental agencies, or corporate social responsibility programs can be a sustainable business model. These funds can support the project's research, development, data collection efforts, and operational costs.*

2. **Corporate Social Responsibility (CSR) Initiatives:**

- a. *Companies concerned about child labour issues may be willing to invest in supporting a child labour detection project as part of their CSR initiatives. Companies could provide funding, resources, or technical expertise to the project, enhancing their brand image and fulfilling their social responsibility objectives.*

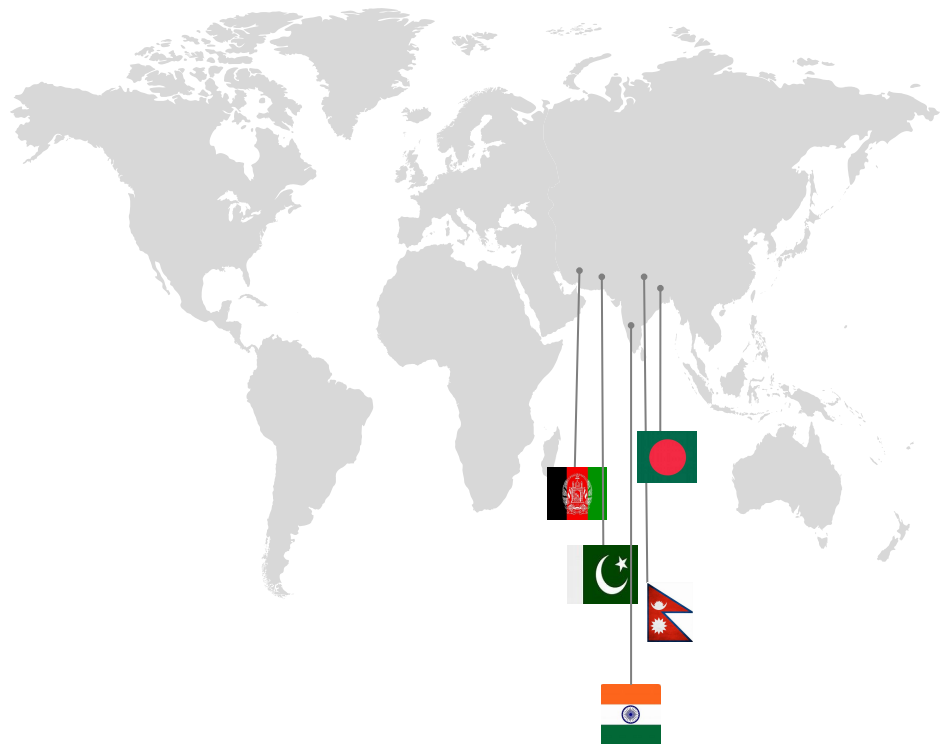
The pre-existing solution for detecting child labour was through NGOs working to eradicate child labour in India and to prevent it by Spreading awareness among parents and communities to avoid disruption in children's education, More stringent laws and effective implementation, Government measures and dedicated platforms such as pencil.gov.in to ensure effective enforcement of child labour laws.



MARKET REGIONS

In South Asia, there are 16.7 million children in child labour. The young, 5-11 year-old children, make up about one-fifth of all child labourers in South Asia, with the highest numbers in India, Bangladesh, Pakistan and Nepal. Nepal has the highest relative risk, with 26% of all 5-17 year olds engaged in child labour.

In absolute terms, child labour for the 5-17 years age range is highest in India (5.8 million), followed by Bangladesh (5.0 million), Pakistan (3.4 million) and Nepal (2.0 million). The young, 5-11 year-old children, make up about one-fifth of all child labourers in South Asia.



PIPELINE

Ecosystem creation

It is equipped with an array of software practices which would be the first responders to the sight of human trafficking, which would inform the responsible authorities.

Human Activity Recognition (HAR)

By analyzing Human Activity Recognition (HAR), we can monitor the safety of all working individuals and help prevent health hazards.

Expanding the Dataset

We would improve the detection of child labour in all parts of the world by expanding our dataset.

Rehabilitation

To create rehabilitation centers to guide the children and generate awareness about the grants provided by the government to support their families and their future.



Thank You