

VISVESVARAYA TECHNOLOGICAL UNIVERSITY

“Jnana Sangama”, Belagavi-590018



INTERNSHIP REPORT

ON

“BLIND ASSIST USING ML”

Submitted in partial fulfillment for the award of degree

BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE & ENGINEERING

Submitted by

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Conducted at

COMPSOFT TECHNOLOGIES

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

ACHARYA INSTITUTE OF TECHNOLOGY

Soladevanahalli, Bangalore-560107

2022-23

ACHARYA INSTITUTE OF TECHNOLOGY

(Affiliated to Visvesvaraya Technological University, Belagavi)
Soladevanahalli, Bangalore-560107

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING



CERTIFICATE

This is to certify that the Internship titled “**BLIND ASSIST USING ML**” is a bonafide work carried out by **MOHADDISA ZAHRA (1AM20EC047), AMIT KESHRI(1AY20CS015), BHUVAN S (1AY20CS038), HARIPRIYA KHAJURIA (1AY20CS059) and YASHASHWINI H (1AT20CS188)**, of Acharya Institute of Technology, in partial fulfillment for the award of **Bachelor of Engineering, in Computer Science and Engineering** under Visvesvaraya Technological University, Belagavi, during the year 2022-2023. It is certified that all corrections/suggestions indicated have been incorporated in the report. The project report has been approved as it satisfies the academic requirements in respect of Internship prescribed for the course Internship / Professional Practice

Signature of Guide

Signature of HOD

Dr. Ajith Padyana
Head of Department
Dept. of CSE

Name of the Examiner

1. _____

2. _____

Signature with Date

DECLARATION

I, **Amit Keshri**, final year student of Computer Science & Engineering, Acharya Institute of Technology-560107, declare that the Internship has been successfully completed, in COMPSOFT TECHNOLOGIES. This report is submitted in partial fulfillment of the requirements for award of Bachelor Degree in Branch name, during the academic year 2022-2023.

Date : 20-09-2023

:

Place : Bengaluru

Usn : 1AY20CS015

Name : Amit Keshri

OFFER LETTER



Date: 14th August, 2023

Name: **Amit Keshri**

USN: **1AY20CS015**

Placement ID: **1408ML026**

Dear Student,

We would like to congratulate you on being selected for the **Machine Learning with Python (Research Based)** Internship position with **Compsoft Technologies**, effective Start Date **14th August, 2023**, All of us are excited about this opportunity provided to you!

This internship is viewed as being an educational opportunity for you, rather than a part-time job. As such, your internship will include training/orientation and focus primarily on learning and developing new skills and gaining a deeper understanding of concepts of **Machine Learning with Python (Research Based)** through hands-on application of the knowledge you learn while you train with the senior developers. You will be bound to follow the rules and regulations of the company during your internship duration.

Again, congratulations and we look forward to working with you!.

Sincerely,

Nithin K. S

Project Manager

COMPSOFT TECHNOLOGIES

No. 363, 19th main road,

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ACKNOWLEDGEMENT

This Internship is a result of accumulated guidance, direction and support of several important persons. We take this opportunity to express our gratitude to all who have helped us to complete the Internship.

We express our sincere thanks to our Principal, for providing us adequate facilities to undertake this Internship.

We would like to thank our Head of Dept – branch code, for providing us an opportunity to carry out Internship and for his valuable guidance and support.

We would like to thank our (Lab assistant name) Software Services for guiding us during the period of internship.

We express our deep and profound gratitude to our guide, Guide name, Assistant/Associate Prof, for her keen interest and encouragement at every step in completing the Internship.

We would like to thank all the faculty members of our department for the support extended during the course of Internship.

We would like to thank the non-teaching members of our dept, for helping us during the Internship.

Last but not the least, we would like to thank our parents and friends without whose constant help, the completion of Internship would have not been possible.

ABSTRACT

The "Blind Assist using Machine Learning Android App" project introduces an innovative mobile application designed to provide vital assistance and support for individuals with visual impairments. Leveraging cutting-edge machine learning techniques and the power of smartphones, this app offers a comprehensive suite of features to enhance navigation, information access, and overall quality of life for users with limited or no vision.

Key functionalities of the Android app encompass text recognition, real-time navigation guidance, voice interaction, and adaptive learning. The app utilizes the smartphone's camera and sensors to identify and issue auditory warnings, convert printed or digital text into spoken words, offer step-by-step navigation instructions, and respond to voice commands for seamless control. The app's integration into Android devices ensures portability and accessibility, making it an indispensable companion for users on the go. Furthermore, the app employs machine learning to adapt and personalize its responses, learning from user interactions to better cater to individual preferences and requirements. This project represents a significant step toward fostering independence, safety, and inclusivity for individuals with visual impairments. By harnessing the capabilities of smartphones and machine learning, the Blind Assist Android App strives to empower users, facilitate their daily activities, and contribute to a more equitable and accessible world

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CHAPTER 1

COMPANY PROFILE

A Brief History of Company

Company, was incorporated with a goal “To provide high quality and optimal Technological Solutions to business requirements of our clients”. Every business is different and has a unique business model and so are the technological requirements. They understand this and hence the solutions provided to these requirements are different as well. They focus on clients requirements and provide them with tailor made technological solutions. They also understand that Reach of their Product to its targeted market or the automation of the existing process into an e-client and simple process are the key features that our clients desire from the Technological Solution they are looking for and these are the features that we focus on while designing the solutions for their clients.

Company is a Technology Organization providing solutions for all web design and development, MYSQL, PYTHON Programming, HTML, CSS, ASP.NET and LINQ. Meeting the ever increasing automation requirements, Sarvamoola Software Services. specialize in ERP, Connectivity, SEO Services, Conference Management, effective web promotion and tailor-made software products, designing solutions best suiting clients requirements.

We strive to be the front runner in creativity and innovation in software development through their well-researched expertise and establish it as an out of the box software development company in Bangalore, India. As a software development company, they translate this software development expertise into value for their customers through their professional solutions.

They understand that the best desired output can be achieved only by understanding the client's demand better. At our Company we work with clients and help them to define their exact solution requirement. Sometimes even they wonder if they have completely redefined their solution or new application requirement during the brainstorming session, and here they position themselves as an IT solutions consulting group composed of high caliber consultants.

They believe that Technology when used properly can help any business to scale and achieve new heights of success. It helps Improve its efficiency, profitability, reliability; to put it in one sentence “Technology helps you to Delight your Customers” and that is what we want to achieve.

CHAPTER 2

ABOUT THE COMPANY

We are a Technology Organization providing solutions for all web design and development, Researching and Publishing Papers to ensure the quality of most used ML Models, MYSQL, PYTHON Programming, HTML, CSS, ASP.NET and LINQ. Meeting the ever increasing automation requirements, Compsoft Technologies specialize in ERP, Connectivity, SEO Services, Conference Management, effective web promotion and tailor-made software products, designing solutions best suiting clients requirements. The organization where they have a right mix of professionals as stakeholders to help us serve our clients with best of our capability and with at par industry standards. They have young, enthusiastic, passionate and creative Professionals to develop technological innovations in the field of Mobile technologies, Web applications as well as Business and Enterprise solutions. Motto of our organization is to “Collaborate with our clients to provide them with the best Technological solution hence creating a Good Present and Better Future for our client which will bring a cascading positive effect in their business shape as well”. Providing a Complete suite of technical solutions is not just our tagline, it is Our Vision for Our Clients and for Us, We strive hard to achieve it.

Services provided by Compsoft Technologies.

- Core Java and Advanced Java
- Research and Development/Improvise of ML Models
- Web services and development
- Dot Net Framework
- Python
- Selenium Testing
- Conference / Event Management Service
- Academic Project Guidance
- On The Job Training
- Software Training

CHAPTER 3

INTRODUCTION

Introduction to ML

Machine learning (ML) is a branch of artificial intelligence (AI) that enables computers to “self-learn” from training data and improve over time, without being explicitly programmed. Machine learning algorithms are able to detect patterns in data and learn from them, in order to make their own predictions. In short, machine learning algorithms and models learn through experience.

In traditional programming, a computer engineer writes a series of directions that instruct a computer how to transform input data into a desired output. Instructions are mostly based on an IF-THEN structure: when certain conditions are met, the program executes a specific action.

Machine learning, on the other hand, is an automated process that enables machines to solve problems with little or no human input, and take actions based on past observations.

Machine learning can be put to work on massive amounts of data and can perform much more accurately than humans. It can help you save time and money on tasks and analyses, like solving customer pain points to improve customer satisfaction, support ticket automation, and data mining from internal sources and all over the internet.

Problem Statement

Visually impaired individuals face substantial difficulties in utilizing mobile phones due to the predominantly visual nature of interfaces. This limitation restricts their access to essential mobile phone features such as messaging, calling, checking battery status, and currency identification. The existing applications may not sufficiently cater to their needs or lack integration of vital functionalities into a single, user-friendly platform. Hence, there is a pressing need to develop a tailored mobile application that acts as a voice assistant, enabling visually impaired users to efficiently access and manage key mobile phone features. The application should encompass modules for messaging, phone management, time/date and battery status, and currency identification through camera scanning. Additionally, the application must leverage speech recognition and text-to-speech capabilities, as well as employ deep learning techniques like Convolutional Neural Networks (CNNs) to accurately identify Indian currency notes from images captured by the device's camera. By addressing these challenges, the proposed system aims to enhance accessibility and improve the overall mobile phone experience for the visually impaired.

CHAPTER 4

SYSTEM ANALYSIS

Existing System

The existing system for assisting visually impaired individuals relies on a range of assistive technologies and tools, each designed to address specific challenges faced by this community. These include screen readers, text-to-speech software, Braille devices, mobility aids like white canes and guide dogs, as well as specialized apps tailored for various tasks. While these solutions have undoubtedly improved accessibility and independence, they also come with certain limitations. Visually impaired individuals still encounter difficulties in using smartphones for basic functions such as messaging and calling. Navigating complex environments remains a challenge, and identifying currency denominations is often problematic. Existing technologies, though valuable, have room for improvement in terms of user-friendliness, comprehensiveness, and adaptability to modern digital devices. This report highlights the need for ongoing innovation in assistive technologies to better cater to the needs of visually impaired individuals and underscores the potential for newer solutions, such as the proposed voice assistant application, to address these shortcomings effectively.

Proposed System

The proposed system is to build a customized application which acts as a voice assistant and can be used to help the visually impaired to access the most important features of their mobile phones. The app consists of four modules. These are:

- 1) Messaging Inbox – In this module the system will speak the new messages for the user and the user can also send messages through Speech Recognition API and text-to-speech API.
- 2) Phone Manager – In this module the user can either use the provided dialer or can speak recipient's phone number to make a call.
- 3) Time/Date and Battery Status – In this module the user can get the phone's current battery status

and also know date and time.

4) Camera – This module will be used to identify Indian currency denomination and predict the notes scanned by the camera.

Objective of the System

The primary objective of the proposed system is to significantly improve accessibility and the quality of life for visually impaired individuals by providing a comprehensive and user-friendly voice assistant application

meaning that it covers a wide range of tasks that visually impaired individuals may need to perform on their smartphones, such as communication, information access, and financial management. It is also designed to be user-friendly, with a simple and intuitive interface that is easy to navigate using voice commands.

One of the key goals of the proposed system is to improve accessibility for visually impaired individuals. This is achieved by providing a variety of speech-based features, such as speech-to-text and text-to-speech, that allow visually impaired individuals to interact with their smartphones without having to rely on sight. The system also includes a number of accessibility features, such as high contrast mode and large text, to make it easier for visually impaired individuals to read and see the screen.

Another key goal of the proposed system is to improve the quality of life for visually impaired individuals. This is achieved by providing a variety of features that can help visually impaired individuals to live more independently and perform tasks that would otherwise be difficult or impossible. For example, the system's image recognition technology can be used to recognize and identify Indian currency denominations, which can help visually impaired individuals to manage their finances more easily.

Leveraging deep learning techniques further enhances the system's accuracy and efficiency, ultimately contributing to a more inclusive and empowering assistive tool for visually impaired individuals.

CHAPTER 5

REQUIREMENT ANALYSIS

Hardware Requirement Specification

1. Smartphone or Mobile Device
2. Camera
3. Microphone
4. Audio Output (Speaker or Headphones)
5. Battery
6. Storage Capacity
7. Internet Connectivity (Optional)

Software Requirement Specification

1. Android Operating System Compatibility
2. Speech Recognition API
3. Text-to-Speech API
4. Deep Learning Framework (TensorFlow and Keras)
5. Kotlin Programming Language
6. Database or Storage System
7. Battery Management Features
8. Image Processing Libraries
9. Security Measures
10. Accessibility Features

11. User Interface (UI) Design Tools

12. Testing Frameworks and Tools

13. Comprehensive Documentation

14. Updates and Maintenance Plan

CHAPTER 6

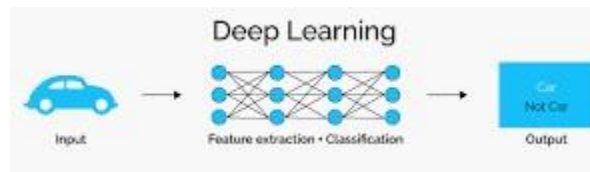
DESIGN & ANALYSIS

The android application is made using Kotlin programming language. Kotlin is a modern statically typed programming language that helps boost productivity, developer satisfaction, and code safety. Some of its features are – Expressive and concise, safer code, interoperable, and structured concurrency. The built in speech-to-text and text-to-speech APIs are used for voice assistant functionality. The speech-to-text API is an intent based API, which launches Google's Speech Recognition service, and returns back the text result. The text-to-speech API, unlike Speech Recognition, is available without Google Services, and can be found in `android.speech.tts` package. Implicit intents are used to make a phone call after receiving the recipient's phone number. The `ACTION_CALL` action is used to trigger built-in phone call functionality available in Android devices. Implicit intents send the user to another app or service based on an action the user would like to perform. For example, here we have a phone number and we want to make a call. For this instead of building our own activity, we create a request to make the phone call using Implicit Intent. Next we have features such as sending and receiving messages and getting the current battery status and battery percentage. These functionalities are implemented using broadcast receivers. Apps can register specific broadcasts. When a broadcast is sent, the system automatically routes broadcasts to apps that have subscribed to receive that particular type of broadcast. The Battery Manager class is used to broadcast all battery and charging details and the `onReceive()` method of the Broadcast Receiver class is used to receive messages.

The currency detection model uses Deep Learning techniques to recognize any Indian Currency using image as an input feed. Deep Learning is a machine learning technique that teaches computer to do what comes naturally to humans. A computer model learns to perform classification tasks directly from images, text or sound.

The image detection is done through a Convolutional Neural Network model built using Tensorflow and Keras Library of python.

Convolutional neural network (CNNs) are one of the most popular technique used to improve images classification accuracy.



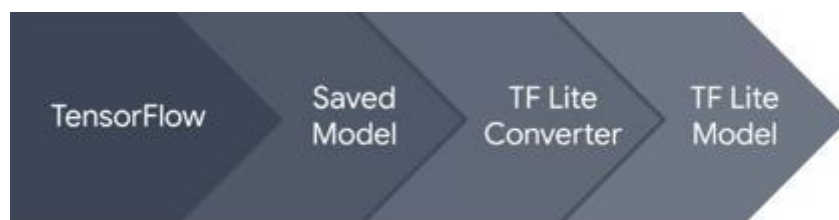
The steps involved are:

1. Training the model
2. Converting the model
3. Deploy to device
4. Optimize the model

The model classifies currency images into 10 different categories comprising of valid old and new currencies. I have used a simple sequential model for classification purposes.

The steps followed in building the model are:

- 1) Dataset collection – The official IEEE dataset of Indian and Thai currency is used which comprises of 2000 different images.
- 2) Splitting dataset – The dataset is partitioned into training and testing directory.
- 3) Building the model – Building a sequential model using MaxPooling and convolutional layers.
- 4) Using Image augmentation – Image augmentation is used to expand the dataset by rotation, flipping, zooming, shifting, etc. and improve the performance of the model.
- 5) Training and Testing - The model is trained on images in the training directory and is tested with images, which the model hasn't seen previously.



Next, the model needs to be converted. Therefore, to convert a trained TensorFlow model to run on mobile devices, the TensorFlow Lite converter Python API is used. This reduces the model into a Flat Buffer, reducing model size and modifying it to be used on TensorFlow Lite operations.

The next important step is deploying the model into the android application. When deploying a

model for use on mobile devices, it is important to consider the model size, workload and the operations that are used.

Model Size – A model must be small enough to fit within your target device's memory.

Workload – The size and complexity of the model has an impact on workload. Large, complex models might result in a higher duty cycle, which will increase power consumption and heat output.

The TensorFlow Lite interpreter, runs optimized models on edge devices such as mobile phones and microcontrollers

CHAPTER 7

IMPLEMENTATION

Implementation is the stage where the theoretical design is turned into a working system. The most crucial stage in achieving a new successful system and in giving confidence on the new system for the users that it will work efficiently and effectively.

The system can be implemented only after thorough testing is done and if it is found to work according to the specification. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve the change over and an evaluation of change over methods apart from planning.

Two major tasks of preparing the implementation are education and training of the users and testing of the system. The more complex the system being implemented, the more involved will be the system analysis and design effort required just for implementation.

The implementation phase comprises several activities. The required hardware and software acquisition is carried out. The system may require some software to be developed. For this, programs are written and tested. The user then changes over to his new fully tested system and the old system is discontinued.

TESTING

The testing phase is an important part of software development. The Information zed system will help in automating the process of finding errors and missing operations and also a complete verification to determine whether the objectives are met and the user requirements are satisfied. Software testing is carried out in three steps:

1. The first includes unit testing, where each module is tested to provide its correctness, validity and also determine any missing operations and to verify whether the objectives have been met. Errors are noted down and corrected immediately.
2. Unit testing is the important and major part of the project. So errors are rectified easily in particular modules and program clarity is increased. In this project the entire system is

divided into several modules and is developed individually. So unit testing is conducted to individual modules.

3. The second step includes Integration testing. It need not be the case, the software whose modules when run individually and showing perfect results, will also show perfect results when run as a whole.

CHAPTER 8

SNAPSHOTS









CHAPTER 9

CONCLUSION

The package was designed in such a way that future modifications can be done easily. The following conclusions can be deduced from the development of the project:

- Automation of the entire system improves the efficiency
- It provides a friendly graphical user interface which proves to be better when compared to the existing system.
- It gives appropriate access to the authorized users depending on their permissions.
- It effectively overcomes the delay in communications.
- Updating of information becomes so easier
- System security, data security and reliability are the striking features.
- The System has adequate scope for modification in future if it is necessary.

REFERENCE

- "Android Programming: The Big Nerd Ranch Guide" by Bill Phillips and Chris Stewart
- Deep Learning" by Ian Goodfellow, Yoshua Bengio, and Aaron Courville
- Speech and Audio Signal Processing: Processing and Perception of Speech and Music" by Ben Gold and Nelson Morgan
- <https://developer.android.com/reference/android/speech/tts/TextToSpeech>
- <https://www.w3schools.com/python/>
- <https://docs.python.org/3/>
- <https://www.tensorflow.org/guide>