VISVESVARAYA TECHNOLOGY UNIVERSITY

BELAGAVI-590018, Karnataka

INTRENSHIP REPORT

ON

“VOICE CLASSIFICATION USING -ML”

BACHELOR OF ENGINEERING IN COMPUTER SCIENCE AND ENGINEERING

Submitted by :

Name : **Sachin Athani**

Usn : 3VN21CS038

Conducted at

COMPSOFT TECHNOLOGIES

VEERAPPA NISTY ENGINNERING COLLEGE

SHORAPUR-585224 YADGIRI DISTIC KARNATAKA

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

VEERAPPA NISTY ENGINNERING COLLEGE SHORAPUR- SHORAPUR-585224 YADGIRI DISTIC KARNATAKA.

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

CERTIFICATE

This is to certify that the internship titled "voice classification using-ml " carried out by Mr. **Sachin Athani** .a bonafide student of verappa nisty engineering college ,in partial fulfillment for the award of **Bachelor of engineering ,in computer science** under visvesvaraya technologiucal university,Belagavi, during the year 2022-2023.It is certified that all correction/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 (21CSI85)

Signatrure of guide Signature of hod signature of principle

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External viva :

1) _____

2) _____

VEERAPPA NISTY ENGINNERING COLLEGE SHORAPUR- SHORAPUR-585224 YADGIRI DISTIC KARNATAKA.

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

DECLARATION

I am **Sachin Athani**,second year student of computer science engineering department ,**veerappa nisty engineering college -585224**,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 computer science engineering, during the academic year of 2022-2023

Date : 17-11-2022

Place : Shorapur, yadgir

Usn : 3VN21CS038

Name : Sachin Athani

OFFER LETTER

COMPSOFT TECHNOLOGIES AUTHORIZED SIGNATORY

INTERNSHIP OFFER LETTER

Date: **14th October, 2022**

Name: **Sachin Athani**
USN: **3VN21CS038**

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 October, 2022**, 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,
1st Block Rajajinagar
Bangalore - 560010

AC KN OWLED GEMENT

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 since thanks to our principal for providing us adequate facilities to undertake this internship

We would like to thank our head of department – (CS) for providing us an opportunity to carry our internship and for his valuable guidance and support

We would like to thank our lab assistant software service for guiding us during period of internship.

We express our deep and profound gratitude to our guide, we are refferd some websites about machine learning and my faculty members also support for this work.

Keep 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 department 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.

May I will try my level best and do this project my friends also helping for doing this project.

Our team will be effort for this project and all college members will be helped for this hod will be responsed for this project.

Name : Sachin Athani

USn : 3VN21CS038

ABSTRACT

Python is a programming language that is preferred for programming due to its vast features, applicability, and simplicity.

Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without being explicitly programmed. Learning algorithms in many applications thats we make use of daily. Every time a web search engine like Google is used to search the internet, one of the reasons that work so well is because a learning algorithm that has learned how to rank web pages. These algorithms are used for various purposes like data mining, image processing, predictive analytics, etc. to name a few. The main advantage of using machine learning is that, once an algorithm learns what to do with data, it can do its work automatically. In this paper, a brief review and future prospect of the vast applications of machine learning algorithms has been made.

Popular apps such as Amazon's Alexa, Apple's Siri and Google Maps employ speech recognition. Machine learning (ML) software can make measurements of spoken words through a set of numbers that represent the speech signal.

Machine Learning is defined as an application of artificial intelligence where available information is used through algorithms to process or assist the processing of statistical data. While Machine Learning involves concepts of automation, it requires human guidance. The abstract should begin with a brief but precise statement of the problem or issue, followed by a description of the research method and design, the major findings, and the conclusions reached. A machine learning model can, therefore, extract the dominant audio per time frame in a waveform by finding patterns in the spectrogram.

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COMPANY PROFILE :

Brief history of compsoft technologies :

Comsoft Technologies is founded by a group of Enterprise Architects having over two decades of experience in software architecture, design and development of mission critical systems for some of the Fortune 500 companies. We hire some of the best talents in the market to deliver quality software on your aggressive milestone dates. Being in the industry and having hands on experience, we fully understand the entire Software Development Life Cycle and we only hire resources who meet our high standards. All of our resources go through our rigorous interview process based on your requirements and we only select the candidates who not only technically strong but also they are fully dedicated to deliver on your promise, the success of your organization.

Our resources are expert in designing and developing applications using Agile and Scrum methodologies. Whatever

your software development methodologies may be, our resources have experience in broad areas and they can pull any project successfully. Software consulting service is the backbone of Comsoft Technologies. We provide talented resources to implement complex projects. Our resources have broad expertise in various skills along with unmatched people skills which makes them unique in the marketplace. Whether you are building complex backend systems or developing OLTP, we are fully dedicated to execute your projects smoothly and provide knowledge transfer so your team can maintain and take them to the next level.
We have highly experienced skilled professionals specialized in various skills for both frontend and backend development. Not only we provide consulting services for your need, our experts have knowledge and experience to guide you to choose the right technologies and tools to develop the projects in the most cost effective way. Regardless of the size of your project and deadlines, we work on your timeline and provide support throughout the project implementation.
Our ERP technical and functional consultants have up-to-date knowledge in Oracle E-Business Suite and SAP products.

Sarvamoola Software Services. 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, SEOServices, Conference Management, effective web promotion and tailor-made software products ,designing solutions best suiting clients requirements

Our technology team is fully dedicated to take up any challenge to execute your project at a very competitive price, giving you the flexibility to do more with less and on time, guaranteed. We deliver complete solution starting from requirements gathering, analysis, design, architecture evaluation, implementation and

support. We have various levels of testing processes (Unit Testing, Integration Testing, UAT, Volume Testing etc) in place to ensure quality of the deliverables. We are proud to have a team of resources with wide area of expertise. Let us show you how you can restructure your IT to save you time and money.

company will be provide some applications they are cam application , data archiving , security software ERP development Automated Testing Process , Supply Chain Services ,

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 delight your customers and that is what we want to achieve.

ABOUT THE COMPANY :

The race for digital transformation is on. In this globally connected on-demand world with rapid advancements in internet technologies, businesses worldwide are under constant pressure to add innovative real-time capabilities to their applications to respond to market opportunities.

Every business worldwide is building event-driven, real-time applications - from financial services, transportation, and energy, to retail, healthcare, and Gaming companies.
Our endeavour is to make it easy to develop innovative real-time applications and efficient to operate them in production.

We have a proven record of building highly scalable, world-class consulting processes that offer tremendous business advantages

to our clients in the form of huge cost-benefits, definitive results and consistent project deliveries across the globe.

We prominently strive to improve your business by delivering the full range of competencies including operational performance, developing and applying business strategies to improve financial reports, defining strategic goals and measure and manage those goals along with measuring and managing them.

Comsoft Technologies provide on demand technical support based on your requirement! We work very closely with you to analyze the requirements and provide source code snippets that you can plug & play in your mainstream flow. We stand behind any source code we provide it to you throughout the implementation and provide 24x7 support.
We also provide training in various technologies with hands-on experience. The candidates successfully completed the training and the tests will receive a plaque of *"Certificate of Completion"* .
Please give us a call and let us explain how our training helps you to develop quality software in the most efficient way!

Financial Industry, Transportation, Supply Chain Management, Insurance, Retail, Manufacturing, Java, J2EE, Web Service, SOAP, JMS, MDB, EJB, Adobe Flex, Dreamweaver, XML, XSD, XSLT, SAX, DOM, SAAJ, JAXB, Oracle EBS Month End Closing, Oracle Application Framework, ADF, SAP Materials Management (MM), Oracle BPEL Processing, SAP Sales & Distribution (SD), Weblogic, Web Sphere, JBOSS, TOMCAT,

Comsoft Technologies provide both online and in-person training in various technologies with hands-on experience. The candidates successfully completed the training and the tests will receive a plaque of *"Certificate of Completion"* . Whether you are scehduling training for your organization's employees or you are an individual who is looking to learn new technologies, we can schedule training in your convenient time to make it more effective for you. Please give us a call and let us explain how our

training helps you to develop quality software in the most efficient way!

Our instructors have 15+ years of experience in developing mission critical systems for some of the Fortune 500 companies and we bring you first hand information how technologies are applied to business scenarios. Our entire training is based on solving practical issues rather than following a book. Candidates successfully completing the training course will have advanced career opportunity. Our instructors are also available after training to help you answer any question you may have.

INTRODUCTION :

Introduction about machine learning :

Machine learning is a type of artificial intelligence (AI) that provides computers with the ability to learn without being explicitly programmed. Machine learning focuses on the development of Computer Programs that can change when exposed to new data. In this article, we'll see basics of Machine Learning, and implementation of a simple machine learning algorithm using python.

Python community has developed many modules to help programmers implement machine learning. In this article, we will be using numpy, scipy and scikit-learn modules.

Machine learning involves a computer to be trained using a given data set, and use this training to predict the properties of a given new data. For example, we can train a computer by feeding it

1000 images of cats and 1000 more images which are not of a cat, and tell each time to the computer whether a picture is cat or not. Then if we show the computer a new image, then from the above training, the computer should be able to tell whether this new image is a cat or not. The process of training and prediction involves the use of specialized algorithms. We feed the training data to an algorithm, and the algorithm uses this training data to give predictions on a new test data. One such algorithm is K-Nearest-Neighbor classification (KNN classification). It takes a test data, and finds k nearest data values to this data from test data set. Then it selects the neighbor of maximum frequency and gives its properties as the prediction result.

Machine learning is programming computers to optimize a performance criterion using example data or past experience . We have a model defined up to some parameters, and learning is the execution of a computer program to optimize the parameters of the model using the training data or past experience. The model may be predictive to make predictions in the future, or descriptive to gain knowledge from data.
The field of study known as machine learning is concerned with the question of how to construct computer programs that automatically improve with experience.

Introduction about voice classification:
Machine learning can be used in pitch detection, understanding speech, and musical instruments, as well as in music generation. For our case, we shall use machine learning for audio classification.Machine learning has shown exemplary results when evaluating the environment using pictures. However, this field has not been fully exploited in audio classification.
This is because sound can give us a nondirectional perspective, unlike a camera. Sound does not depend on illumination. This means that you can hear the sound the same way no matter if it's day or night.
Nevertheless, converting sound waves into audio and spectrograms (visual representation of frequencies) can allow us to use machine learning capabilities.

Machine learning for audio can be used in pitch detection and music generation. For our case, we'll use it for classification.
An excellent example of an audio classification problem is when a machine has to determine whether the audio is speech or music.
This tutorial introduces you to Machine Learning for audio classification and some of the associated theories.
We will also implement an audio classification task using TensorFlow.

Problem statement :

Voice classification using machine learning program using python programming language.

SYSTEM ANALYSIS :

Proposed system :

Voice classification using machine learning with python application.

Objective of the system :

One of the main reasons for the importance of classification is that **regardless of repertoire, singing is ultimately about vocal comfort**. Accurately identifying one's voice type, alongside a reliable vocal technique, enables the singer to freely portray a character, or to focus on conveying the meaning of the music.

Large datasets are used to build this voice classification.

All the parameters are analysed using linear regression algorithm.

This classification is used to the fix the some applications they are alexa,google assistant, voice.

REQUIREMENT ANALYSIS :

Hardware Requirement specification :

Processor : Intel core

RAM : 4 GB

Hard disk : 20GB(approx.)

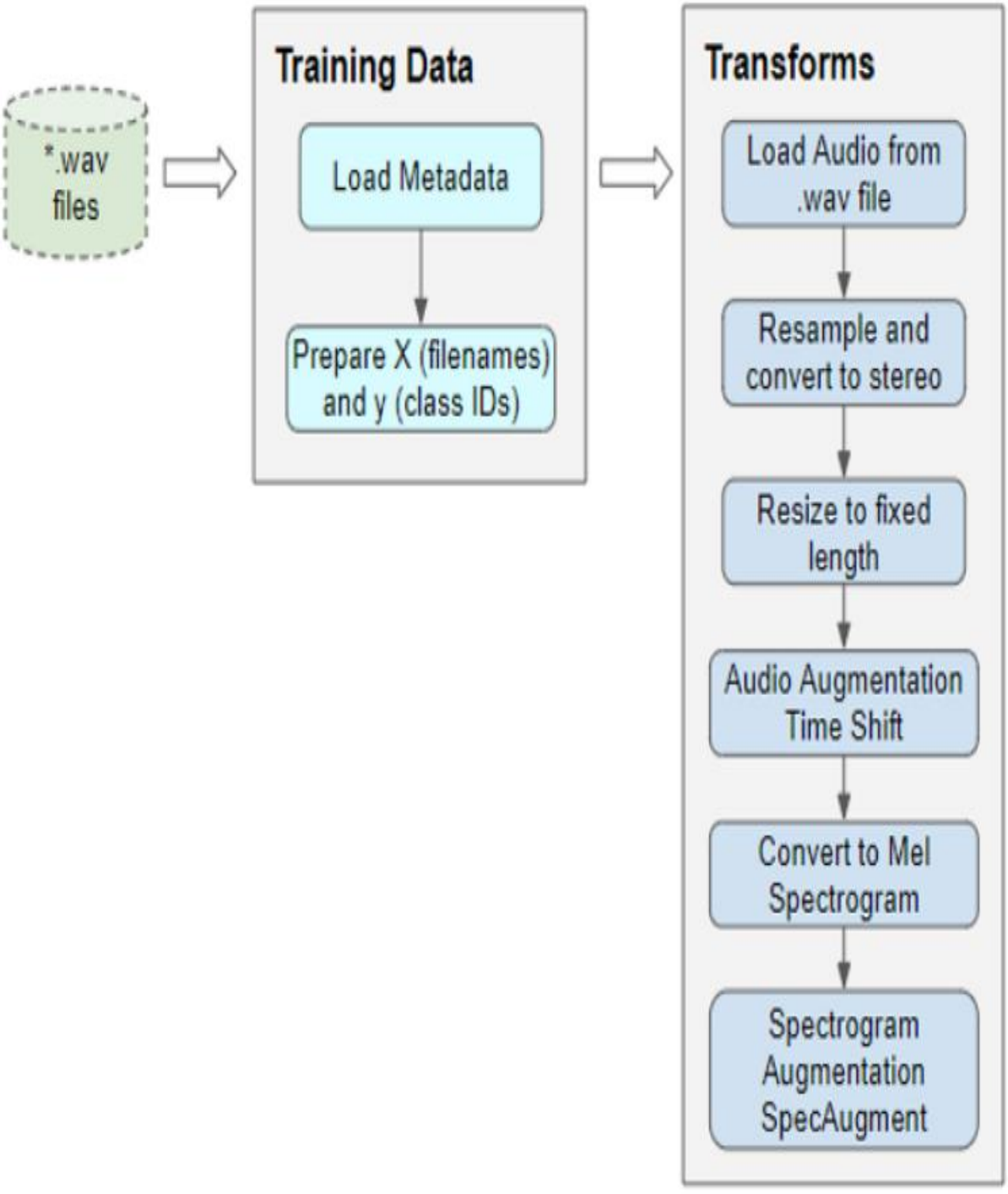
Software Requirement specification :

Operating system : windows 7

Language : python

IDE : Jupyter notebook

DESIGN AND ANALYSIS :



IMPLIMENTATION :

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 efficiency and effectively.

The system can be implemented only after through testing is done and if it is found to work according to the specification. It involves careful planning, investigation of the current system and it 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 of 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. It is the Information zed system will help in automate 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 in 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 module and program clarity is increased. In this project 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.

PROGRAM FOR AUDIO CLASSIFICATION :

```
# coding: utf-8

# In[1]:


import glob
from random import shuffle

import librosa
import numpy as np
import pandas as pd
from keras import optimizers, losses, activations, models
from keras.callbacks import ModelCheckpoint, EarlyStopping
from keras.layers import Dense, Input, Dropout, BatchNormalization,
Convolution2D, MaxPooling2D, GlobalMaxPool2D
from sklearn.model_selection import train_test_split
from tqdm import tqdm

# In[2]:
input_length = 16000*5

batch_size = 32


n_mels = 320
# def audio_norm(data):
#
#     max_data = np.max(data)
#     min_data = np.min(data)
```

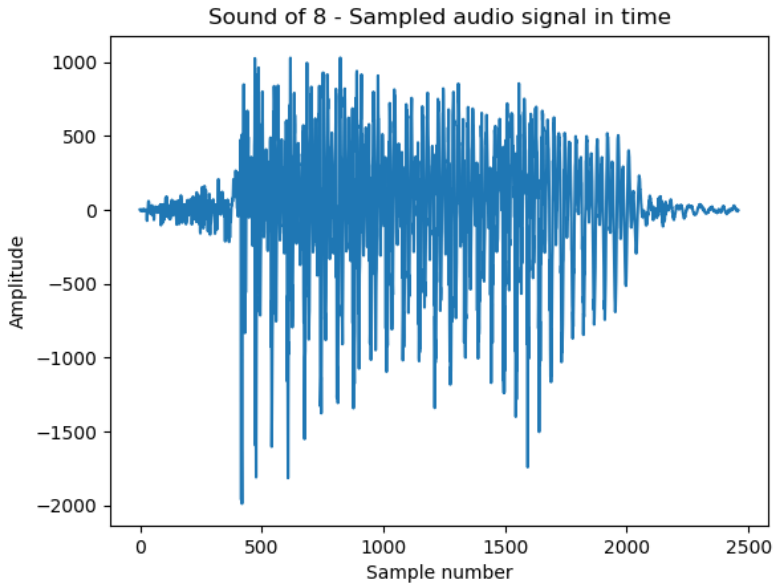
```
#     data = (data-min_data)/(max_data-min_data+0.0001)
#     return data-0.5

def preprocess_audio_mel_T(audio, sample_rate=16000, window_size=20,
#log_specgram
                 step_size=10, eps=1e-10):

    mel_spec = librosa.feature.melspectrogram(y=audio, sr=sample_rate,
n_mels= n_mels)
    mel_db = (librosa.power_to_db(mel_spec, ref=np.max) + 40)/40

    return mel_db.T


def load_audio_file(file_path, input_length=input_length):
    data = librosa.core.load(file_path, sr=16000)[0] #, sr=16000
    if len(data)>input_length:


        max_offset = len(data)-input_length

        offset = np.random.randint(max_offset)

        data = data[offset:(input_length+offset)]


    else:
        if input_length > len(data):
            max_offset = input_length - len(data)

            offset = np.random.randint(max_offset)
        else:
            offset = 0


        data = np.pad(data, (offset, input_length - len(data) - offset),
"constant")


    data = preprocess_audio_mel_T(data)
    return data


# In[3]:
train_files = glob.glob("../input/audio_train/*.wav")
test_files = glob.glob("../input/audio_test/*.wav")
train_labels = pd.read_csv("../input/train.csv")


# In[4]:
file_to_label = {"../input/audio_train/"+k:v for k,v in
zip(train_labels.fname.values, train_labels.label.values)}


# In[5]:
#file_to_label


# In[7]:

#
# data_base = load_audio_file(train_files[0])
# fig = plt.figure(figsize=(14, 8))
# plt.title('Raw wave : %s ' % (file_to_label[train_files[0]]))
# plt.ylabel('Amplitude')
# plt.plot(np.linspace(0, 1, input_length), data_base)
# plt.show()
```

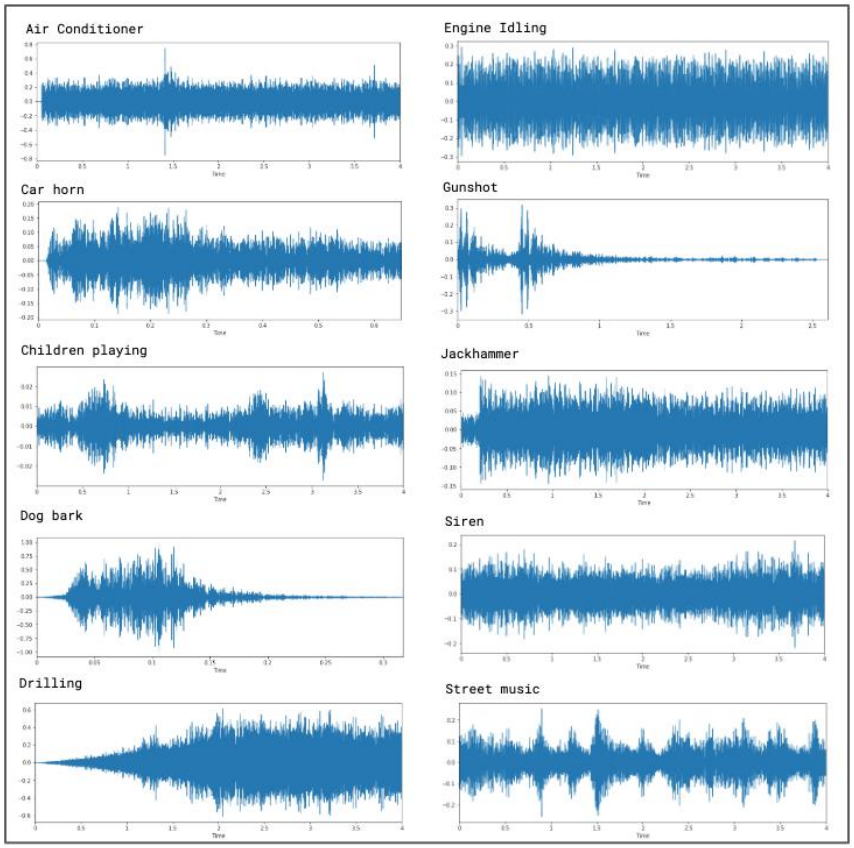
```
# In[8]:
list_labels = sorted(list(set(train_labels.label.values)))
# In[9]:
label_to_int = {k:v for v,k in enumerate(list_labels)}
# In[10]:
int_to_label = {v:k for k,v in label_to_int.items()}


# In[11]:
file_to_int = {k:label_to_int[v] for k,v in file_to_label.items()}

# In[12]:
def get_model_mel():

    nclass = len(list_labels)
    inp = Input(shape=(157, 320, 1))
    norm_inp = BatchNormalization()(inp)
    img_1 = Convolution2D(16, kernel_size=(3, 7),
activation=activations.relu)(norm_inp)
    img_1 = Convolution2D(16, kernel_size=(3, 7),
activation=activations.relu)(img_1)
    img_1 = MaxPooling2D(pool_size=(3, 7))(img_1)
    img_1 = Dropout(rate=0.1)(img_1)
    img_1 = Convolution2D(32, kernel_size=3,
activation=activations.relu)(img_1)
    img_1 = Convolution2D(32, kernel_size=3,
activation=activations.relu)(img_1)
    img_1 = MaxPooling2D(pool_size=(3, 3))(img_1)
    img_1 = Dropout(rate=0.1)(img_1)
    img_1 = Convolution2D(128, kernel_size=3,
activation=activations.relu)(img_1)
    img_1 = GlobalMaxPool2D()(img_1)
    img_1 = Dropout(rate=0.1)(img_1)

    dense_1 = BatchNormalization()(Dense(128,
activation=activations.relu)(img_1))
    dense_1 = BatchNormalization()(Dense(128,
activation=activations.relu)(dense_1))
    dense_1 = Dense(nclass, activation=activations.softmax)(dense_1)

    model = models.Model(inputs=inp, outputs=dense_1)
    opt = optimizers.Adam()

    model.compile(optimizer=opt,
loss=losses.sparse_categorical_crossentropy, metrics=['acc'])
    model.summary()
    return model


# In[13]:
def chunker(seq, size):
    return (seq[pos:pos + size] for pos in range(0, len(seq), size))


# In[14]:
def train_generator(list_files, batch_size=batch_size):
    while True:
        shuffle(list_files)
        for batch_files in chunker(list_files, size=batch_size):
            batch_data = [load_audio_file(fpath) for fpath in batch_files]
            batch_data = np.array(batch_data)[:, :, :,np.newaxis]
            batch_labels = [file_to_int[fpath] for fpath in batch_files]
            batch_labels = np.array(batch_labels)

            yield batch_data, batch_labels
```

```
# In[15]:
tr_files, val_files = train_test_split(sorted(train_files), test_size=0.1,
random_state=42)


# In[16]:
model = get_model_mel()
# model.load_weights("baseline_cnn_mel_bigger.h5")
#
# # In[17]:
#
#
# model.fit_generator(train_generator(tr_files),
steps_per_epoch=len(tr_files)//batch_size, epochs=20,
#                     validation_data=train_generator(val_files),
validation_steps=len(val_files)//batch_size,
#                     use_multiprocessing=True, workers=8,
max_queue_size=20,
#
callbacks=[ModelCheckpoint("baseline_cnn_mel_bigger.h5", monitor="val_acc",
save_best_only=True),
#                                EarlyStopping(patience=5,
monitor="val_acc")])


# In[18]:


#model.save_weights("baseline_cnn.h5")
model.load_weights("baseline_cnn_mel_bigger.h5")

# In[19]:


# In[20]:
bag = 10

array_preds = 0

for i in tqdm(range(bag)):

    list_preds = []

    for batch_files in tqdm(chunker(test_files, size=batch_size),
total=len(test_files)//batch_size ):
        batch_data = [load_audio_file(fpath) for fpath in batch_files]
        batch_data = np.array(batch_data)[:, :, :,np.newaxis]
        preds = model.predict(batch_data).tolist()
        list_preds += preds



    # In[21]:

     array_preds += np.array(list_preds)/bag


# In[22]:
list_labels = np.array(list_labels)


# In[30]:
top_3 = list_labels[np.argsort(-array_preds, axis=1)[:, :3]]
#https://www.kaggle.com/inversion/freesound-starter-kernel
pred_labels = [' '.join(list(x)) for x in top_3]
```

```
# In[31]:
df = pd.DataFrame(test_files, columns=["fname"])
df['label'] = pred_labels


# In[32]:
df['fname'] = df.fname.apply(lambda x: x.split("/")[-1])


# In[33]:
df.to_csv("baseline_mel_bigger.csv", index=False)
```

SNAPSHOTS :





CONCLUSION :

* Conclusion is the one type of our worked experience or what happed doing this work that is conclusion.

* It may be help in developing new programs.

* It is easy to read about code for any program it is the basics of machine learning.

* Machine learning is nothing but the basics about the python machine learning.

* It is easy to built about some applications for examples : voice classification, image classification, emotions about feelings and etc.

* The package was designed in such a way that future modification can be done easily. The following conclusion can be deduced from the development of the project.

* It provides a friendly graphical user inter face which proves to be better when compared to existing system.

* It gives appropriate access to the authorized users depending on their permissions.

* It effectively overcomes the daily in communications.

* Updating of information becomes 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 :

An understanding of TensorFlow and Scikit-learn.

A Kaggle account.

We can also use github.com for any code of the programs

Some applications are used in python they are jupyter notebook, and also some libraries are used for example numpy, pandas, librosa

TensorFlow: This library was developed by Google in collaboration with the Brain Team. It is an open-source library used for high-level computations. It is also used in machine learning and deep learning algorithms. It contains a large number of tensor operations. Researchers also use this Python library to solve complex computations in Mathematics and Physics.

Matplotlib: This library is responsible for plotting numerical data. And that's why it is used in data analysis. It is also an open-source

library and plots high-defined figures like pie charts, histograms, scatterplots, graphs, etc.

Pandas: Pandas are an important library for data scientists. It is an open-source machine learning library that provides flexible high-level data structures and a variety of analysis tools. It eases data analysis, data manipulation, and cleaning of data. Pandas support operations like Sorting, Re-indexing, Iteration, Concatenation, Conversion of data, Visualizations, Aggregations, etc.

Numpy: The name "Numpy" stands for "Numerical Python". It is the commonly used library. It is a popular machine learning library that supports large matrices and multi-dimensional data. It consists of in-built mathematical functions for easy computations. Even libraries like TensorFlow use Numpy internally to perform several operations on tensors. Array Interface is one of the key features of this library.