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Go, change the world

Major Project
20MCA41

On

"Covid Patient Tracing and Diagnosis System"

Submitted by
ISHITA SARKAR
USN: 1RV20MC028

Under the Guidance
Of

Internal Guide

Dr. Jasmine KS

Associate Professor

Department of MCA
RV College of Engineering®
Bengaluru – 560059

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Submitted in partial fulfillment of the requirements for the award of degree
of

MASTER OF COMPUTER APPLICATION

2021-2022

RV COLLEGE OF ENGINEERING ®

(Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi)

DEPARTMENT OF
MASTER OF COMPUTER APPLICATIONS

Bengaluru– 560059

CERTIFICATE

Certified that the project work titled "**Contact Tracing using GPS Data and Machine Learning"** carried out by **ISHITA SARKAR, USN:1RV20MC028, a** bonafide student of **RV College** of **Engineering®, Bengaluru** submitted in partial fulfillment for the award of Master of Computer Applications of **RV College of Engineering®, Bengaluru affiliated to Visvesvaraya Technological University, Belagavi** during the year **2021-22.** It is certified that all corrections/suggestions indicated for criteria assessment have been incorporated in the report deposited in the departmental library. The project report has been approved as it *satisfies* the academic requirement in respect of project work prescribed for the said degree.

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RV COLLEGE OF ENGINEERING ®

(Autonomous Institution Affiliated to Visvesvaraya Technological University, Belagavi)

DEPARTMENT OF
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DECLARATION

I, **ISHITA SARKAR**, student of fourth semester MCA in the **Department of Master of Computer Applications,** RV College of Engineering®, Bengaluru declare that the project titled **"Contact Tracing using GPS Data and Machine Learning"** has been carried out by me. It has been submitted in partial fulfillment of the course requirements for the award of degree in **Master of Computer Applications of RV College of Engineering®, Bengaluru affiliated to Visvesvaraya Technological University, Belagavi** during the academic year **2021-22**. The matter embodied in this report has not been submitted to any other university or institution for the award of any other degree or diploma.

Date of Submission: Signature of the Student

Student Name: Ishita Sarkar

USN:1RV20MC028

Department of Master of Computer Applications

RV College of Engineering®

Bengaluru-560059

EXL

BY HAND/UNDER REGISTERED A. D. POST

Date: Jan 07th, 2022

To,
Ishita Sarkar,
Master of Computer Applications,
RV college of Engineering

Subject: Internship

Dear Ishita Sarkar,

You have been selected as an Intern in the Decision Analytics Team of Inductis (India) Private Limited for a period of 6 months starting from Jan 18, 2022 and unless otherwise terminated earlier pursuant to the terms & conditions mentioned here in after, automatically ending on Jul 18, 2022 without any notice or compensation to you.

We would like to take this forward and make you an offer on the following terms and conditions:

1. Scope of Internship/Project

You are expected to work as an intern during working hours/shifts of Inductis. You shall complete the project based on the inputs received from Inductis from time to time.

2. Duration

The engagement would be for a period of 6 months starting from Jan 18, 2022 and unless otherwise terminated earlier pursuant to the terms & conditions mentioned here in after, automatically ending on Jul 18, 2022 without any notice or compensation to you. However, depending upon the exigencies of project, the period of Internship may be varied at the sole discretion of Inductis.

3. Payment

Inductis shall, during the above said internship period, pay you a monthly stipend of INR 10, 000/- all incl. (Indian Rupees Ten Thousand only), which shall be subject to tax deduction at source.

4. Representations and Warranties by You/Trainee/Intern

4.1 You represent and warrant that you have all the requisite permissions, approvals, qualifications, skills and experience to undertake internship and project and that you are not engaged /working anywhere else, and that there are no contractual, judicial, administrative, regulatory, academic, professional and/or legal conditions, debars or restrictions including visa, FRRO and/or immigration restrictions, conditions, etc. which, or which may prevent, debar or prevent you from undertaking the internship and/or project under this offer/internship, and that you are duly allowed and permitted by the terms & conditions of your visa / immigration document, if any, to undertake the internship and project.

16. Governing Laws and Jurisdiction of Courts

This engagement/agreement shall be construed in accordance with the laws of India. The parties agree to the exclusive jurisdiction of the courts located in Delhi.
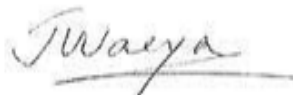
17. Waiver

No failure by either party to enforce any rights or remedies hereunder shall be construed as a waiver of such right(s) or remedy.

18. Acknowledgement and Acceptance

Please acknowledge receipt of this letter/agreement/document and your acceptance of this engagement/letter/agreement/document by signing a copy in the space provided and returning to us at the earliest.

Sincerely,
For Inductis (India) Private Limited

Jyotsna Warya
Vice President 2 – Human Resource

I, Ishita Sarkar, daughter/son of Amit Sarkar, resident of #29 Lakshmi Nagraj Nilaya, 13th cross, 6th Main, near Anika Family Restaurant MSR Nagar, Mathikere-560054 do hereby acknowledge and accept this document/letter/ agreement and do hereby unconditionally agree to all the contents and terms and conditions of this documents/ letter/ agreement with my free consent, and unconditionally agree to abide by all the terms and conditions if this documents/ letter/ agreement.

(Ishita Sarkar)
Date: 09-01-2022
Place: Bangalore

ACKNOWLEDGEMENT

ABSTRACT

Tracking, screening, and forecasting existing and future infected cases, early detection and diagnosis of infection, medicine and vaccine research, and lowering the burden of healthcare professionals are all essential uses of artificial intelligence (AI) in the battle against the COVID-19 pandemic. COVID-19's propagation may potentially be handled as a data science problem. Non-traditional strategies for processing COVID-19 data, such as data collection and interpretation, modelling, prediction, and data visualization and communication, are required to manipulate COVID-19 infection dynamics.

If a person is diagnosed with Covid-19 and the diagnosis is confirmed, the next critical step is contact tracing to prevent the disease from spreading further. So how exactly can one achieve it, first of all, all the GPS data of the infected person is being collected. Next one need to choose an appropriate algorithm to render data such as Density-based Clustering, Hierarchal-based Clustering, Partitioning-based Clustering using the KNN technique etc. Further the data is passed through the chosen Machine Learning algorithm where its being processed and depict the rendered data in graphical format. Finally, test the trained algorithm with test data to check it's performance. The software technologies used for the above-mentioned steps are Python and Python libraries such as NumPy, Pandas and matplotlib; Machine Learning algorithms, and Jupyter notebook to compile our code/algorithm, and the hardware requirements are, Desktop or a laptop with minimum of 4-8 Gb RAM. The above steps are designed to collect individual personal data, which will be analyzed by ML and AI tools to track down someone vulnerable to the new virus due to their recent chain of contacts.

If used thoroughly, this idea can break the chain of transmission of the current novel coronavirus and suppress the epidemic by providing greater opportunities for adequate controls and helping to reduce the extent of the recent pandemic. The digital contact tracing process can be done virtually in real-time and much faster than the non-digital system which reduces manual effort and increases accuracy. The expected accuracy of the proposed system is about 80-90%.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The Coronavirus-2 and its associated illness, coronavirus disease COVID which was first detected in China in late 2019, pose the most significant public health threat in the past 100 years. This sickness has swept the globe like wildfire. The worldwide reaction to the outbreak has been patchy. Some governments reacted quickly and efficiently, while others failed terribly. Strict lockdowns are one means of restricting viral propagation; however, this comes with a high economic cost due to company closures and job losses, and there is a chance that the spread will restart once the lockdowns are lifted.

1.2 Project Description

To combat COVID, most governments have focused on developing smart lockdown tactics that use a number of technological solutions. Overall, early disease prevention initiatives and a mix of high and low-tech solutions enabled several nations (such as China and South Korea) to limit disease spread. These countries rely on passengers being monitored and quarantined. Human movement was severely hampered in the early days of the outbreak. People began to withdraw within their houses. However, it resulted in the closure of the transportation industry. Individuals with minimal risk were also asked to adhere to quarantine, and their physical presence was either monitored by state operatives or tracked via cell tower location data. Identified patients were kept in covid wards for about a fortnight, determined by the availability of health care facilities.

Tracking, screening, and forecasting existing and future infected cases, early detection and diagnosis of infection, medicine and vaccine research, and lowering the burden of healthcare professionals are all essential uses of AI in the battle against the

covid pandemic. The propagation may potentially be handled as a data science problem. Non-traditional strategies for processing covid data, such as data collection and interpretation, modelling, prediction, and data visualization and communication, are required to manipulate covid infection dynamics.

If a person is diagnosed with Corona virus and the diagnosis is validated, the next crucial step is to trace the person's contacts in order to prevent the According to the World Health Organization, the virus is spread mostly by saliva, droplets, or nasal secretions. Contact tracing is an vital public health method for preventing the transmission of SARS-Cov-2. Contact tracing is a way of recognizing and monitoring people who have recently been in contact with a Covid patient in order to keep the spread of the virus further. In general, the method detects the ill person 14 days after the exposure.

If implemented completely, this approach has the potential to break the chain of transference of the present new coronavirus and suppress the epidemic by increasing options for effective controls and assisting in the reduction of the contemporary pandemic's scope. In this regard, a method of digital contact tracing with a mobile application is available in many affected countries, leveraging a variety of technologies such as GPS, Bluetooth, and smartphone tracking data. The digital contact tracing method is substantially faster than the non-digital technique and may be completed virtually in real time. All these digital apps are intended to capture an individual's personal details, which will be processed by Machine Learning algorithms and techniques to identify people who are at risk to the new virus owing to their recent string of interactions.

1.3 Company Profile

Insurance, healthcare, banking and financial services, media, retail, and other industries are served by EXL Service, a worldwide analytics and digital solutions firm. The company's headquarters are situated in New York, and it employs over **30,000**+ people across various countries and continents.

Vikram Talwar and Rohit Kapoor co-founded EXL in the year 1999. Vikram Talwar served the company as CEO as well as a vice-chairman after the company was founded in year 1999. Rohit Kapoor is the company's CEO as well as the vice-chairman of the company at the moment. Kapoor has previously held the post of president of the corporation. Conseco bought EXL in August 2001 and ran it as a completely owned subsidiary. Conseco sold the firm to Oak Hill Capital Partners and FTVentures in 2002. On October 20, 2006, the company's shares began trading on the NASDAQ market under the ticker EXLS.

With the purchase of peer business Inductis, EXL embarked along the route of expansion through acquisitions shortly before its NASDAQ debut. This acquisition was made to diversify EXL's income stream; previous to the acquisition, business process outsourcing (BPO) accounted for 90% of EXL's revenue; after the acquisition, BPO accounted for 70% of EXL's revenue, with the rest coming from research and analytics and advisory services. Through the acquisition of OPI in 2011, EXL increased their distribution reach in Eastern Europe and Southeast Asia. EXL was said to have planned a massive purchase spree in the US healthcare business in 2013, in response to the Affordable Care Act's inception and demand that all Americans have health insurance. The healthcare market accounted for around 10% of EXL's revenue at the time of this study in 2013.

EXL set foot in Latin America in 2014 by the way of a strategic joint venture with CT&S, which paired EXL's technical prowess with CT&S's local understanding and brand image. EXL's escalating client base for Spanish-language services was also amplified by this joint venture. EXL expanded its healthcare analytics capabilities by acquiring SCIOInspire Holdings in 2018.EXL purchased Clairvoyant in 2021, gaining scale in data, artificial intelligence, and cloud engineering.

1.4 Dissertation Organization

The remaining dissertation is arranged as follows:

Chapter 1: Introduction

In first chapter the part includes the description of the project i.e., what is the need of this project, what are the tools required to develop this project and what will be the outcome of this project. Second part includes brief introduction about the company and domain in which this project is based on. Third part includes the technical features of this project.

Chapter 2: Literature Survey

It consists of four segments where the first part discusses about any literature survey done with respect to content related to the project. The second part is about the existing & proposed systems. The tools & technologies used for project will be third and the requirements of hardware & software for running the project is the fourth segment

Chapter 3: Software Requirement Specification

In third chapter the first part includes the brief introduction of the project, abbreviations used while writing the document and overview of the project. The second part includes functional requirements i.e., the modules used in the project and what will be the input, processing and output of each module. It also includes non-functional requirements, design constraints i.e., hardware limitations and software compliance.

Chapter 4: System Design

Chapter 4 is all about system design i.e., a bigger view of the project on a large scale by explaining the problem and specifying the modules

Chapter 5: Detailed Design Fifth chapter includes the description of the detailed design. It includes object modelling which contain class diagram for the project, dynamic modelling which contains use case diagram, sequence diagram and activity diagram, functional modelling which contain data flow diagrams. These diagrams are included to describe the flow of the project.

Chapter 6: Implementation

This chapter provides code snippets related to the project & an explanation to implementation of the modules along with screenshots is given.

Chapter 7: Testing

Seventh chapter includes testing. It includes test cases for each module. This chapter include one failed test case.

Chapter 8: Conclusion

This chapter tells the whole summary of the project, comparison of existing system and proposed system and what all new things have been implemented.

Chapter 9: Future Enhancements

This chapter gives any future works/improvements that can be implemented in the future to improve and enhance the overall efficiency of the project.