OUTLINING THE PORTFOLIOS OF FREELANCERS ACROSS WORK DOMAINS

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled **"Outlining The Portfolios of Freelancers Across Work Domains"**, submitted **by Imran Hossain, Md. Faysal Ahmed** and **Nurunnahar Nody, ID-191-15-12722, 191-15-12294** and **191-15-12537** to the Department of Computer Science and Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on 29 January, 2023

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We hereby declare that, this project has been done by us under the supervision of **Dr. Sumit Kumar Banshal, Assistant Professor, Department of CSE** Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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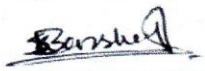

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ABSTRACT

People's demand increasing day by day and according to the demand for earning money also increasing. Our goal is to improve people's lives by creating economic opportunity. Upwork gives good economics opportunities that's why we choose upwork online market. It is important to get necessaries data from raw data. Analyzing the incomes of Upwork using success label depending on domains. We analysis success rate (Excellent, Good, Below Average, Very Good, Average). All of the previous research we see that common classifiers like Naive Bayes, K-Nearest Neighbors, Decision Tree, Support Vector Machines and others. We use various types of classifiers in Agencies and freelancer's data such as Decision Tree, Random Forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine, Naive Bayes in Agencies and freelancer's data and found that Decision Tree 98%, Random Forest 96%, XG-Boost 96%, K-Nearest Neighbor 80%, Support Vector Machine 84%, Naive Bayes 78% from agencies. From our result Decision Tree play more significant impact on our model as well as Random Forest and XG-Boost significant perform well on model performance. From freelancer dataset we found Decision Tree 98%, Random Forest 98%, XG-Boost 96%, K-Nearest Neighbor 80%, Support Vector Machine 75%, Naive Bayes 74%. So from our result Decision Tree and Random Forest play more significant impact on our model as well as XG-Boost significant perform well on model performance.

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CHAPTER 1

Introduction

1.1 Introduction

Online freelance marketplaces offer geographically general business ideas. Many business people will option for this website to get their job done. Upwork website is one of them.Freelance Marketplaces such as Upwork, Fiver.com or Guru encourage get to farther administrations from a phenomenal pool of masters in different areas. For occurrence, Upwork, apparently the biggest stage of its kind, was detailed in 2018 as having 12 million dynamic specialists, out of which 500.000 were enlisted as "Web, portable and programUpwork website is mainly an online marketplace for freelancers which includes writing, graphic design and web development fields for those people who are willing to make money but staying home. People can find here projects, communicate with clients, and get their desirable work. And we can call this work as Online freelancing or outsourcing. The platform employees on Upwork are free to choose who they work for, what projects they take on, and how much they demand for their services. Daily lots of students or job holders create an Upwork account to start their freelancing career, but at maximum lose their focus just because they didn't get any work. The reason for not getting any work is lack of skills, incomplete profile, unattractive bio. They don't even know which domain they have to choose for their success. For our work we select an Upwork dataset of freelancers. We use domain, hourly income and success rating as parameters and apply some machine learning classifier to analyze which domain is success in this large sector. In this paper we are classifying domain of Upwork through existing profiles using income and success label. Which helps the newcomers to know which domain helps them to get desirable work. Finding work as a freelancer, it can be challenging. But if they check out freelancers' profile then it can be easy to find suitable work quickly. This case study (I) presents the general features of the Upwork platform. ii) Classify successful domain through freelancers existing profile using success label. iii) calculate success label of freelancers based on their rating. iv) discussed how newcomers gain knowledge through our paper. v) Demanded domain on online marketplace.

1.2 Motivation

In this paper, we can see the domains category which domain is best, or which one is less good. From this, newcomers and others can learn what kind of skills and domains are needed. In freelancing sectors, we can see most of the freelancers are student. And Upwork it's very familiar site in this sector. Students or others easily get money within this sector sitting at home. For doing freelancing they don't need to go outside. But if they want to get desirable work, they need to know what kind of skills are needed for getting work and which domain they need to select.

As we are CSE students, we are well familiar with freelancing sector. But when it comes for knowledge about skills, income then there we face problems for lacking source. So, we decided to summarize successful existing profiles of Upwork's. We choose Upwork cause its most familiar site to the freelancers. From this upcoming newcomer able to learn which domains are needed, a successful domain helps them to choose skills. Encourage up-comers, classify the domain and know the top market place in the online market motivated us to do this.

1.3 Rationale of the Study

We are classifying the domain of Upwork through existing profiles using income and success label. Which helps the newcomers to know which domain helps them to get desirable work. New up comer's freelancer interest in work with agencies because of them of facilities. So they need to know the hourly income and job success label for decide a suitable domain for him/her. This work will help the up comers to get him/her job field area.

1.4 Research Questions

Analysis the successful domain based on hourly income and success rating.

1.Why we chose Upwork as freelancing site for this project?
2. How it will help newcomer freelancers?
3.Is it possible to find out classifying domain using success label?
4.Is there any limitation in this paper?
5.How much important to know about Upwork existing profiles?
6.Which challenges we face to complete this project?
7.What are the environmental benefits of freelancing?
8.How weclassify the behavior of freelancers?
9. Which domain is demanded on online marketplace?

1.5 Expected Output

Our expectation is classifying the domain of a freelancer. Which domain is familiar for up comer's freelancer. For any type of automated machine, we must train a machine, and as a result, the machine must study. From existing profile under agencies and freelancer's data analysis here. Those existing profile give us information that domain.A freelancer will benefit from obtaining a specific domain. We tried to reduce biasness and wanted good co-relationship between attribute-attribute. Which can help all models perform well and accuracy good.

1.6 Project Management and Finance

- Collect data: By scraping the Upwork online market, we collected data. Algorithms for machine learning will be useful.
- Prepossessing: Preprocessing data is converting raw data the well data. When we collect raw data, there are certain errors, missing data, incomplete sentences, grammatical faults etc.

- Applied ML: Applied common used machine learning algorithms.

- Analysis: Classifying domain based on success label using various types of algorisms.

1.7Report Layout

Our thesis paper is splitup into six chapters. Each chapter has a number of aspects that are covered in detail and is explored from a variety of angles. The contents of this report paper are as follows:

Chapter 1:

This chapter will cover the section of - 1.1 Introduction, 1.2 Motivation, 1.3Rationale of the Study,1.4Research Questions,1.5Expected Output,1.6 Project Management and Finance,1.7 Report Layout.

Chapter 2:

In this chapter we will discuss the section of – 2.1Preliminaries/Terminologies,2.2 Related works, 2.3 Comparative Analysis and Summary,2.4Scope of the Problem**,**2.5Challenges.

Chapter 3:

This chapter will be about the methodology we used for completing this research including the section of - 3.1 Research Subject and Instrumentation3.2 Data Collection Procedure/Dataset Utilized 3.3 Statistical Analysis3.4 Proposed Methodology/Applied Mechanism 3.5 Implementation Requirements.

Chapter 4:

In this chapter we will discuss our results and the sections are- 4.1 Experimental Setup 4.2 Experimental Results & Analysis ,4.3 Discussion.

Chapter 5:

In this chapter will cover the sections of- 5.1 Impact on Society,5.2 Impact on Environment,5.3 Ethical Aspects ,5.4 Sustainability Plan.

Chapter 6:

In this final chapter we will give our conclusion part with the future scope and for that the sections that are included - 6.1 Summary of the Study ,6.2 Conclusions, 6.3 Implication for Further Study.

Chapter 2

Background

2.1 Preliminaries/Terminologies

Freelancer, or freelance worker, are terms commonly used for a person who is self-employed and not necessarily committed to a specific employer long-term. Freelance workers are sometimes represented by a company or a temporary organization that resells freelance labor to clients; others work independently or use professional associations or websites to induce work.

An online marketplace is a type of e-commerce website where product or service information is provided by multiple third parties. Various types of skills are must be knowing every freelance worker and there are - Graphic Designer, Freelancer, Translator, Web Developer, Content Writer, Data Entry, Virtual Accountant, Logo Animator, Brand Designer, Editorial Designer, IT Support, Customer Service, Web Designer, WordPress Developer, Lead Generation, Administrative specialist, App Developer, UI & UX Designer, Accountant ant, Researcher, Video Editor, Writer, Shopify Expert, Bookkeeper, General Accountant etc. Also Freelance Websites to Find Work are Upwork, Fiverr, Freelancer.com and many others website.

2.2 Related Work

Freelancing platforms are usually larger and more complex and are used to develop skills. Some attributes are the same but not all**.** From 25 people (54.3%) of these 46 individuals believe the workload is unstable of the 23 respondents, 50% stated managing work alone was tough. 28 persons (or 60%) are content with their freelancing work. One can predict the future condition of freelancing in this nation from the results of this study. Government assistance is required for the freelance industry's bright future and will help freelancers become more powerful and Class is – Very Satisfied, Satisfied, Neutral, dissatisfied, Very dissatisfied. One might infer the future condition of freelancing in this nation from the results of this study also SPSS tools are using for analysis[1].Additionally, we increase employment with skill sets that are frequently negative. In order to produce a more accurate

recommendation, a collaborative filtering algorithm is applied to factor in the client's overall rating, the minimum budget/hourly rate, deadline, re-hire, etc. With 83.40% (Logistic Regression) and 84.03% (Linear SVM) accuracy, the proposed technique accurately selects the right jobs. In this research, we offer a recommender system that utilizes association rule mining and client feedback classification to find suitable jobs for freelancers[2]. Which is two more groups than in 2011. Legal professionals (with almost 38,000 freelancers) and media professionals (with nearly 32,000) are two recently introduced categories. Less than a thousand people, at the other end of the spectrum, work as independent contractors as senior officers in the security industry or as associate professionals in conservation and the environment for 3 categories Associate professional and technical occupations Managerial profession in the professional fields[3].Multiple regression are use and accuracy is 80%, its challenges, potential solutions to the country's unemployment problems, and the financial benefits of freelancing for both graduates and non-graduates. Primary, secondary, higher secondary, tertiary, and others are the categories. His research focused on the identities of freelancers, the works of freelancers, the service recipients or clients of freelancers, the prices of freelancers' services, the hiring process for freelancers, the attitudes of freelancers toward their works and clients, as well as the difficulties faced by freelancers[4]. For scale factor and perspectives forthe development of self-employment in context of the processes of globalization and the forming and formation of a new (creative, knowledge and innovation) economy or a creative creativity economy. It does this by conducting an analytical review of the literature from 1970 to 2017 on the subject of self-employment and freelance as a new form of self-employment.The basic form of the labor age has been fulfilled, and self-employment, or freelance work, has grown quickly in the new economy, which is altering the possibilities of the labor market[5]. Freelancers from around the world as illustrative materials to comprehend their motivations for embracing or rejecting an entrepreneurial profession in the future. A large amount of economic activity is performed by freelancers. Kitching and Smallbone (2008) suggest a broad definition of freelancers as all self-employed workers and directors of limited companies without employees in order to determine the size of the freelance sector[6]. Websites known as online freelancemarkets connect clients desiring

legally deliverable skills with freelancers. Using a power structural framework, dynamics and selection can be handled. Moreover, our findings can be used in prospective experiments to evaluate the effects of policy changes because they can be easily read as shapes that calculate client values[7].Unsupervised method for topic modeling in big text corpora, used to find clusters of abuse. They show that applying LDA to hundreds of thousands of unlabeled jobs posted on Freelancer.com identifies clusters of similar abuse jobs and the common terms that identify it. More complex jobs including the creation of software devices, Web site programming, etc. could be obtained from Freelancer, Guru, and oDesk[8]. For analyses the topic of a website's value in relation to postings for freelance and remote work. It isessential to remove busy pages in order to boost the efficacy of VSE. In the research literature, there are various techniques for filter out irrelevant pages. With the aid of a specific keyword set's frequency, relevance can be evaluated. The semantic web utilizes a range of machine learning algorithms. freelancing stages essentially advance knowledge-based shapes of work, such as realistic plan, computer program improvement, and creative composing. This sort of knowledge-based work contrasts with microwork, such as photo labeling and information passage, which typically does not require particular information. Besides, freelancing stages are commonly utilized for completing regularly larger and more complex and skills advancement that conventional taxi driving. These two examples outline the value of understanding how gig economy platforms, as developing shapes of work, disrupt existing working practices[9].For classifying are Decision Tree 86% ,Support Vector Machine 82%,Naive Bayes 87%.Numerous machine learning calculations play vital part in semantic web. It is used to form ontologies. Association rule and clustering calculations are utilized to extricate information from web pages and advance utilized to construct ontologies. Web utilization mining analyzes weblogs to discover utilization design of the user. This research is very valuable to suggest and build a user profile. Web pages are exceptionally assorted due to its structure, length, language, and formats. It is also energetic in nature. All these issues make it very difficult for look engine to create a list for the web. Within the first step in classification, we manually labeled web pages based on content available on that page. e.g. ‘I require an independent java developer’, ‘we are searching for remote PHP

developer', and 'need work from domestic site developer' are the positive web page. All other web pages are labeled as the negative web page. This labeled dataset after preprocessing is utilized for testing and preparing. Once web page classifier is prepared, it classifies the given set of web page into positive web page and negative web page[10].There are different websites accessible in freelance marketplace which offers jobs. The most popular sites are Upworks,Elance.com, Guru.com, Freelancer.com, oDesk.com. The Outsourcing site acts as an authority during charging by giving due share to the job seekers as well as ensuring work suppliers investments, there's a mechanism for securing money related benefits of both side by having an escrow account. Escrow cash is exchanged as it were on fulfilling the condition that the work searchers have completed the assigned jobs[11].An automated model for selecting remote specialists in a system meant to decrease the time-to-market for program items. Decision Tree 62%, Random Forest 85.3%, Linear Regression 30.58%,K-means83% these classifiers are used for classification. The execution of the algorithm utilizing R was computationally reasonable. The assumption was made after analyzing multiple execution times on created information sets with more than 5000 candidates per time-zone, which shifted between 2 and 15 seconds. show to naturally enroll the ideal improvement cell of 3 computer program engineers working in a Follow the Sun system, from an existing worldwide resource of abilities, Upwork.com. It's worth saying that with negligible specialized alterations to the execution stages, the demonstrate is consistent with other well-known Freelancing stages[12].Numerous existing system FMSs such as Shortlist and Kalo now provide as it were a responsive web application as a program solution. They cover onboarding, communications, project assignments, invoicing and installments. They help to brace connections between business people and freelancers, and increase their productivity. These systems cannot naturally decide the correct specialist to contract for each specific project, thus requiring entrepreneurs to physically examine each bidder's details such as reviews, skills, experience, qualifications or past projects worked on[13]. Advanced work platforms, such as Upwork or Fiverr, give an increasingly common workplace for millions of workers – software engineers, creators, scholars and numerous more – around the world The study in this manner points to understand how HRM exercises apply to and take shape

on advanced platforms by studying worker recognitions.We combine supervised content analysis with an in-depth qualitative substance investigation, depending on 12’924 scraped comments from a web gathering of workers on Upwork. The platform employs machine learning algorithms that handle “detailed and energetic data, counting skills given by freelancers, feedback and success markers of consultants and clients” to shape “trusted, helpful, and effective client experiences” for workers and clients[14].In spite of the fact that gig economies have numerous benefits, freelancers should ensure that they are aware of the dangers. Not all freelancing companies conduct commerce within the same way. A few companies, such as Upwork, allow the specialist to select their jobs, taking a rate of the income earned for each work, whereas others charge a level expense that's included to the most of the cost effective project. In the economy represent some short term in the worldwide success gain business future[15]. The remote work, in any case, raised a number of concerns since the developer in Athens didn’t arrange to move to Silicon Valley for the project. The solution they arrived at permitted the developer to stay in Athens and work remotely using a web platform called oDesk, which was pointed at addressing concerns of remote work, such as visibility, proficiency and trust. Two years later the combined firm was rebranded to Upwork, which is presently the world’s biggest outsourcing site. The stage points at “creating financial and social value on a worldwide scale by giving a trusted online work environment to put, through collaborate, and succeed”[16].Literature has often specified that specialist show an entrepreneurial behavior as directors of their brand as they can produce value by the creation of financial activities and identification of unused items or forms. This paper develops a clear examination to close this gap in the writing and evaluate self-branding within the setting of online labor markets. Instead of pointing to recognize objective features of occupations and freelancers like occupation scientific categorizations on O-Net (2020) or evaluation of abilities on Burning Glass (2019), this study refers to the acknowledgment of subjective development of professional self-presentations and understandings of themselves. The analysis is directed towards an observational analysis of values, characteristics, and topics that are written within self-descriptions[17]. The literature review section has three section theoretical discussion on the issues of IT, ICT, ITES, Outsourcing, Freelancing and Online Marketplace.

Information Technology (IT) is characterized as the computing and communication advances for tackling real-life issues; it includes computing environments, common application computer program like visual introduction applications, word processing, tabular data control, World Wide Web, Database Administration System, email administration systems, infection, and spam assurance and outsourcing includes moving of an exchange to an exterior provider through a long-term contract that was previously represented inside, and also may involve the transfer of staff to the seller. Freelancers can be characterized as skilled professional benefit suppliers who are not one or the other workers nor managers, providing labor on a short time basis under a contract for works or services in trade of a fee to a range of business clients[18].Related research encourage underscores the impacts of algorithmic control and management on online freelancer's behavior and results on the stage recent work demonstrate appear stages utilize of calculations can create modern-day invisible cages, which affect how and why people discover work. In a qualitative study of online freelancers working exclusively on Upwork, highlighted the extra demands and limitations online labor platforms frequently forced on freelancers in their study, which driven them to adopt basic literacies to use stage features profitably for assignments such as building a notoriety and overseeing transaction dangers[19]. Web-based workers is accomplished by a platform that allows buyers and sellers to find one another and complete the transaction: after discovering the market, the buyer information the work from the provider, the couple of them communicate while the work is being done, the output is received, and the buyer the seller. The platforms give suppliers the chance to promote themselves. As long as a seller has a computer, Internet access, and the necessary abilities, online freelancing has opened up new options for them to access work in a worldwide market at any time and from any location[20].For Technology Business Incubators (TBIs)The idea of incubators is motivated by the incubators can be characterized as an environment for an integrated system of place, hardware, administrations, offices, support instruments, consulting and organization designed to help entrepreneurs in managing and creating modern establishments. In the 1990s, incubators extended their proposals past providing the framework to include giving trade back and expanding entrepreneurs‟ organizing. It became evident that unused firms

needed a certain sort of back, particularly in soft ability ranges such as understanding advertise conditions and how to manage a firm[21].Independent workers face extra stressors related to the nature of their work, counting working in an environment missing organizational back. The absence of organizational support and a long-term relationship with an organization makes a ‘liminal space’ with specialists facing greater vulnerability. Gig workers are working in a modern work environment managed by online stages. One implication of the new environment is that gig workers have less independence in controlling their possess work[22].

Compare classification Accuracy:

Table 2.2.1: Compare classification Accuracy

Paper Name	Name of Classifier	Accuracy
1.A Machine Learning approach to Classify web documents of freelancing and remote work in IT field	Decision Tree Support Vector Machine Naive Bayes	86% 82% 87%
2. An automated recruiting model for an optimal team of software engineers from global freelancing platforms	Decision Tree Random Forest Linear Regression K-means	62% 85.3% 30.58% 83%
3.Why lose control? a study of freelancers' experiences with gig economy platforms	Support Vector Machine	84%
4.Development of an Intelligent Job Recommender System for Freelancers using Client's Feedback Classification and Association Rule Mining Techniques	Logistic Regression Support Vector Machine	83% 84%
5. Factors, Impacts, Problems and Solutions of Freelance Earning in the context of Bangladesh	Multiple regression	80%

2.3 Comparative Analysis and Summary

We discovered after analyzing those previous research that all models are difficult and complex and used various types of method and algorithms They used many types automated model. Building a "Analyzing the revenues of Upwork employing success rates based on domains using Machine Learning Techniques" is what we want to achieve. We will discover our successful domain and success rate once this effort is complete.However, determining the cause of his or her failure to succeed in his or her work is helpful for aspiring freelancers, especially in Bangladesh. Moreover, any model that uses our dataset to categorize freelancer success.

2.4 Scope of the Problem

- Lack of Experience: Any professional or academic research activity acquired in any research field, in the public or private sector, is referred to as "research experience." To complete a research paper, we need to proper knowledge about some topics like data analysis, algorithm’s, calculations, finding research paper etc. So, it’s important to gain these kinds of knowledge before research anything.

- Choosing the Right attributes: The study design that will work best for the strategy you want to propose must be chosen by the researcher. But choosing right attributes its difficult for the researchers because it must be unique from other research papers.

- Web scrapping: Web scraping is a method for gathering information from websites that can be saved for later use in research or preserved throughout time. For web scrapping we face some problems like Bot access, IP blocking, captcha, slow or unstable load speed, login requirement, real time data scrapping.

- Data prepossessing: The term "data preprocessing" describes a group of methods for improving the quality of the raw data. We can make data easier to use and analyze by preparing it. The reliability of a model is improved by removing data inconsistencies or duplicates that could otherwise exist. Preprocessing the data makes sure there aren't any incorrect or missing numbers based on by errors or human error. For prepossessing we face some problems like 1. Lack of proper understanding. 2. Data growth issues. 3. confusion while big data tool selection.

2.5 Challenges

- Data collection: Data collection is the process of gathering data for use in business decision-making, strategic planning, research, and other purposes.
  And for collecting data we face some challenges. First challenge is finding relevant data. It’s very difficult to find relevant data which can match our paper topic. Deciding what data to collect is another problem for data collection.This is a fundamental issue both for upfront collection of raw data and when users gather data for analytics applications. Dealing with big data, it’s a problem also. Big data environments typically include a combination of structured, unstructured, and semi structured data, in large volumes. That makes the initial data collection and processing stages more complex.
- Execution: The research project needs to be carried out and monitored, and the project plan needs to be updated and revised in response to new information and/or circumstances.
- Algorithm: When we implement algorithms we face many challenges
  Inadequate Training Data: The lack of both quality and quantity of data is the main problem when employing machine learning algorithms. Despite the fact that data is essential for the processing of machine learning algorithms, many data scientists contend that lack of data, noisy data, and clean data severely tax these algorithms.
  Poor quality of data: Data is vital to machine learning, as we've already covered, and it must be of high quality.

Noisy data, incomplete data, inaccurate data, and unclean data produce low-quality outcomes and less accurate categorization.

- Overfitting and Under fitting: One of the most frequent problems that data scientists and engineers working with machine learning face is overfitting. A machine learning model begins collecting noise and inaccurate data into the training data set once it is trained with a large amount of data. The model's performance suffers as a result.
- Lack of skilled resources: Even though the markets for machine learning and artificial intelligence are growing exponentially, these sectors are still fresher than others. It is also a problem when there is a shortage of skilled workers.

- Data Bias: Another significant difficulty in machine learning is data biasing. When particular dataset components are substantially weighted or given a higher priority than others, these errors happen. Biased data produces unbalanced findings, inaccurate results, and other analytical mistakes.

Chapter 3

Research Methodology

3.1 Research Subject and Instrumentation

Our thesis tittle is “Outlining The Portfolios of Freelancers Across Work Domains”. Now a days Analysis a specific domain based income rating topic in research field. In our research methodology, we used some machine learning models because there some mathematically functions that we used in our proposed model.

It will be extremely difficult for us to work with a machine learning model because it requires a high configuration PC, GPU, and other apparatus.

The following is a list of the tools and technologies required to launch our plan-

Software and Hardware:

• Intel Core i3 10th generation with 8GB RAM.

• 1TB HDD

• 128GB SSD

• Google Colab with GPU Development Tools:

• Windows 10

• Python 3.7

• NumPy

• Beautiful Soup

• Pandas

3.2 Data Collection Procedure/Dataset Utilized

The first step is collected raw data from upwork online market place via scraping, which is then followed by categorization and labeling of this dataset. From upwork we collect 2501 data after cleaning dataset we find the Column (Name, Domain, Country, HourlyIncome, TotalIncome, Bio, AgencyName, Rating, JobSuceess, Skill-badge, TotalSkills, Requiredskills). We can use three columns in this dataset: the first is Domain, followed by HourlyIncome, and finally Success-Label.

The following figure 3.2.1 Show basic Web Crawling Process flowchart:

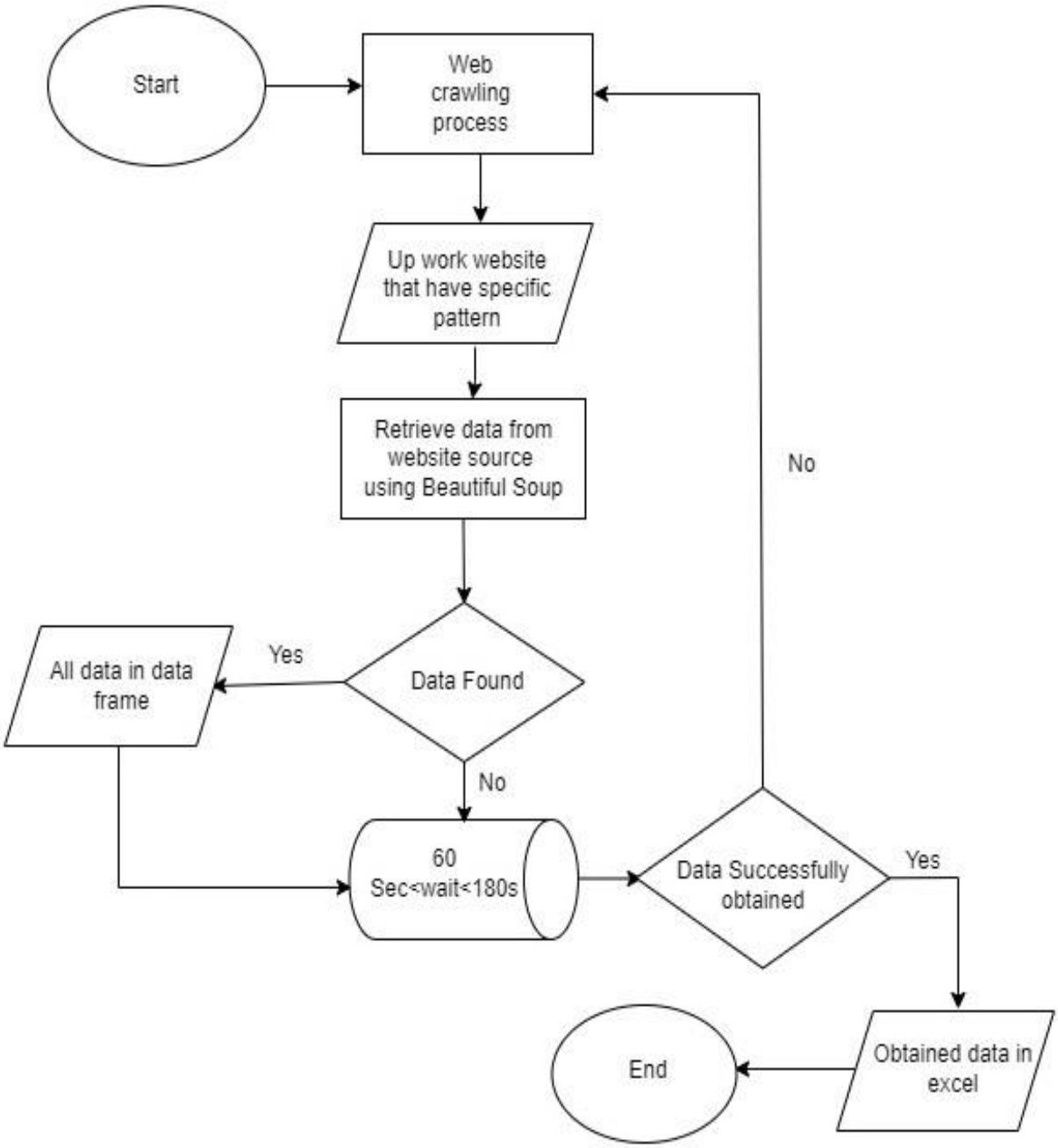

Figure 3.2.1: Basic Web Crawling flowchart

Start the program here. First step web crawling process. It is the process of applying a software or automated script to index data on web sites. After that we decided a website upwork that have specific pattern. We Retrieved data from upwork website source using BS. In python is we found data add the data in data-frame else it would delay minimum 60 to 180 Second. If data successfully obtained, then saved the data in excel sheet or else go back web crawling process again and continue same loop. Finally end the program.

The following figure 3.2.2 Show basic Methodology flowchart

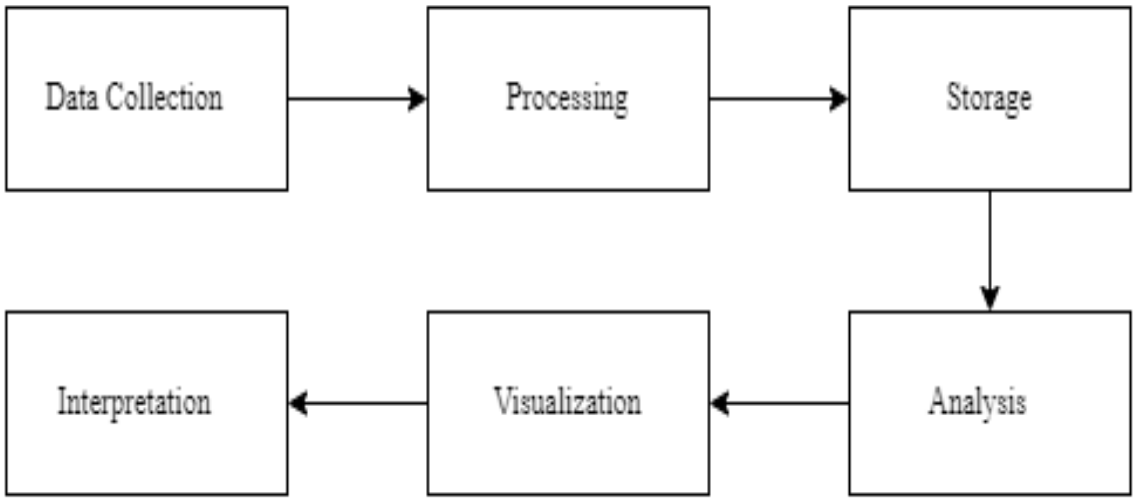

Figure 3.2.2: Methodology flowchart

Data Collection: Collecting data from upwork using scraping process.

Processing: Preprocessing data is converting raw data into well-formed data. When we gather raw data, there are certain mistakes, missing data, and incomplete sentences in the dataset.

Storage:All raw data be kept for a minimum of 3-years after study completion.

Analysis:The process of considering something carefully or using statistical methods in order to understand it or explain it.

Visualization:Formation of mental visual images.

Interpretation:The task of drawing inferences from the collected facts after. an analytical and/or experimental study.

3.3 Statistical Analysis

We collected data amount Agencies 2501 and freelancer 20270. From Agencies Success label divided with five categories (Excellent 1799, Good 447, Below Average 174, Very Good 76, Average 5) We classifying data and finding perimeter and class rating of success label (Excellent 71.9%, Good 17.9%, Below Average 7.0%, Very Good 3.0%, Average1.0%) and Freelancers (Excellent 45.5%, Good 1.50%, Below Average 51.1%, Very Good 1.50%, Average 0.4%).

3.4ProposedMethodology/Applied Mechanism

Classifying the incomes of Upwork using success label depending on domains. For analyzing success rate, we applied machine algorithms Decision Tree, Random Forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine, Naive Bayes in python. In python we import pandas as pd, numpy as np, matplotlib.pyplot as split, seaborn, beautiful Soup those library.

The following figure 3.4.1 Show basic Architecture proposed Method

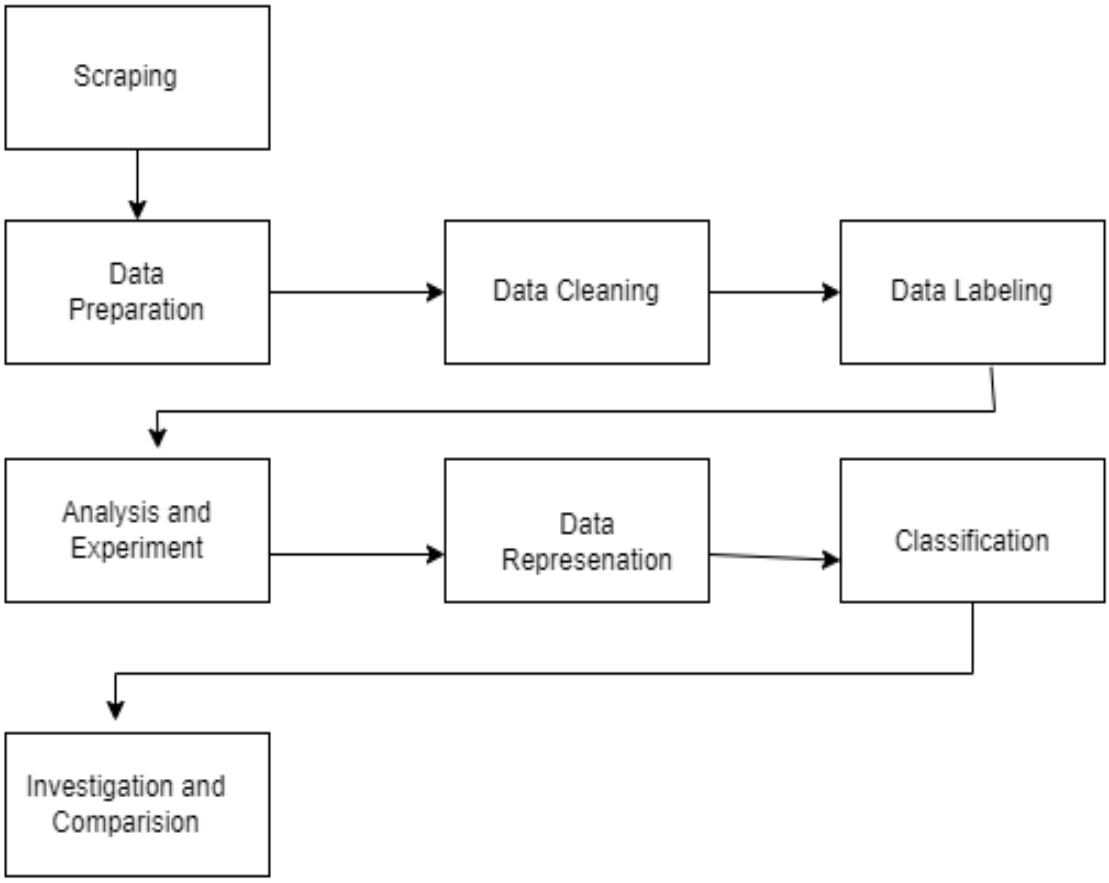

Figure 3.4.1: Architecture proposed Method

3.5 Implementation Requirements

For this type of work, we need well know market place upwork is one of them. We decided to collect their data that's why we use python library named beautiful soup to collect data. Scraping process mainly followed to collect their data. We stored data our data excel and drive. Preprocessing data is converting raw data into well-formed data. When we gather raw data, there are certain mistakes, missing data, and incomplete sentences in the dataset, labeling the profile rating and clean the raw data needed. In machine learning, there are several algorithms and various kinds of models for different types of motives. Here used those machine learning Decision Tree, Random Forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine, Naive Bayes. When we implement in machine learning application we install some pip in python. In our proposed work we used two algorithms as a combined. This two algorithm are very useful for analysis.

Chapter 4

Experimental Results and Discussion

4.1 Experimental Setup

Summarize data classify values and plotting all values or show table and graph. Here, we train and test our proposed Decision Tree, Random Forest and XG-Boost model and what performance we get from it. We will also compare our model's performance with some pre-trained model like- Decision Tree, Random Forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine, Naive Bayes.

4.2 Experimental Results & Analysis

Our focus is to find out classifying domain label and how much job Success label.

The following figure 4.2.1 Show basic machine learning algorithm Accuracy compare

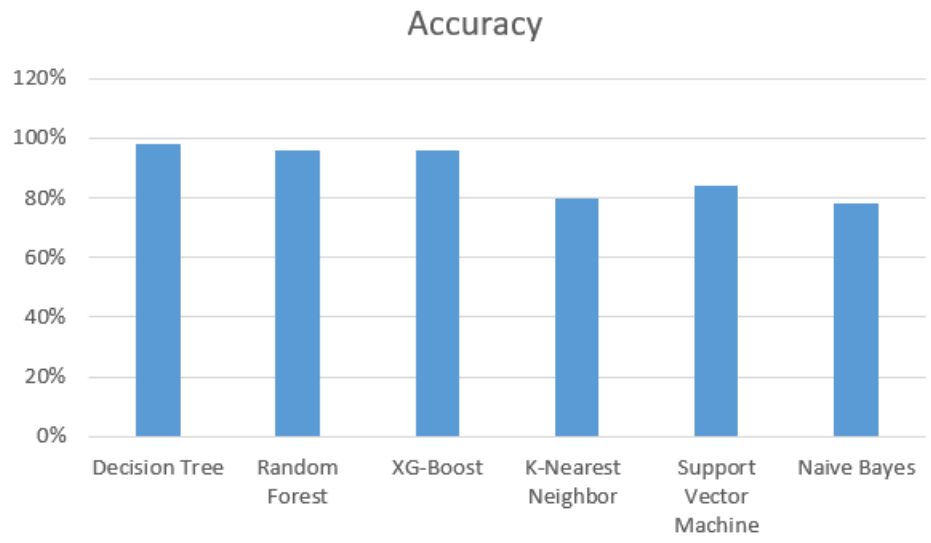

Figure 4.2.1: Machine learning algorithm Accuracy of Agencies

For agency classification we applied some algorithms. This chart shows the accuracy of applied algorithms. Here we found 98% accuracy for decision tree. And respectively 96%,

96%, 80%, 84% and 78% for random forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine and naïve bayes. Here we can see that decision tree is most accurate model for our dataset.

The following figure 4.2.2 Show basic machine learning algorithm Accuracy compare

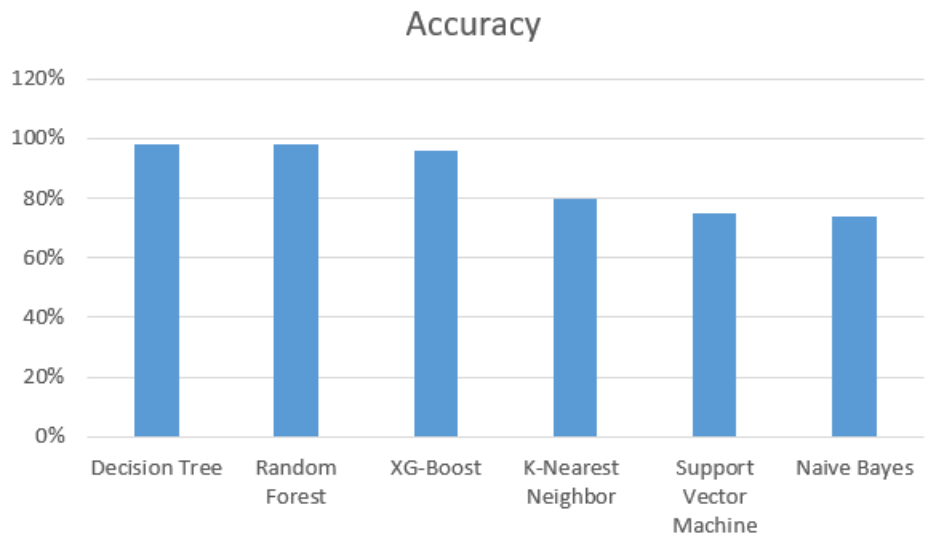

Figure 4.2.2: Machine learning algorithm Accuracy of Freelancer

For freelancer classification we applied some algorithms same as we applied for agency's freelancers. This chart shows the accuracy of applied algorithms. Here we found 98% accuracy for decision tree. And respectively 98%, 96%, 80%, 75% and 74% for random forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine and naïve bayes. Here we can see that the decision tree algorithm and random forest algorithm are the most accurate model for our dataset.

4.3 Result Discussion

Table 4.3.1: Classification of Class-Label

Rating	Class Label
0 to .2	Below Average
.21 to .4	Average
.41 to .6	Good
.61 to .8	Very Good
.81 to 1	Excellent

We can divide five classification of class label. Five class labels are (Excellent, Good, Below Average, Very Good, Average) and rating are 0 to .2, .21 to .4, .41 to .6, .61 to .8, .81 to 1.

Table 4.3.2: Classification Accuracy of Agencies

Name of Classifier	Accuracy
Decision Tree	98%
Random Forest	96%
XG-Boost	96%
K-Nearest Neighbor	80%
Support Vector Machine	84%
Naive Bayes	78%

From our result Decision Tree and Random Forest play more significant impact on our model. Agencies data and found that Decision Tree 98%, Random Forest 96%, XG-Boost 96%, K-Nearest Neighbor 80%, Support Vector Machine 84%, Naive Bayes 78% from agencies.

Table 4.3.3: Classification Class-label of Agencies

Class Label	Percentage
Excellent	71.9%
Good	17.9%
Below Average	7.0%
Very Good	3.0%
Average	1.0%

In this table Success-label (Excellent, Good, Below Average, Very Good, Average) respectively 71.9%, 17.9%, 7.0%, 3.0% and 1.0%. We found here the most class label in excellent.

Table 4.3.4: Classification Accuracy of Freelancer

Name of Classifier	Accuracy
Decision Tree	98%
Random Forest	98%
XG-Boost	96%
K-Nearest Neighbor	80%
Support Vector Machine	75%
Naive Bayes	74%

From our result Decision Tree and Random Forest play more significant impact on our model. From freelancer dataset we found Decision Tree 98%, Random Forest 98%, XG-Boost 96%, K-Nearest Neighbor 80%, Support Vector Machine 75%, Naive Bayes 74%.

Table 4.3.5: Classification Class-Label of freelancer

Class Label	Percentage
Excellent	45.5%
Good	1.50%
Below Average	51.1%
Very Good	1.50%
Average	0.4%

In this table Success-label (Excellent, Good, Below Average, Very Good, Average) respectively 45.5%, 1.50%, 51.1%, 1.50% and 0.4%. We found here the most class label in below average.

4.3.1 Random Forest

In addition to regression, the random forest area is supervised to learn a set of rules that are applied to each classification. Its polling might be completed for each expected outcome. From our agencies dataset, random forest provides 96% accuracy and from freelancer provides 98%. For our dataset, Random Forest working really good.

4.3.2 Decision Tree

The objective of a Using a decision tree, one may create a model that predicts the value of the target variable. straightforward choice rules drawn from the characteristics of the data. from our dataset, the decision tree has a 98% accuracy rate and freelancer 98% accuracy.

4.3.3 Naive Bayes

Bernoulli Naive Bayes classifier predicts the likelihood that the entry will be classified for each of the classes, making it a probabilistic classifier. The accuracy of the Gaussian Naive Bayes model is 78% for our textual sample and freelancer accuracy 78%.

4.3.4 XG-Boost

The gradient boosted trees approach is widely used and effectively implemented in mainstream applications by XG-Boost. Its polling could be finished for each accuracy and fairness. Random forest offers 96% accuracy on our dataset and freelancer 96% XG-Boost worked really well for our dataset.

4.3.5 K-Nearest Neighbor

The K-NN set of recommendations considers that many of the current statistics and the accessible data are similar, and it places the current statistics in the category that most closely resembles the available categories. K-NN rules have an 80% accuracy rate and freelancer accuracy 80%K-Nearest Neighbor also worked really well for our dataset.

4.3.6 Support Vector Machine

For dataset, Support Vector Machine gives 84% accuracy and freelancer accuracy 74%dataset working really good.

The following figure 4.3.1 Show basic machine learning algorithm Accuracy compare

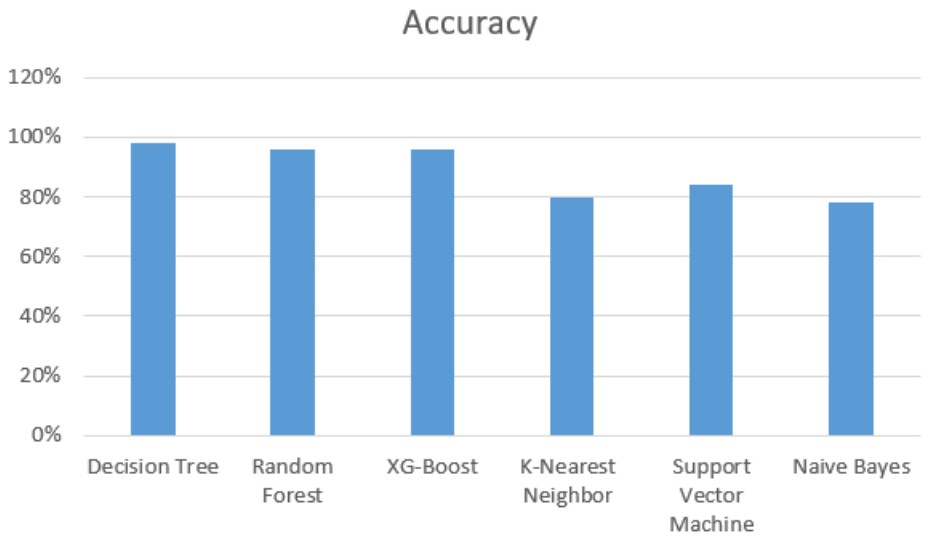

Figure 4.3.1: Machine learning algorithm Accuracy of Agencies

For agency classification we applied some algorithms. This chart shows the accuracy of applied algorithms. Here we found 98% accuracy for decision tree. And respectively 96%, 96%, 80%, 84% and 78% for random forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine and naïve bayes. Here we can see that decision tree is most accurate model for our dataset.

The following figure 4.3.2 Show the total number of domain of Agencies

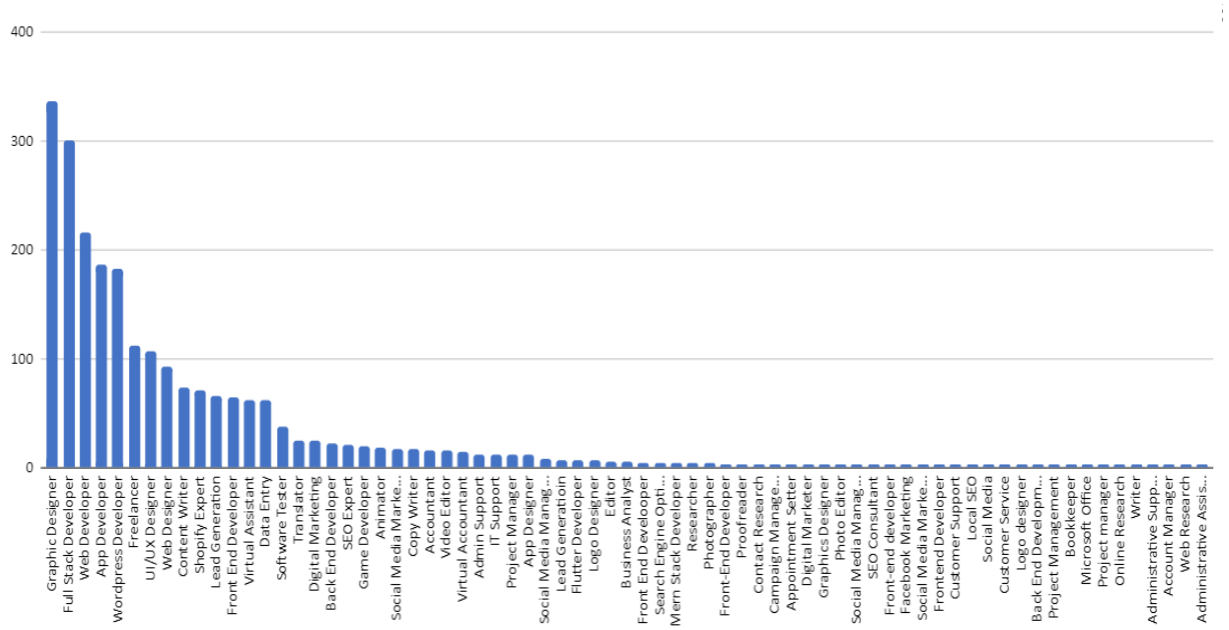

Figure 4.3.2: Total number of domain of Agencies

The graph chart depicts the total number of Agencies domains. Graphic designer, Full stackwebdeveloper, Web developer, App developer, Wordpress developer, Ui/Ux designer, Web Designer, Content write, Lead generation are all countable domains. There are various types of domains, but most people are working on demandable domains for these types.

The freelancer-requested domains in the online market classified under agencies are displayed in this graphical image. There are numerous domains here. But the most sought-after field is graphic designers. Due to the switch to digital, the print industry is currently seeing a severe fall in demand. However, as more companies begin to prioritize their online presence, digital designers are more in demand than ever. The field of graphic design is one that creative people are really interested in. Due to the increased necessity for visual communication among firms, this industry is still robust and in great demand. Graphic designers for social media, advertising, and marketing are required to help brands stand out in every way [23]. Then full-stack developers are the most in-demand field. Since it is familiar with every layer of the technological stack, they can build a fully functional application prototype by themselves. This makes them particularly useful for businesses that must quickly deliver a minimum viable product (MVP) and then polish it. Full-stack engineers may move quickly from one component of the product to another, which helps businesses maintain low overhead. Full-stack developers can't possibly be specialists in every area, which is probably their largest drawback when compared to more specialized workers [29]. Demand for web developers can be observed here. It benefits from widespread, high demand. It benefits from widespread, high demand. No matter where they are, businesses of all sizes want functional websites. Some regions continue to have excellent tech reputations. These centers provide great chances for ambitious tech workers [25]. Also in demand are app developers. The current era of mobile apps is benefiting from the digitalization phase, which has sped up and simplified communication. According to a recently conducted poll, Facebook was found to be the most popular app on both the top operating systems, Android and iOS, which is one of the main factors that has contributed to greater interaction and connection. Similar to Facebook, other social networking applications have made communication easier and are the best tools for advertising and promoting businesses. In a similar vein, WhatsApp is the most popular social messaging app, with over half a billion users. To acquire and sell their goods, people have ended up starting business groups on WhatsApp [31]. WordPress is the most widely used content management system in the world with a 42% market share, making it a popular option for

people looking to create websites. However, creating a website is a difficult task, and not everyone has the skills, time, or patience to do so [32]. Domain freelancers are in demand. The practice of freelancing has increased in popularity in the workplace today. You may wish to start freelancing for a variety of reasons, such as the freedom it gives you to set your own hours, make some additional money, and select your own assignments. Faster connections made possible by new technology, a new work culture that has arisen, and growing demand from employers are the main driving forces behind this development [27]. Web designer and UI/UX designer salaries are nearly identical. Writing content, generating leads, being an expert in Shopify, and being a front-end developer are all needed here. Less pressure is placed on other people's territory.

The following figure 4.3.3 Show basic machine learning class-label (Excellent, Good, Below Average, Very Good, Average)

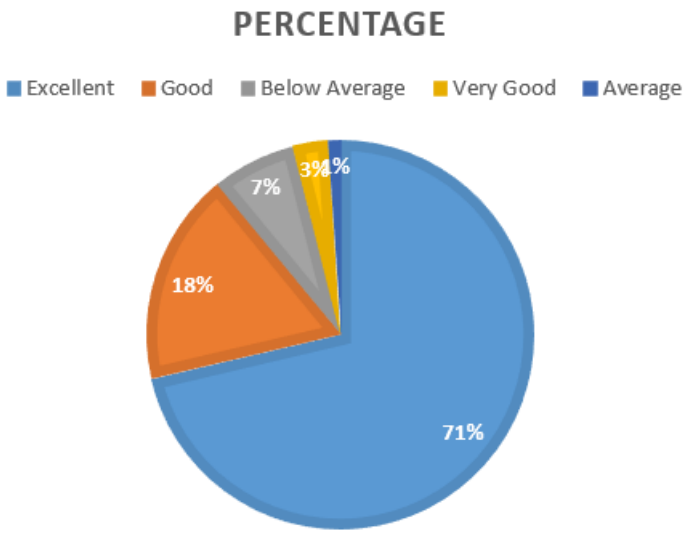

Figure 4.3.3: Agencies- machine learning Class-Label

We modified classification of success rate as five class labels excellent, good, below average, very good, average. This pie chart shows the accuracy of those labels. They were respectively 71.9%, 17.9%, 7.0%, 3.0% and 1.0%. We found here the most accurate label is excellent.

The following figure 4.3.4 Show basic machine learning algorithm Accuracy compare

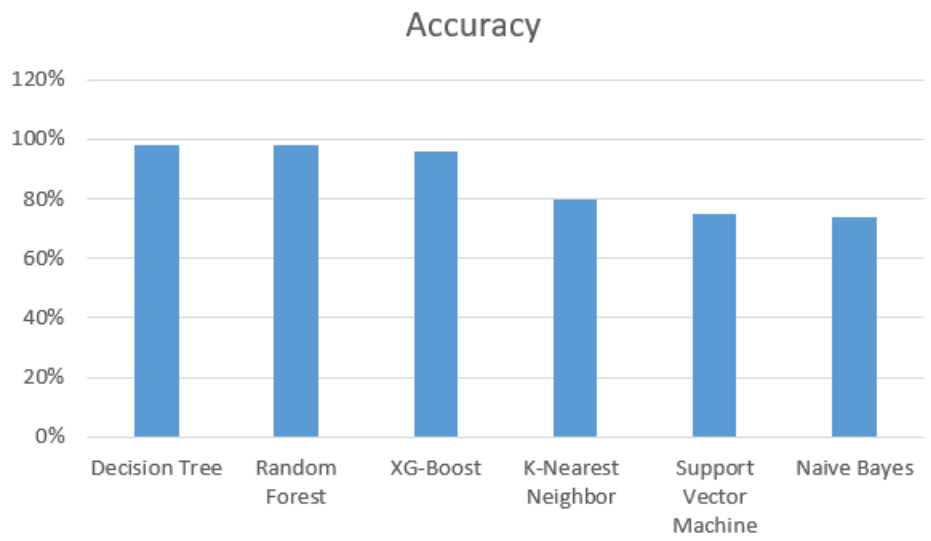

Figure 4.3.4 Machine learning algorithm Accuracy of Freelancer

For freelancer classification we applied some algorithms same as we applied for agency's freelancers. This chart shows the accuracy of applied algorithms. Here we found 98% accuracy for decision tree. And respectively 98%, 96%, 80%, 75% and 74% for random forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine and naïve bayes. Here we can see that the decision tree algorithm and random forest algorithm are the most accurate model for our dataset.

The following figure 4.3.5 Show the total number of domain of Freelancer

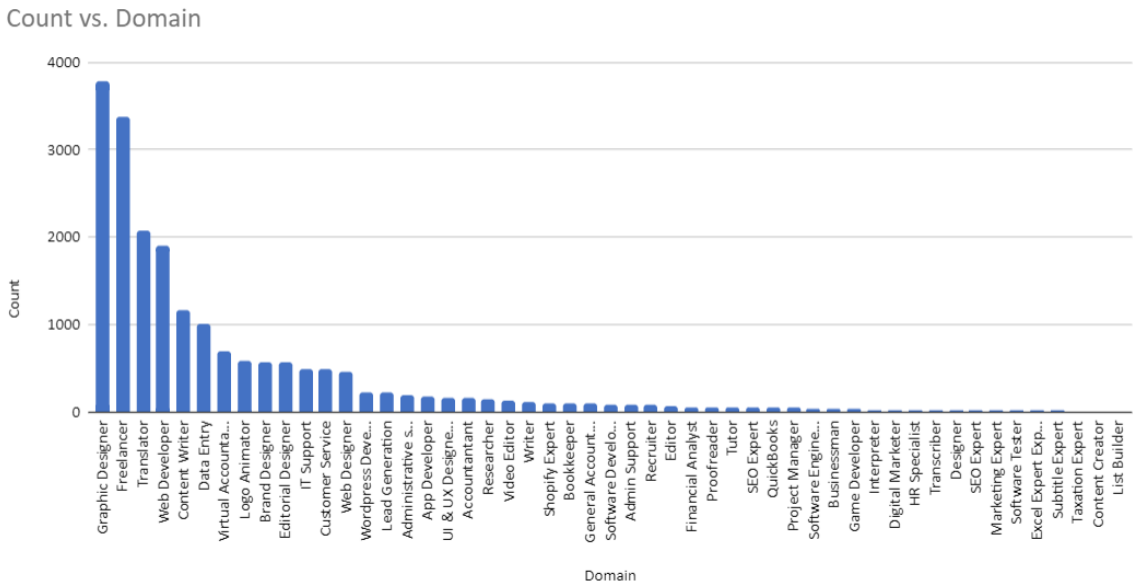

Figure 4.3.5: Total number of domain of freelancer

The graph chart depicts the total number of freelancer domains. Graphic designer, Freelancer, Translator, Web developer, Content writer, and Data entry are all countable domains. There are various types of domains, but most people are working on demandable domains for these types.The popular domains in the internet market are presented in this graphical perspective. There are several domains here. But the most sought-after field is graphic designers. Due to the switch to digital, the print sector is seeing a significant fall in demand. However, as more companies begin to prioritize their online presence, digital designers are more in demand than ever. The field of graphic design is one that creative people are really interested in. Due to the increased necessity for visual communication among businesses, this industry is still robust and in great demand. Graphic designers for social media, advertising, and marketing are required to help businesses stand out in every way [23]. Therefore, there is a demand for freelancer. The act of freelancing has risen in popularity in the work place. You may wish to start freelancing for a variety of reasons,

such as the flexibility it gives you to set one's own hours, make some additional money, and select your own assignments. Faster connections made possible by new technology, a new work culture that has arisen, and growing demand from employers are the primary factors behind this development [24]. Today's globe still has a huge demand for translation. Clear and effective interaction across cultures and languages is now required in our multilingual and multicultural society. Translation is useful to businesses, educational institutions, and humanitarian missions [30]. Demand for web developers may be seen here. It benefits from broad, high demand. Regardless of wherever they are, all types of companies want functional websites. Some regions continue to have excellent tech reputations. These areas provide great chances for ambitious tech workers [25]. The profession of content writers is likewise in high demand online. Furthermore, it is in high demand because companies now recognize the importance of great content. There are numerous choices to choose from to launch your content writing profession, including social media writing, news writing, blog writing, and copyright [26]. The most crucial instrument for assisting in the information organization in a business or sector is thought to be data entry. The work requires great attention and focus to every detail that must be recorded for analysis or research. This helps to maintain track of all the data relating to invoices, salaries, and tax bills so that it can be retrieved as necessary. Accurate data input is essential for the efficient operation of any firm [27]. Virtual Accountant made an appearance demand. A virtual accountant is a certified accountant who performs remotely or online and provide accounting services such as tax preparation. Virtual accounting offers your company the same benefits of having an internal accountant at a more reasonable cost. The same skills are in demand for logo designers, brand designers, and editorial designers[28]. Less users use other domains. There is less pressure in this area.

The following figure 4.3.6 Show basic machine learning class-label (Excellent, Good, Below Average, Very Good, Average)

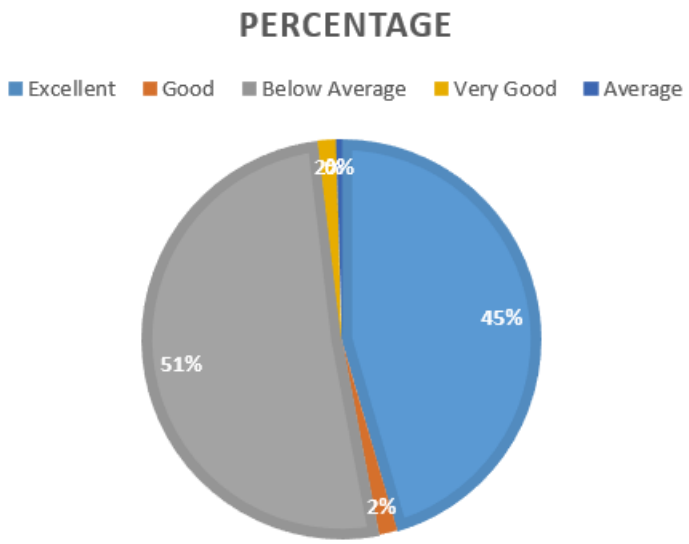

Figure 4.3.6: Freelancer machine learning Class label

We modified classification of success rate as five class labels excellent, good, below average, very good, average. This pie chart shows the accuracy of those labels. They were respectively 45.5%, 1.50%, 51.1%, 1.50% and 0.4%. We found here the most accurate label is below average.

Chapter 5

Impact on Society, Environment and Sustainability

5.1 Impact on Society

This paper will show us the successful domain of a freelancer which helps to convince more students or workless people to do freelancing that economically helps our society. Lots of people are now trying to freelance. They thought it’s better to freelancing rather than go out home and find private or public jobs.The study's key findings showed that freelancing is significantly and positively associated to lowering the unemployment rate in any country. So doing freelancing economically help our society.

5.2 Impact on Environment

Our findings will have a significant effect on the environment. Our work is about freelancing and it’s encouraging to know that working remotely is becoming more and more popular as there are numerous advantages for freelancers.A freelancer has the freedom to work concurrently with businesses or organizations, or companies from all around the world.Most freelance work is completed online from a freelancer's home. Comparing office and home, most freelancers choose work from home. Flexibility in working from home reduces work-related carbon pollution, which causes rising temperatures, when compared to working from offices. The main reason of carbon pollution in office is using of electricity. It produces carbon pollution from a variety of on-site sources, including offices, conference rooms, and dining areas, in relation to their comfort and work requirements. There is less paper, plastic, and bottle waste when people work from home remotely. Freelancers contribute to environmental improvement by minimizing travel, which lowers carbon and nitrogen oxide emissions. It is well knowledge that enterprises who employ transportation generate emissions of nitrogen oxide, one of the dangerous greenhouse gases linked to global warming. Carbon dioxide, a dangerous gas that contributes to diseases including heart and lung disease, is released during travel. Therefore, as more people have worked online, fewer people drive to work, which leads to fewer sicknesses and diseases and happier individuals, communities, and humanity all around.

5.3 Ethical Aspects

From an ethical perspective, our work models do not breach any fundamental human rights or secrets. Our data was gathered from online freelancers' marketplace, Upwork. As a result, no one can be identified or harmed using the data we process. By hurting or frightening others while performing our tasks, we have not accomplished any work or obtained any data. We have taken extra steps when collecting and storing data because it is essential to our work. We didn't claim the work of any other people or organizations as our own while finishing our own. We worked on our personal computers. We have not used anyone else's tools or taken anyone else's data or information. We carried out our investigation with integrity, honesty, adherence and legality in mind.

5.4 Sustainability Plan

Our target is to classify the income category of freelance marketplace using ML algorithms. Our work is beneficial for freelancers and for newcomers. For analyzing success rate, we applied machine algorithms Decision Tree, Random Forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine, Naive Bayes in python. We collect our dataset from online marketplace. But after so many scrapping and cleaning we find out that our dataset has no stable correlation. And our dataset is also not bias. Biased datasets produce skewed results, systemic prejudice, and low accuracy because they don't truly represent the use case for ML models. So, our work will be helpful for future study. After finding more correlation and making bias dataset, produce perfect accuracy is possible.

Chapter 6

Summary, Conclusion, Recommendation and Implication for Future Research

6.1 Summary of the Study

Our project work similar on classifying domain. Using ML learning algorithms, we have completed our work for classification. Our work is very helpful for new comer who are interested in online marketplace. We got good outcomes for all model's datasets. From the time we searched well known online marketplace. We found Fiverr, Toptal, Jooble, Upwork, Flexjobs, SimplyHired, Guru. We decided upwork for scarping the data because of it motive and started collecting data form it. Then cleaning the dataset that took almost 4 months and we finished the projects. To complete this project, firstly we collect dataset form online marketplace. Store data in excel and drive. Storing those data is necessary because of back up files for safekeeping and quick recovery. Then labeling the column of the dataset. Preprocess must need in dataset to handle missing data in the dataset. We saw the correlation between data using IBM SPSS. After that we applied ML algorithms on our model. Found out the best accuracy on our model. See the demanded domains.

In this model will help classification of domain of marketplace. Through this paper people will know Outlining the portfolios of freelancers across work domains that will help them to give knowledge and inspire to do freelancing.

6.2 Conclusions

We attempt to develop a method for classify of domain in this paper. The purpose of this paper is to work on the presentation of classification in domain on online marketplace. To start, we download raw data from Upwork and cleaning it, as machines can understand preprocessed data more correctly. We used six ML learning Algorithms, from agencies data we got Decision Tree 98%, Random Forest 96%, XG-Boost 96%, K-Nearest Neighbor 80%, Support Vector Machine 84%, Naive Bayes 78% different result from it. From the result of agencies, we can see that decision tree algorithm is suitable for our model. From freelancer data we got Decision Tree 98%, Random Forest 98%, XG-Boost96%, K-Nearest Neighbor 80%, Support Vector Machine 75%, Naive Bayes 74%. From the result of freelancers, we can see that decision tree and random forest algorithm is suitable for our model.

6.3 Implication for Further Study

In this paper we classify the suitable domain for freelancer. We collected data from a well-known marketplace name upwork using scraping. Scarping Data are very complicated to cleaning and reduce bias and get good correlation. Here we also face same problem. We saw the correlation between attribute-attribute was very low. To improve correlation attribute, the variables difference should be greater. So good correlation forecast events using the most recent data and information and to determine the prevalence of different factors and their relationships. Here we applied Decision Tree, Random Forest, XG-Boost, K-Nearest Neighbor, Support Vector Machine, Naive Bayes and see the accuracy on those models. There have also commonly used Machine Learning (ML) Algorithms Dimensionality reduction algorithms, Gradient boosting algorithm and AdaBoosting algorithm they can perform well in our model. So, applied all algorithm May find good results on our model and Classifying the Success behavior of freelancers.

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