AN INTELLIGENT SYSTEM FOR FARMER'S REQUIREMENT IN MAHAWELI PROJECT

Project ID- 20_21-J11

Final Report

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Declaration

We declare that this is our own work and this proposal does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any other university or Institute of higher learning and to the best of our knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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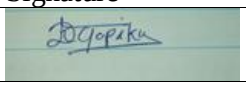
De Silva D.K.G.	IT17172806	

The supervisor/s should certify the proposal report with the following declaration.

The above candidates are carrying out research for the undergraduate Dissertation under my supervision.

…….. ……

Signature of the supervisor: Date

Acknowledgement

I would like to express my sincer gratitude to Prof. Pradeep Abeygunawardhana Head, Department of Computer Systems Engineering, Sri Lanka institute of Information Technology, our research supervisor for his patient guidance and encouragement throughout this proposal work. I like to thank Ms.Narmadha Gamage, our co-supervisor, for her assistant to success the proposal. My gratitude extended to my research team for the support to make the proposal report.

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Abstract

Sri Lanka is an agricultural country and agriculture is the most important sector to the economy; the main crop and farming is rice in the Mahaweli area. Other than rice many crops cultivated for domestic consumption. Yams, Pulses, Grains, Vegetable and Fruits are other cultivated crops in the Mahaweli area.

They are mainly two different seasons to cultivate called 'Yala' and 'Maha'. They are synonyms for two monsoons. Yala season is effective between May and August. Maha season normally falls during "North-east monsoon" between September and March. During these two seasons farmers cultivate different crops based on rainfall, nature of the soil, and other cultural seasons happens in the country and moreover according to agriculture department approximately 30 present of the population engaged with the agriculture purposes. As a result of that output rapidly increased. In addition modernization of farming methods for an example using chemical fertilizers, modern equipment (tractors, crop plant machines) and high-yield seeds helps to increase the productivity of the output.

When gather the information I noticed the main problem that farmers has to face is the market. Although they cultivated and get a good output, they will not an expected profit due to lack of knowledge about today market behavior. This document prepared for the research project under "An intelligent system for farmer's requirements in Mahaweli project" developing marketing analysis tool. This marketing analysis tool helps to predict future value of the crops or other currently trend crops using Machine Learning. Therefore farmers can identify the today market strategies and with the help of that identify what the real needs; according to the results farmers can get a good income by cultivating these crops.

Developing this tool I assume farmers can more interact with the new technologies to identify the real need of the market and this will helps to build a bridge between traditional agriculture and new technology to accomplish the market needs.

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Abbreviation	Description
SVM	Support Vector machine
PSO	Practical Swram Optimization
TS	Time Series
ML	Machine Learning
CI	Confident Interval
PI	Prediction Interval

1. INTRODUCTION

During the ancient kingdoms Sri Lanka was leading agrarian societies in the world. Sri Lanka has a great standing history for the agriculture and became paddy cultivation destination at that time. In that time agricultural purposes were narrowed and mainly forcing for the domestic consumptions. Sri Lanka faced significant changes during the colony era in every industry. Therefore agriculture industry also changed.it changed to the trade and international market over consumption basis agriculture. Considering agriculture there are mainly 4 categories we can categorized, Planting, Fishing, livestock and forestry and further we can divided into 16 subcategories for accomplishing better understand. In this research we considered only plantation agriculture.

As mention before agriculture is the one of most important economical industry of the country. In Mahaweli area consider as a dry zone of the country and mainly cultivated rice. Approximately 95 percent of domestic needs cultivated from here. Considering Mahaweli area it devoted form 'Mahaweli Ganga'. In 1977 government decided to futher developed the project in order to make country in self-sufficient in rice. They originally decided to cultivate 450,000 acres from 900,000 acres. But due to the irrigation issues Mahaweli project estimate to cultivate about 500,000 acres in dry zone of the land and more than 140,000 families were settled there. In addition 71,000 acres developed in Mahaweli H existing cultivated 80,000 acres land.

The elaboration of the technology for this industry is lack comparing to other industries. Therefore the one of main economical important industry may perform under the expected level. If the technology involved more productivity will be increased. As a final year undergraduate students we decided to introduce new system for Mahaweli project under four aspects. Harvest, Plant healthiness, Market analysis and Trade platform will be developed as our main four components in the system. We hope using our system farmers can cultivate and get an expected income.

1.1 Background and Literature survey

In Mahaweli area farmer's main consideration is water. There is mainly two seasons according to falls of the monsoon. According to the Agriculture Department today there were significant changes of the monsoons due to human activities and the cultivation patterns and crops not as the same in the past. The farmers follow various techniques and experiments according to gain a good output. But without have a proper knowledge about the market, cultivating the crops waste of their time, effect and money also. Most of the farmers cultivate the crops according to their traditional knowledge that they gain from their families. But in the present it differ from the past, like above mention before weather patterns were different, people's needs were different and some irrigation systems were different comparing to the past, due to these reasons if they plant crops they will not get a good income.

Other reason that farmers cannot get an expected market was government policies. Therefore farmers get a good output they cannot get a good market. Sri Lanka still import different agriculture products including rice, dairy products, fruits, sugar ect. In 2007 importation of these products increased 9 percent. As a Sri Lankan it is very disappointed that there is no substantial policy for agriculture although after 72 years of independence.

Natural disaster such as floods, droughts, wild animal challenge becomes huge impact for the productivity of the output in every year. Recently COVID19 and last year Easter attack significantly affect toward the agriculture. Overcome of this pandemic situations and get a worth market to the farmers is a quite challenge. During COVID19 lockdown period people were doing gardening as a hobby, as the result of that many of the crops requirements fulfill from their own gardens. Because of that some of the cultivated crops by farmers were over production and waste the products.

As the above mention facts directly impact to the market behavior and price of the crops. Therefore we can conclude that market analysis also more important unless cultivate the regular crops as a pattern. Ultimately farmers need to get a good income comparing to the expenses that they had to pay. According to get good income they have to have a good knowledge about today's market behavior and prices of the crops. Due to these reasons we identified that the need of market analysis according to help to farmers before they plant crops what are the actual prices of the crops in the today market particular cultivated season. Therefore they can cultivate according to that prediction and get a good income rather than cultivated their own traditional patterns.

Analysis market tool proposed to this overcome to these difficulties before farmers cultivated the crops. Predict the next cultivated season crops prices helps to farmers get a good idea about the future market behavior and prices of the crops rather than plant traditional crops as usual.

1.1.1. Marketing Analyzing tool

Considering marketing analyzing main concern was accuracy of the results. This results directly impact to the people gets the decisions crop cultivation. People want to see the next cultivated season for selected year. Mainly three crops consider when developing the marketing tool; they are Paddy, Onion and Potatoes. Reason behind the selected crops was they are the three major crops which cultivated in Mahaweli area. To improve the effectiveness of the app we used those crops among the various crops in the Mahaweli area.

An Intelligent system for farmer's requirement in Mahaweli project is a mobile application which farmers can use to predict depending on the farmer's requirement.

1.1.2. Model generation

In this Marketing Analyzing tool created algorithm for predicting stock market prices to the particular crop, season and year.

1.2 Research gap

Currently in Sri Lanka and foreign countries has marketing analysis tool for analyzing the stock market. There are some apps to analyze the stock market price for certain companies stocks are available. MarketWatch, Stock Market Tracker, Stock Exchange are some of example for the market analyze apps. There all are real time apps, shows financial news, market data and investing analysis in major stocks. Some of major stocks; Apple Inc, Bank of America Corporation, Tesla, Amazon, Netflix, American Express Company ect. Through these apps we can get to know the latest update about the stock prices, get real time stock alerts and breaking news to track markets.

Considering the agriculture perspective there are several apps to download and get information about the modern agricultural techniques. 'Krushi Advisor' is a one of popular agricultural app in Sri Lanka. This will provide agriculturally advices to food crop cultivation in Sri Lanka. Mainly this app covers all the information related to the agriculture for an example water management, weed management, fertilizer recommendation, and disease management, suitable locations for particular crop, seed and planting material requirements.

'Crop Farmers App' is another app for summarizing details in crops, fruits and vegetables. This app helps to farmer to summarized the details about the the growing of the crop and fruits and also describes the diseases and pests attacks with the details of symptoms, causes and how they attack and spread to those crops. This app basically acts as a guide to cultivate the crops and fruits. The app shows good practices and techniques farmers can adopt to improve the harvest.

Comparison those facts we can identify the marketing analysis app for the agriculture are rare. There were apps to analyze market and also there were apps to help to agricultural purposes, but the combination of these two are rare. The purposed Marketing analyze tool for the agriculture acts like bridge in between marketing and agriculture to predict the next season trend crops. Weather condition, cultural events, analyzing past marketing data give a result to the farmers. This covers machine learning area and using Time Series algorithms (TS) and Linear Regression algorithms preceding the results. To make the results more accurate this will convert to the real time app. Because of that adding new data can update the TS module and preceding the more accurate results.

Most of researches about market analysis conduct by using Support Vector Machine (SVM) and Practical Swarm Optimization (PSO). Because of the dynamic behavior of the stock market. Therefore this research can be used as the attempt to proof stock market analysis can be done by Linear Regression algorithm.

1.3 Research Problem

The research problem is to introduce new an intelligent system for predict, analyze the past, present, future marketing trends to the farmers and helps to get a good market for their products. To complete that create a real time module to predict the market future and the model will update with the current model with new data. The platform shows historical market requirement details also. The past Market analyze data to create a model has to be very accurate otherwise the predictions will be not accurate and it may cause lots of errors. To get an accurate data is a main concern in order to create an analyzing tool.

The main target audience was the farmers; apart from farmers this app can use students, agriculture entrepreneurs and other agricultural information seekers. The main concern is that farmers have lack of technology knowledge; therefore this app has to develop very convenient way to understand the operations and other features. User interfaces have to be very user friendly and the flow of the app and operations has to be very to handle by them.

To update the model need to get current data from the farmers. According to do that the purposed app has to convenient way to farmers to fill the current data. To fill data form has to more user friendly and easy to understand.

2. OBJECTIVES

2.1 Main Objectives

Create a mobile application to analyze past market data and predict future market trends. Combination of the market and agricultural industries in order to proceed the good harvest and good income.

2.2 Specific Objectives

To fulfill the main objective above mention has to follow some specific objectives

1. Collect past market data from the Mahaweli Authority
2. Gather information from the farmers get their requirements
3. Analyzed the collected data
4. Create a model for analyze the past data
5. Create a mobile application for more user friendly way
6. Get a user inputs from the application
7. Display the analyzed data

3. METHODOLOGY

3.1 Methodology

The Agrarian division plays a preeminent part in firming the local economy up. This division contributes 7% to GDP concurring to the Central Bank Report 2018. The Mahaweli Authority of Sri Lanka has moreover contributed greatly to the advancement of agrarian division within the country. To continuously mature the degree of developed land and the generation level in agrarian sector, the taking after components were generally helped. Building modern Mahaweli frameworks, giving new lands to agriculturists, re-cultivating the lands which were not developed for the thirty years because of war period, advancing the water system frameworks, creating Mahaweli farms, presenting modern sorts of crops and advanced rural innovation, giving fertilizer endowments and empowering the usage of natural fertilizers are the reasons for this continuous development

Sri Lanka is an agricultural country. Due to lack of knowledge about the stock market prices farmer's cultivated products may be wasted. To reduce the wastage and improve the knowledge about prices of the stock market developed this intelligent mobile application.

The process of the Stock market Analysis is using Linear Regression algorithm predict the prices. The reason of using this algorithm was this is the most suitable algorithm for the numeric values. Stock market prices come as a numeric value. Therefore Linear Regression algorithm is the most suitable algorithm for the system.

Data we collected for the algorithm mainly Statics Department of Mahaweli Authority of Sri Lanka. Since 2013 to 2018 (5 years) static data used for the create the algorithm.

AGRICULTURE AND LIVESTOCK						
Extent and Production						
Paddy						
Cultivated Extent (Ha)	161,230	130,626	180,870	158,628	98,931	165,420
Production (Mt)	849,813	753,802	1,005,694	884,868	507,827	906,051
Values (Rs.Mn)	26,659	30,152	47,971	31,890	24,838	44,460

Figure 3.1 – Data regarding the Paddy cultivation

After that data gathered send to the model to proceed the calculations. In here 5 years data used and two main crops consider beside the Paddy. Therefore main three models were generating according to the crops. After generating the models data were mapped according to the criteria used such as season and the year. Then algorithm created the pattern according to that. Integrate the model with the front end which created using Android studio. Finally when the user using the app it will generate the output according to the pattern. In here data will not store in the database due to market prices of the crops change time to time; therefore it will not necessary to store to the database.

3.2 System Overview

The proposed system consist main four functionalities; Harvest prediction, Plant Healthiness, Market analysis, Trade platform. As mention above Market analysis is predict the future market trends in order to get an idea to the farmers what crops has to cultivated to get a good income.

Harvest prediction is developing harvest requirement prediction tool for next year. Creating an real-time machine learning model to predict harvest. The model will update the current model with new data. Platform show historical harvest details and details gathering component.

Plant healthiness is developing healthiness and crop disorder identification platform. Using crops quality analysis with trained models. And quality classification. Platform to show quality of the crops produced by farmers and techniques to improve the quality.

Trade platform is the place where according to the market requirements. Creating algorithms to map market requirements with farmers harvest details.

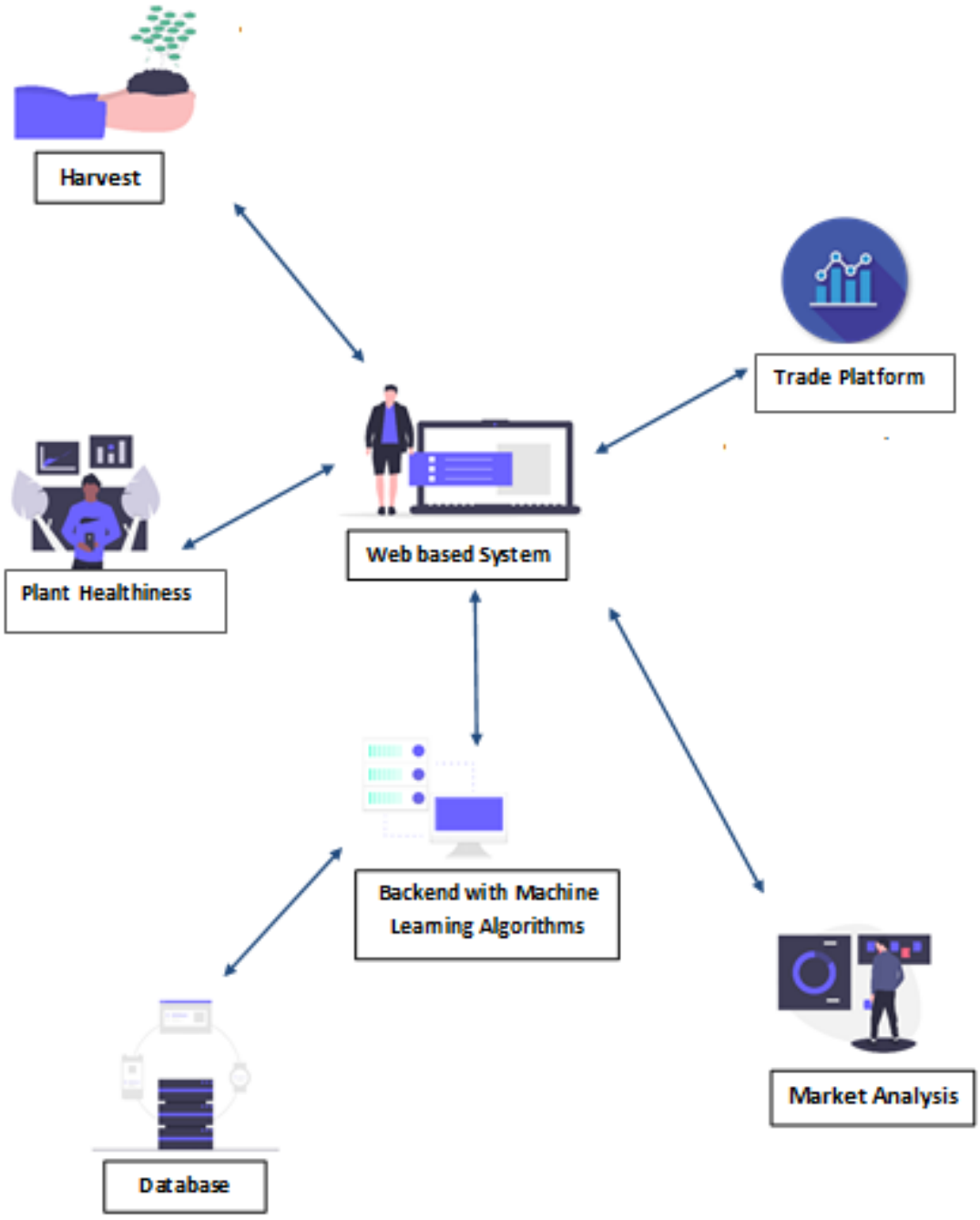


Figure 3.2.1 – System Overview with major components

3.3 Marketing Analysis

First gather the marketing data from the online or Mahaweli Authority. Then save the data from the database called 'Marketing database'. The data saved the database used to train model in Machine learning. Machine learning Linear Regression algorithm used to train the model. After train the model provide the result.

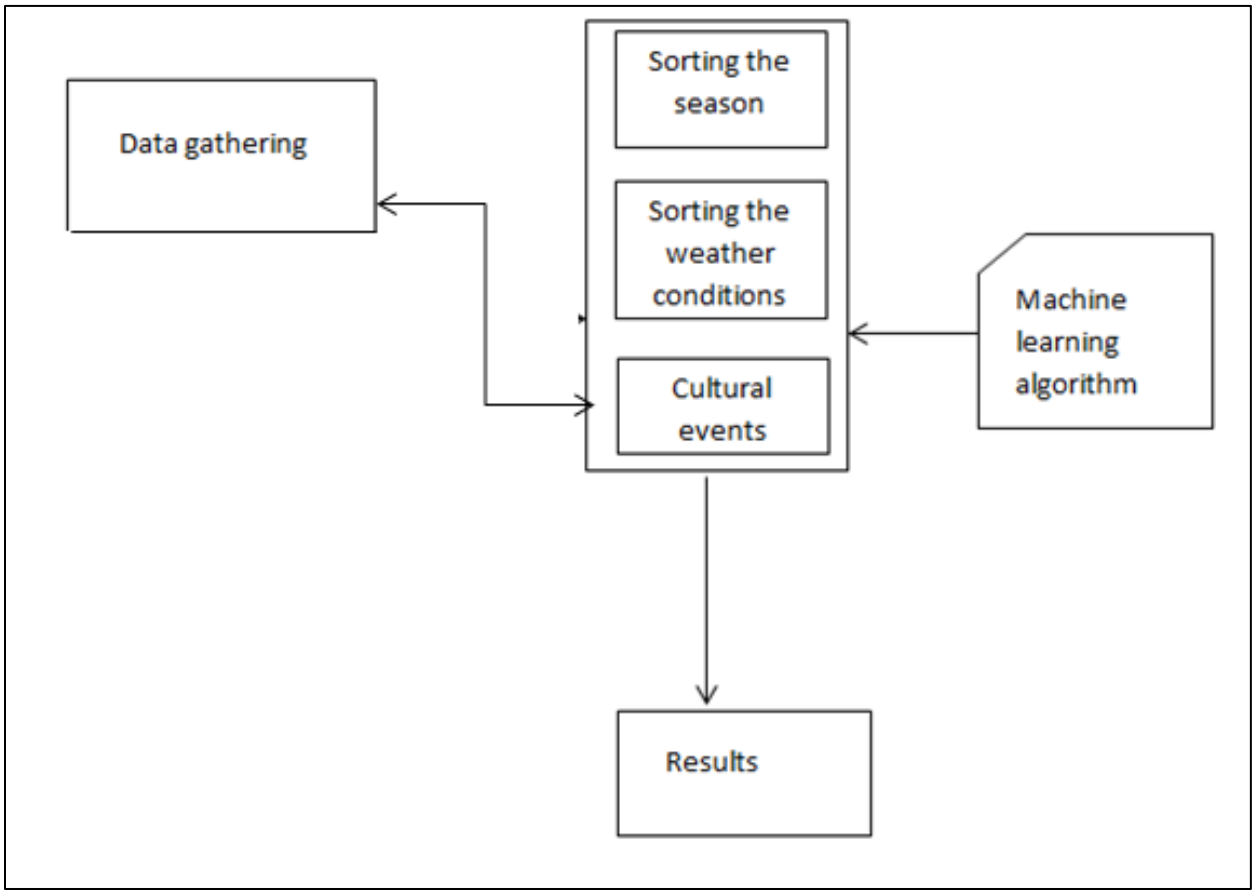


Figure 3.2.2– Marketing Analysis backend high level diagram

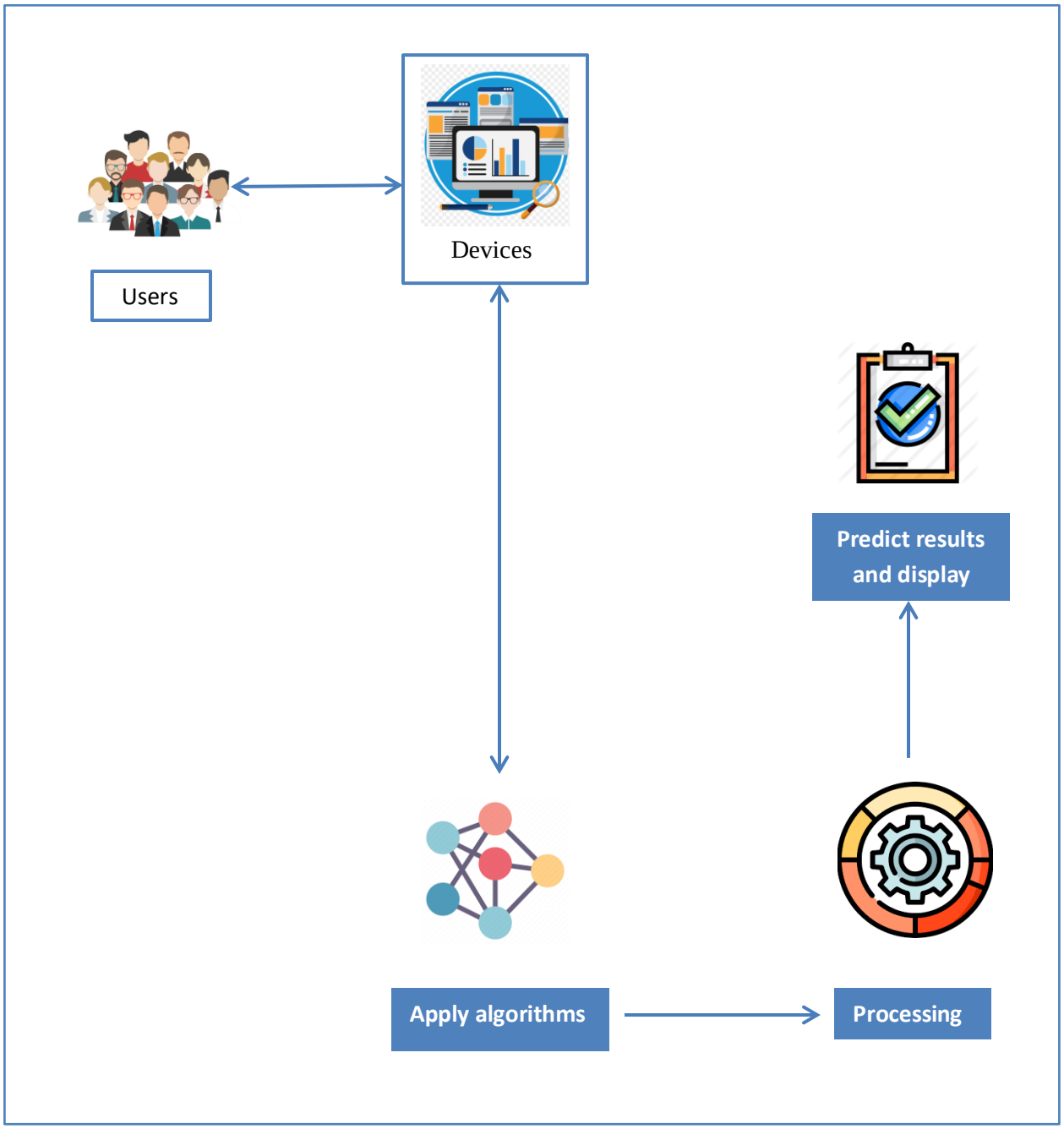


Figure 3.2.3– High level architecture diagram of Market analysis component

High level architecture diagram of Market analysis component

According to the above diagram stock market analysis has two main part frontend and backend. Frontend done as mobile application using Android studio. Backend implemented using Java, Phyton. As machine learning algorithm in here used Linear Regression algorithm. This algorithm implemented using Tensorflow lite.

First user input the data such as crop, cultivated season and the year. Then input that user entered go to the backend to identify the pattern. After that data model update the according to the user input and display the predicted output.

Data model trained using past data which collected from "Mahaweli Authority in Sri Lanka". Therefore model was implemented and tested. Predicted output will be display according to the past results which will generated from the model.

3.4 Methodology for Market Analysis

Description of experimental area

The related data for the model creation gathered from "Mahaweli Authority of Sri Lanka" form 2013 to 2018. According to the data average temperature is 31°C and the average rainfall is 500mm. Evaluation pressure of the tested period of 800 hPa. Consider the soil texture Mahaweli area has mixed soil. All related irrigation, fertilization, pest and disease control were performed when it's necessary.

Considering the Stock market prices depend on the harvest that obtains in each season. To calculate the harvest using below equation.

$$\delta = 0.3964 + 3.631sin\left(\frac{360D}{365}\right) - 22.97cos\left(\frac{360D}{365}\right) + 0.03838sin\left(2\frac{360D}{365}\right) - 0.3885cos\left(2\frac{360D}{365}\right) + 0.07659sin\left(3\frac{360D}{365}\right) - 0.1587cos\left(3\frac{360D}{365}\right) - 0.01021cos\left(4\frac{360D}{365}\right)$$

δ = sun declination
D = number of the days (1,2,3….., 365)

Linear Regression model

From 2013 to 2018 samples of crops stock market prices were recorded. Below table shows the particular data stored to the train the model.

	A	C	D	E	F	G	H	I	J	K	L	M	N	O
1		date	close	high	low	open	volume	adjClose	adjHigh	adjLow	adjOpen	adjVolume	divCash	splitFactor
14	12	2015-06-12 00:00:	127.17	128.33	127.11	128.185	36886246	117.1901309	118.259098	117.1348395	118.1254772	36886246	0	1
15	13	2015-06-15 00:00:	126.92	127.24	125.71	126.1	43988946	116.9597501	117.254638	115.8447068	116.2041009	43988946	0	1
16	14	2015-06-16 00:00:	127.6	127.85	126.37	127.03	31494131	117.586386	117.816767	116.4529122	117.0611177	31494131	0	1
17	15	2015-06-17 00:00:	127.3	127.88	126.74	127.72	32918071	117.309929	117.844413	116.7938759	117.6969688	32918071	0	1
18	16	2015-06-18 00:00:	127.88	128.31	127.22	127.23	35407220	117.8444126	118.240668	117.2362071	117.2454224	35407220	0	1
19	17	2015-06-19 00:00:	126.6	127.82	126.4	127.71	54716887	116.6648626	117.789121	116.4805579	117.6877536	54716887	0	1
20	18	2015-06-22 00:00:	127.61	128.06	127.08	127.49	34039345	117.5956012	118.010287	117.1071938	117.4850184	34039345	0	1
21	19	2015-06-23 00:00:	127.03	127.61	126.8792	127.48	30268863	117.0611177	117.595601	116.9221519	117.4758032	30268863	0	1
22	20	2015-06-24 00:00:	128.11	129.8	127.12	127.21	55280855	118.0563629	119.613737	117.1440548	117.2269919	55280855	0	1
23	21	2015-06-25 00:00:	127.5	129.2	127.5	128.86	31938100	117.4942337	119.060823	117.4942337	118.7475055	31938100	0	1
24	22	2015-06-26 00:00:	126.75	127.99	126.51	127.67	44066841	116.8030911	117.94578	116.5819255	117.6508927	44066841	0	1
25	23	2015-06-29 00:00:	124.53	126.47	124.48	125.46	49161427	114.7573092	116.545065	114.711233	115.6143259	49161427	0	1
26	24	2015-06-30 00:00:	125.425	126.12	124.86	125.57	44370682	115.5820726	116.222531	115.0614119	115.7156935	44370682	0	1
27	25	2015-07-01 00:00:	126.6	126.94	125.99	126.9	30238811	116.6648626	116.978181	116.1027333	116.9413196	30238811	0	1
28	26	2015-07-02 00:00:	126.44	126.69	125.77	126.43	27210952	116.5174189	116.7478	115.8999982	116.5082036	27210952	0	1
29	27	2015-07-06 00:00:	126	126.23	124.85	124.94	28060431	116.1119486	116.323899	115.0521967	115.1351338	28060431	0	1

Figure 3.3.1 – table of model data

A numerical demonstrate is of regression when it interfaces the behavior of a variable in function of another. A regression demonstrate that contains more than one regressor variable is named different, and is broadly used to alter the organized information in a linear frame with the obscure coefficients that take after the regressor variables.

According to that the relation between above variable and the stock market prices calculation will be generating according to this equation.

$$\delta = \big((high - low) \div (close - open)\big) * volume\ \big((ao - ac) + (ah - al)\big)av + splitFactor + \in$$

δ = Predicted price
high = high price consider the period range
low = low price consider the price range
close = close price
open = open price of the crop
ao = adjOpen
ac = adjClose
ah = adjHigh
al = adjLow
av = adjVolume
splitFactor = price of the split range of the crop

€ = random error term
In expansion, it is vital to choose an suitable set of regressors, based on a model that incorporates all variables, and not all regressors are essential. Hence, an examination ought to be consider to select an appropriate demonstrate that contains adequate regression factors for forecast, of low support cost and easy to utilize.

Many criteria can be used for perform this task. In here I used high, low price of the particular crop, close and open price of the crop, adjOpen, adjClose, adjHigh, adjLow, adjVolume to predict the market price of the specific crop.

To alter the models, the centrality level of the regressive factors was utilized at 5% and concomitant to the open value, which alludes to the most reduced level of centrality for acknowledgment of the model received.

In arrange to have a common thought of the precision of the forecasts of the received model, it is essential to decide the confidence intervals (CI), which gives the likely values for the normal reaction and too the prediction intervals (PI) that comes about within the likely values for an reply to an x not belonging to the analyzed information, but which have a place to the extend of variety examined.

Mathematical model to predict stock market

Having a show that employments a single linear regression function, in differentiate to one created beneath the strategies of neural systems (with higher number of regressive capacities) is curiously and computationally lighter, in any case considers of numerical modeling connected to farming are still beginning. From the existing regression models, there are those classified as linear and non-linear models, the final being valuable for depicting the development of natural materials over time, as they utilize parameters of natural translation that encourage examination.

To help the Linear regression model to analyzed crop prices data follow below steps,

I. At first, the assessment of the finest subsets to compose the show was assessed, utilizing the Collaborator tool
II. At that point, through an examination of the ordinary probability of the buildups charts, (residues of x balanced values and residues x arrange of perception), two exceptions were found, that's , information that were outside normality which were causing misfortunes within the translation of comes about of the factual tests connected to the samples.
III. At last, a new modeling was performed, coming about within the condition displayed with the comes about gotten from the expectation coefficients.

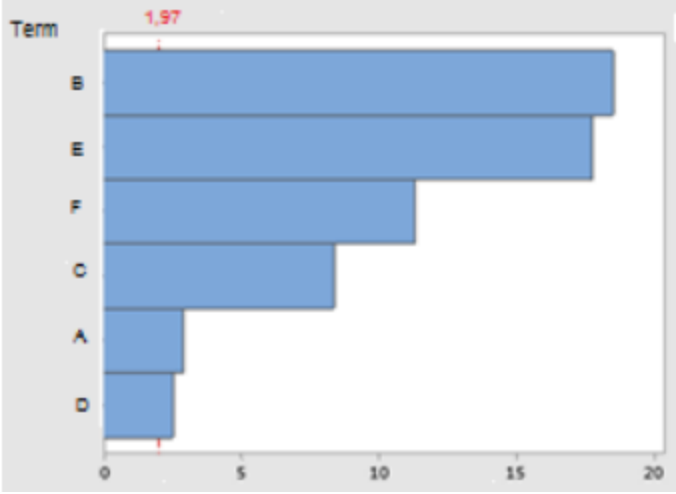


Figure 3.3.2- : Pareto chart of standardized effects

From the pareto's chart of the impacts it was conceivable to compare the relative magnitude and statistical significance of the terms, in diminishing arrange of the absolute values, Above figure mention the standard effect of the model used. With the reference line highlighted in red showing the critical terms for the model (with a centrality level of 5%, i.e. $\boldsymbol{\alpha}$ = 0.05), whose t esteem (t$\boldsymbol{\alpha}$/2) - utilized to decide the certainty and forecast interims - was 1.97.

Concurring to the comes about appeared chart, the factors chosen for the demonstrate are factually noteworthy, considering that they display values over the reference esteem, with the month (B) being the foremost conspicuous (18.5232), due to the variety the sun declination over the days of the year that influence the necessary photoperiod for crops in realizing photosynthesis; the emphasis month and photoperiod (E) was the moment most imperative calculate (17.8005); and the photoperiod raised to the moment control (F) was the third highlighted (11.3096).

Besides, it is vital that the demonstrate displayed S values break even with to 10.808, Mallows' Cp of 7.0 and open-values less than 5%, as the level of centrality utilized in this venture was α = 5% and with regard to Evans run the show (n/k be at slightest 10), we have that n=362 and k=6, whose relationship come about in 60.33, that's , the values found are palatable for the utilize of the relapse equation.

In order to confirm in case the demonstrate proposed in this consider meets the suspicions of the examination, the charts of ordinary probability of the residues, residues x order, histogram of residues and residues x adjustments were proved. It will mention below figure.

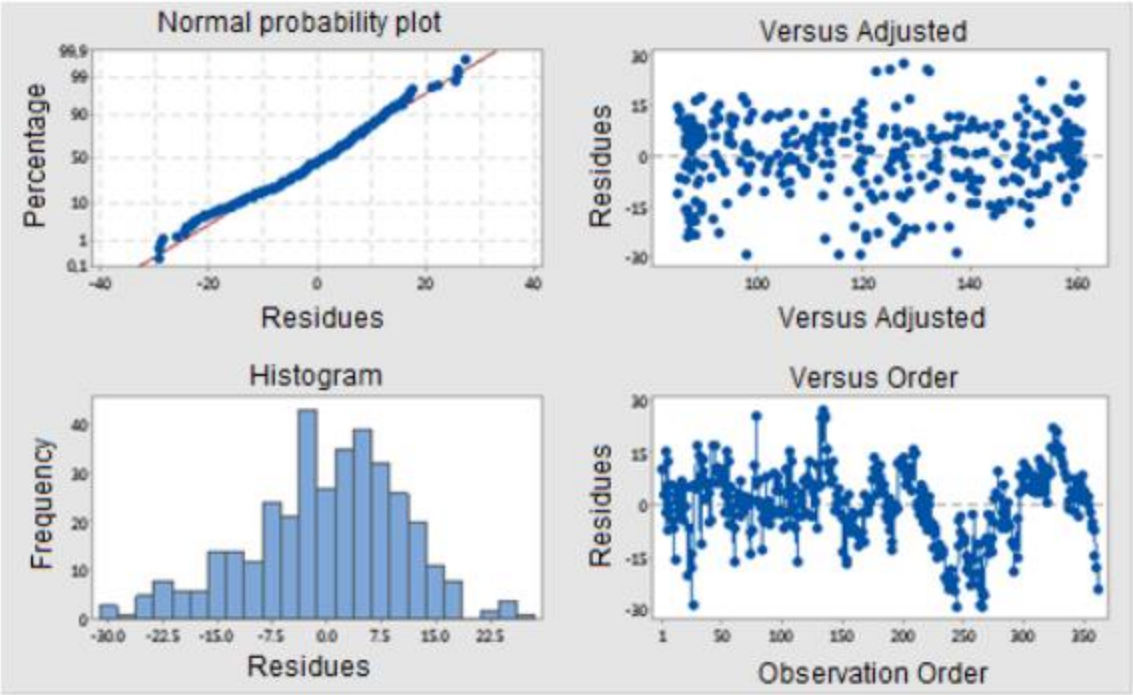


Figure 3.3.3 - Graphs of Gestation residue

The typical probability plot of the residues (upper left side of Figure 3.3.3) was utilized to confirm the suspicion of dissemination of these in arrange to take after roughly a straight line, hence confirming that there's no prove of variation from the norm, exceptions or unidentified variables.

because of the huge number of information focuses (n = 362), the buildups histogram (lower left side of Figure 3.3.3) proved to be successful, where each bar contained sufficient focuses to dependably outline the asymmetry.

As for the chart of residues x adjusted values (upper right side of Figure 3.3.3), it was discovered that the residues were haphazardly conveyed on both sides along line 0, with no identified designs within the focuses.

In any case, in a point by point examination, it was identified that 22 focuses had huge residues and were not perfectly balanced, which are stamped in red within the chart in Figure below, which conceivably are given due to the delay within the collection of bunches, without noteworthy misfortunes for the clarification of the demonstrate.

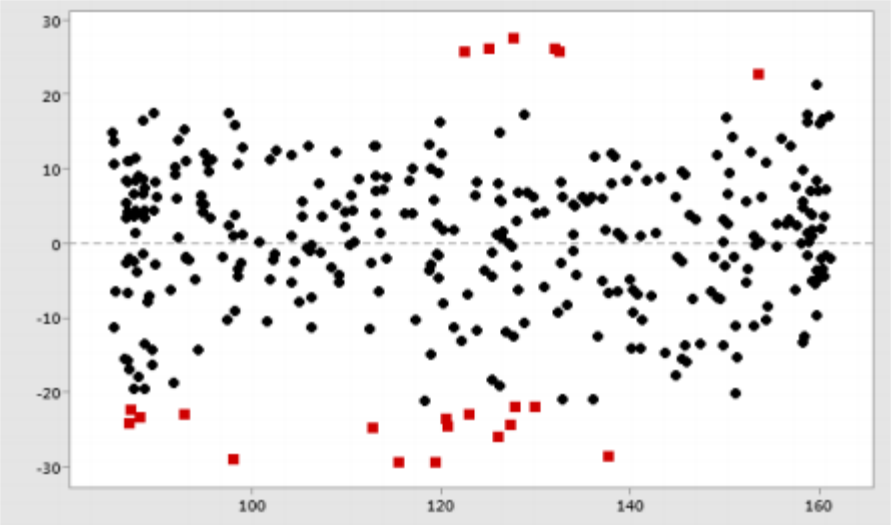


Figure 3.3.4 - Graph of Adjusted Values x Waste

At last, the chart of residues x order of collection (lower right side of Figure 3), shows that the residues have palatable freedom from each other, by showing themselves haphazardly around the central line.

With a importance level of 5%, i.e. α=0.05 and t value (tα/2) of 1.97, the certainty and forecast intervals were separately ± 4.88 and ± 21.30, and the comes about displayed within the application are related to the expectation.

3.4.1 Interfaces

Figure 3.4.1.1 – Home page

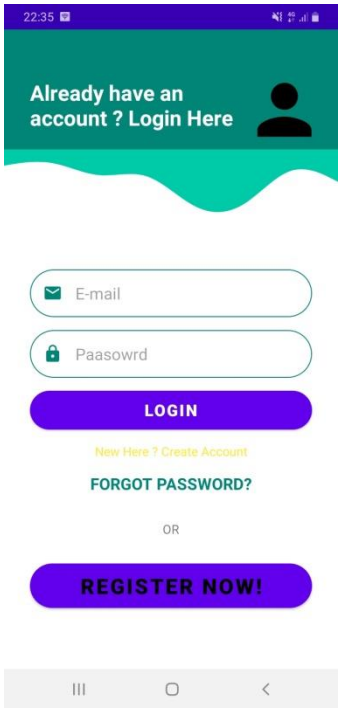


Figure 3.4.1.2 – Login page

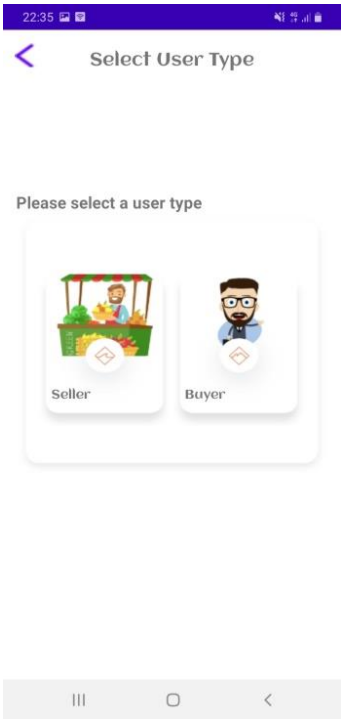


Figure 3.4.1.3 – Select user type

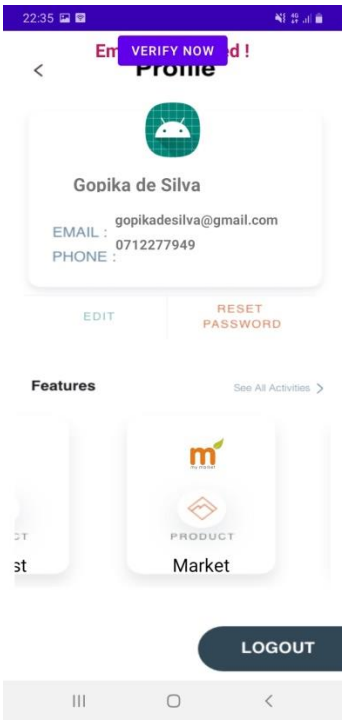


Figure 3.4.1.4 – Market analysis

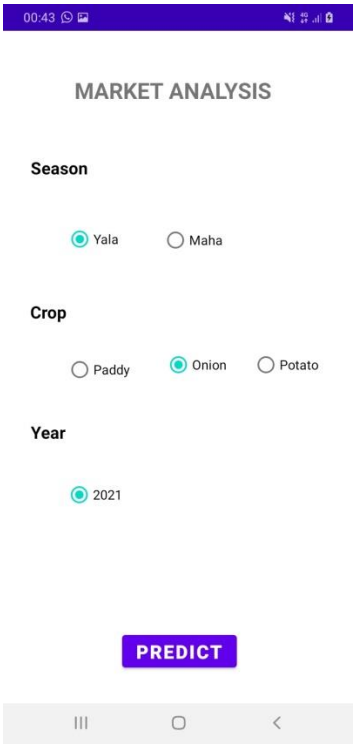


Figure 3.4.1.5 – Market analysis

Home page

In this mobile application main feature is language preferences. We have included all three language as the option. Before going to forward user can select the language as he wish. All the components are working perfectly any language user select. Our goal is to enhance the user experience by providing this option to the users. (Figure 3.4.1.1)

Login

For the login completion user has to provide valid email and password which user provided in the registration phase. Username and password required as the inputs. They are validated for accuracy with what was stored in the database during the registration phase. If they are invalid notification will display and user has to provide valid inputs. (Figure 3.4.1.2)

Select user type

In here user can select the type. Two types we mention in here as Buyer and Seller. For Marketing component either user buyer or seller user can predict the results of crop prices in stock market. But certain components work with the particular user type. For an example Trade platform only seller can select and sell their products. If you select user type as buyers' user cannot put the advertisements of the product, only can buy the products. (Figure 3.4.1.3)

Market Analysis component

Marketing analyzing component main objective is to predict the particular crop stock market prices in particular season and the year. In here we selected main three crops to predict the prices. They are Paddy, Onion and Potatoes. Those are the main three crops cultivated in Mahaweli area. Sri Lanka there is two main seasons called "Yala" and "Maha". Therefore in our research we consider these two seasons. (Figure 3.3.1.4 and Figure 3.4.1.5)

3.5 Approaches

To develop the marketing analysis tool I prefer to follow Software Life Development Life Cycle model (SDLC) Prototype model. Create an incomplete version of the system and test the prototype and there are any changes has to be done can change the system according to the new requirements that user mention. The reason to choose this model the users that we gathered information are farmers. They don't have a good knowledge about the system or technology therefore user can identify the system after the interacting with the prototype because of that requirements that previously gathers can be changed, there will be a mismatch between the customer's (farmer's) requirements and we gathered data previously and there is no particular system to analyze marketing data for agriculture, therefore for the first time the system has lot of issues. To minimize the damage to the whole system I preferred to use the prototype system.

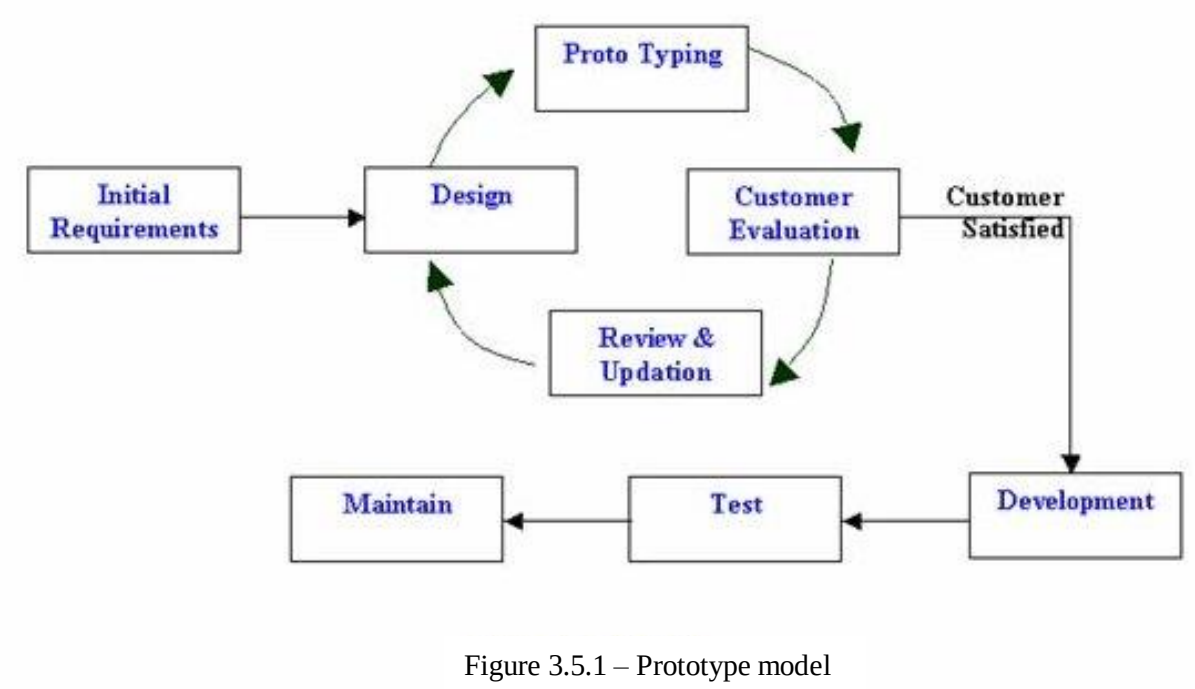


Figure 3.5.1 – Prototype model

3.5.1 Feasibility study –

This is the first and main phase to identify the system whether financially and technology feasibility. If the feasibility phase pass move to the next phase. Litureature review helps to identify the feasibility study pass or not

3.5.2 Requirements gathering and analysis

This is the most important phase to determine the require of the system. Due to current situation of the country requirement gathering has to be done by online. Online databases use to analyze

the market. Interviewing farmers, field officers and officers in Mahaweli Authority can get requirements. Requirements can be Functional requirement, Non-functional requirement and User requirements

3.5.2.1 Functional requirements

1. Application analyze the previous marketing data
2. Application should predict the next season marketing crops
3. Application should display the predicted crops
4. Application should update with new inserted data

3.5.2.2 Non-functional requirements

1. Reliability
2. Usability
3. Availability
4. Performance

3.5.2.3 User requirement

1. Use case scenario

Use case ID	01
Use case name	Predict the next season marketing crop
Precondition	User has to valid login
Primary actor	Farmer
Main success scenario	1. User select the year and the season in the menu (Yala, Maha) 2. User select the cultivated area 3. Select continue button to direct the next page 4. Display the cultivated result
Extensions	1 a) If user not select the year or season system will display the error message 3 a) If user press continue button without select the cultivated area system will display the error message

Table 3.5.2.3.1 Use case scenario

3.5.3 Design

This phase is design UML diagram, prototypes, User Interfaces to map the real requirements of the users. User can test the design and give a feedback, there are any changes has to be done, we can change the design and reevaluate the new design with the stakeholders, if the design is perfect we can move to the next phase. This phase helps to developers make any changes of the system before the development. Therefore in the development phases it's not an easy task to change the system.

3.5.4 Development

After the design development can be done. In here technologies are used. Frontend mobile application used Android studio. For ML model implementation used Tensorflow. To enhance the user experience we converted the application to main three languages; Sinhala, Tamil and English.

Server side run Tensorflow which can used to implement the machine learning models. The data is transmitted as Ajax calls as serialized Json objects. The trained model can be trigged via these types of calls.

3.5.5 Test and Maintain

Testing helps to improve the quality of the product. It will check whether the requirements in SRS satisfy or not. Testing can be done automation or manual. Mainly testing can be divided as Unit testing, Integration testing and System testing. These testing helps to make sure the system meets the requirements or not. Unit testing helps to make sure each units of the system work properly. Integration testing helps to ensure the module work properly after the combined. System testing is test the system to make sure system work properly or not.

After the system delivered developing team get a responsible for maintain the system particular time period. If the new bug or error comes after the during maintain time developing team will correct it and deliver the system.

Unit testing

Unit testing is done by divide the developed system into small parts called units. Therefore each and every unit has to test under this unit testing. The actual coding is started of the units when the system design document is received. The start of the system development done by starting coding the units; those units can be integrated later phases. Those units designed and tested for its functionalities. Unit testing validated when it's meets their specifications.

Integration testing

To perform Integrated testing the individual units combined and tested. The objective of this testing validating the specifications mention when integrated two or more units and the produced results satisfy the objectives.

System testing

Testing the whole system together against with the produced results and system specification. After tested units integrated with the system, system has to tested to ensure whether the results are fulfill the system requirements and integration between units are done by properly or not. System testing is a type of black box testing. The person who tested the system not required the knowledge of the code or logic.

User acceptance testing

After the implementation of the designed system and tested by the team members, give the demo version of the final system to the user. Therefore they can use the system and verify whether the system satisfy the requirements or not. If user satisfy the system user acceptance testing is success, if user dissatisfy the particular component of the system team has to solve the problem.

3.6 Technology used

- Version control – Gitlab
- Machine Learning Linear Regression algorithm
- Mobile Application development – Android studio
- Machine Learning algorithm development – Tensorflow lite

4 RESULT AND DISCUSIION

4.1 Results and Research findings

The initial step for the research was taken by finding the data related to the stock market prices of certain crops. It was quite challenging due the present situation of the country. We could find the data from our main resource person “Mahaweli Authority of Sri Lanka”.[4]. The data found dived into two parts training and testing.

The entire research component was based on that data. Model generation, Price prediction all the output generation process conduct by using that data. Using 5years (2013 - 2018) crop price generating the model. The accuracy can be improved the model by using latest data and considering more years rather than 5years.

Linear Regression algorithm was the suitable algorithm when generating the numeric values, but considering the stock prices analyzing most of the researchers were used Support Vector Machine (SVM) and Practical Swarm Optimization (PSO). But in in this research I showed Linear Regression algorithm also can be used for the stock market prices predictions. The accuracy of the prediction approximately 88.9%.

Later if we can integrate this Linear model with the SVM or PSO models to predicting the results accuracy will be improved.

4.2 Discussion

This developed app mainly focus on the Mahaweli farmer's to reduce their effort and wastage. Because cultivators put lot of effort to get a good products; if they unable to sell them it will be huge lost. Sri Lanka is a developing country. Therefore our mainly income was the agriculture. During past few years agriculture field heavily damaged due to COVID 19 pandemic. Therefore we believe our effort towards agriculture will be help to reduce the farmer's effort and improve the productivity.

Background literacy cover the topic of the component of the system. Linear Regression model chose due to its effectiveness to predict the numeric values and novelty of the predict stock market prices. To understand the model little difficult because of that novelty.

We developed mobile application instead of web application due to user friendliness. Therefore more user base can created for us toward this application. Mobile app developed using Android studio and Machine Learning model was implemented by using Tensorflow lite. Integrate machine learning model with the front end and display the predicted value of the particular crop for particular season and the year was main objective of the component.

Hope to implement the model with SVM and PSO model for further to obtain more accurate results.

5. DESCRIPTION OF PERSONAL AND FACILITIES

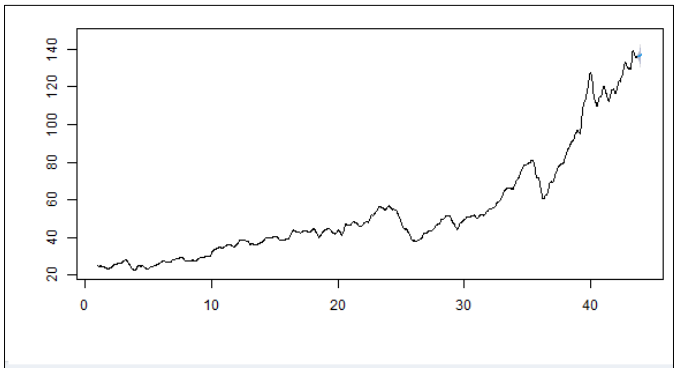
Member	Component	Task
De Silva D.K.G.	Develop marketing analyzing tool	1. Collect past market data from the Mahaweli Authority 2. Gather information from the farmers get their requirements 3. Analyzed the collected data 4. Create a model for analyze the past data 5. Create a web application for more user friendly way 6. Get a user inputs from the application 7. Display the analyzed data

Table 5.1 – Description of personal and facilities

6. CONCLUSION

In this system introduced new algorithm can be used for the stock prediction. Earlier it was SVM or PSO for the prediction stock market prices. The proposed solution provides predicts stock prices thought the use of Linear Regression algorithm. Most of numeric values prediction done by through the Linear regression; therefore it used for this system also. Using the data past 5years (2013 - 2018) helps to implement the algorithm above mention. Using more data and latest data will be improving the accuracy of the algorithm. However using this algorithm I can obtain approximately 88.9% accuracy. To enhance the accuracy this algorithm can be integrate with the SVM or PSO models.

Developing web version of the system will be considered more in order to spread the system more. However according to the gaining results we can decide Linear algorithm also can use for the stock market predictions.



Maha

Point Forecast	Lo 80	Hi 80	Lo 95	Hi 95
136.03	135.70	136.36	135.53	136.53
136.12	135.40	136.84	135.01	137.22
136.20	135.01	137.40	134.37	138.03
136.29	134.54	138.03	133.62	138.95
136.37	134.02	138.73	132.77	139.97
136.46	133.44	139.48	131.84	141.08

Figure 6.1 – final output for paddy in Maha season

7. REFERENCE LIST

[1]Osman Hegazy, Omar S. Soilman, Mustafa Abdul Salam, 'A Machine Learning Model for Stock Market prediction' Faculty of computers and informatics Cario university

[2] Arjuna Gunawardhana 'Agriculture sector Performance in Sri Lanka economy'

[3] W.G. Somarathne 'Sri Lanka agriculture for next decade' university of Peradeniya.

[4] Statical book 2018 by Mahaweli Authority

[5] Paulo Sérgio Barbosa dos Santos, Mariana Matulovic, 'Mobile App for the Prediction of Bananas Harvest' Dept. of Biosystems Engineering, São Paulo State University (Unesp),

[6] Shunrong Shen, Haomiao Jiang, Tongda Zhang, 'Stock Market Forecasting Using Machine Learning Algorithms', Department of Electrical Engineering Stanford University

[7] Rohit Choudhry, and Kumkum Garg, 'A Hybrid Machine Learning System for Stock Market Forecasting', Manipal University Jaipur

[8] V Kranthi Sai Reddy, 'Stock Market Prediction Using Machine Learning', Student, ECM, Sreenidhi Institute of Science and Technology, Hyderabad, India

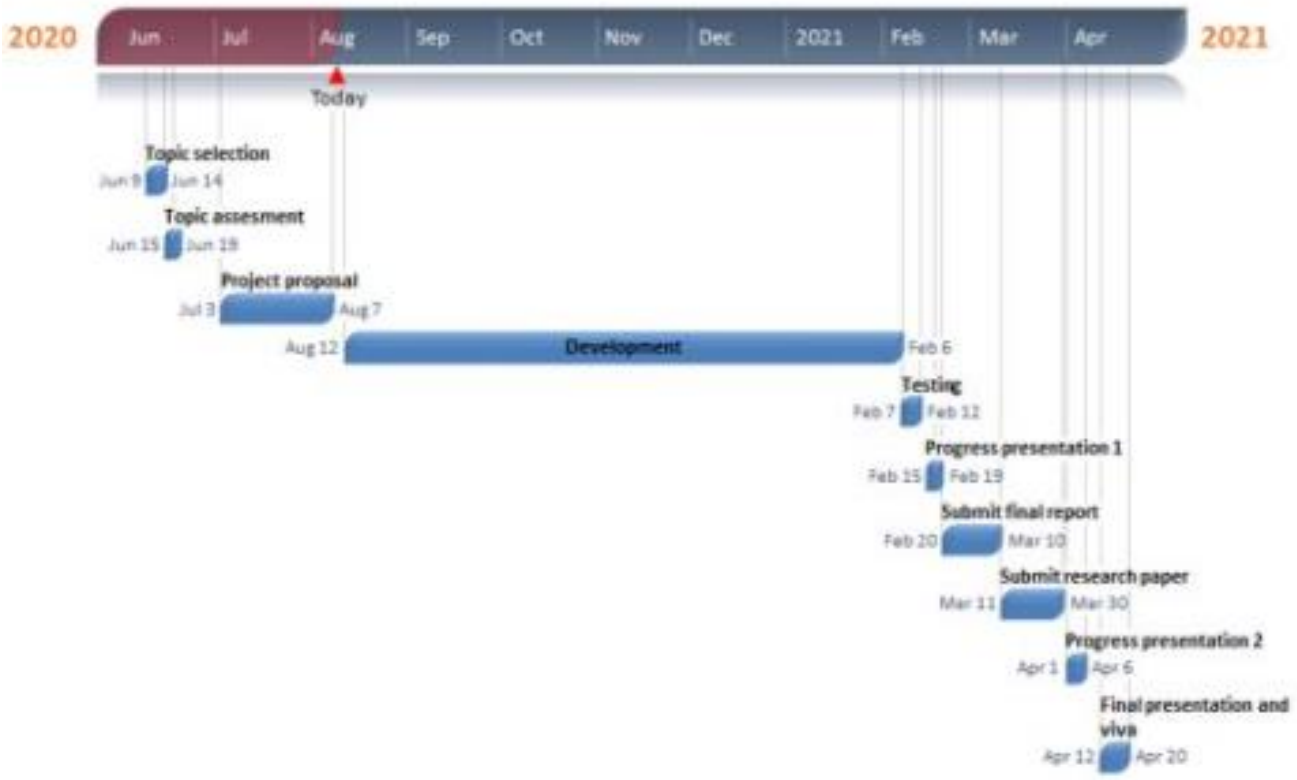
8. GLOSSARY

Term	Definition
Machine Learning	It's a type of Artificial Intelligence (AI). Provide computers to learn without being explicitly programmed. Machine learning focuses on the development of computer programs that can change when exposed to new data
SVM	Support Vector Machine categorized as supervised learning in Machine learning. SVM analyzed data for classification and regression analyzing
PSO	PSO is a computational strategy that optimizes a issue by iteratively attempting to make strides a candidate arrangement with respect to a given degree of quality. It understands a issue by having a populace of candidate arrangements, here named particles, and moving these particles around within the search-space concurring to straightforward scientific equation over the particle's position and speed.
Linear Regression algorithm	This a Machine Learning algorithm categorized supervised learning. Predict the numeric values based on independent variables.

9. APPENDICES

9.1 Research Banner

9.2 Grantt chart



9.3 Use case scenario for the component

Use case ID	01
Use case name	Predict the next season marketing crop
Precondition	User has to valid login
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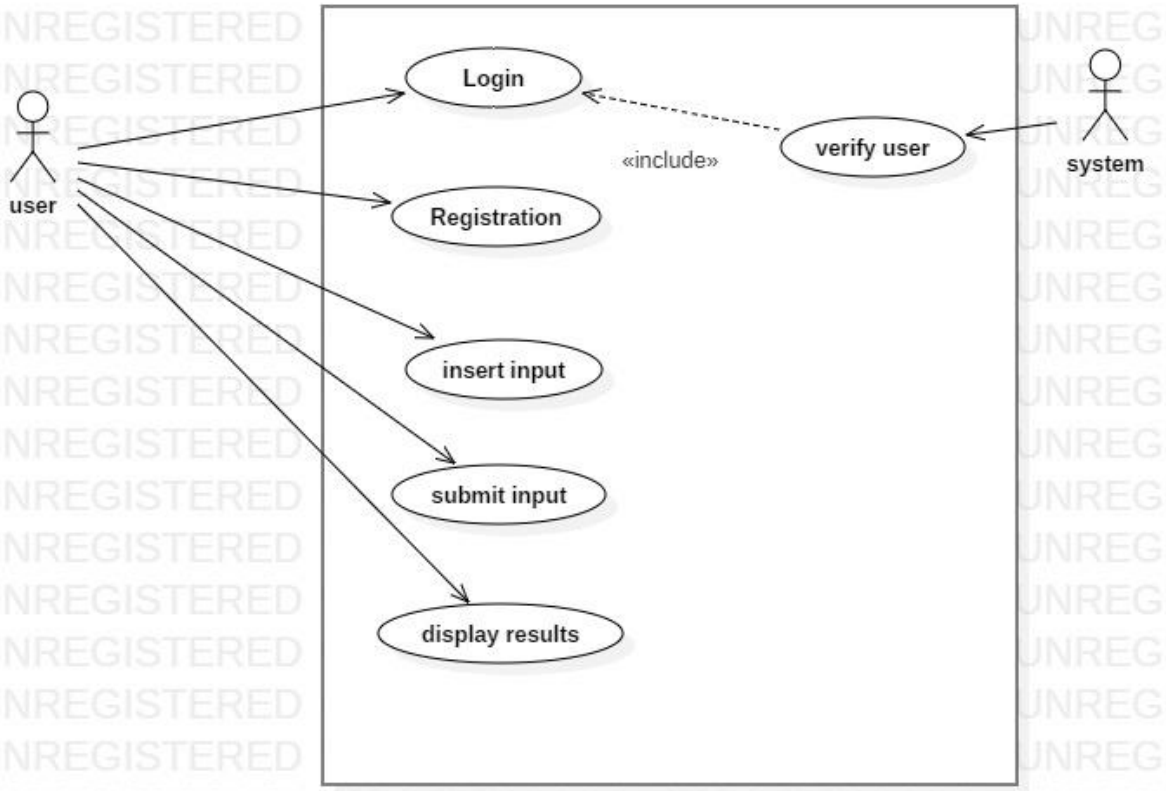
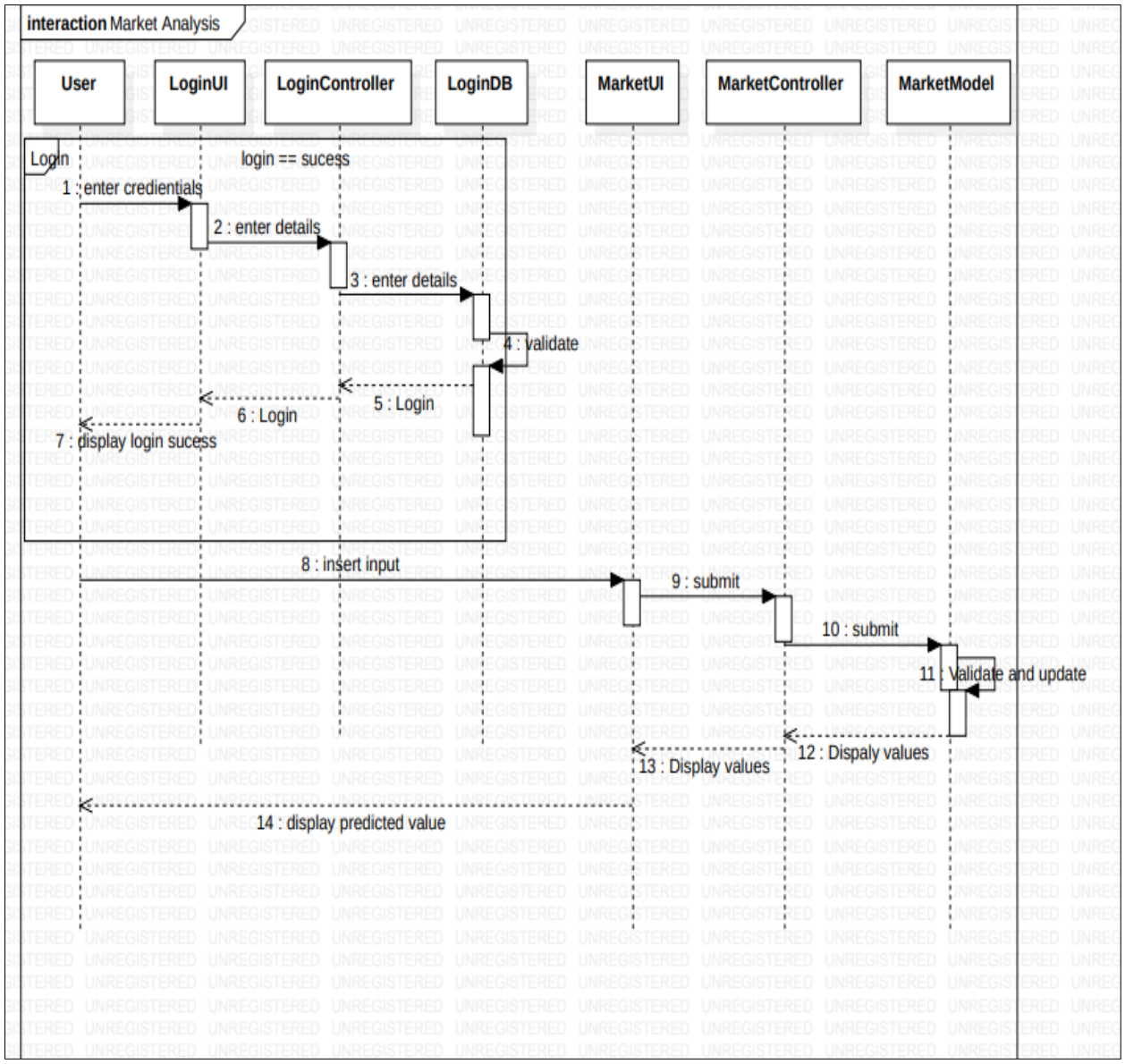
Extensions	1 a) If user not select the year or season system will display the error message 3 a) If user press continue button without select the cultivated area system will display the error message

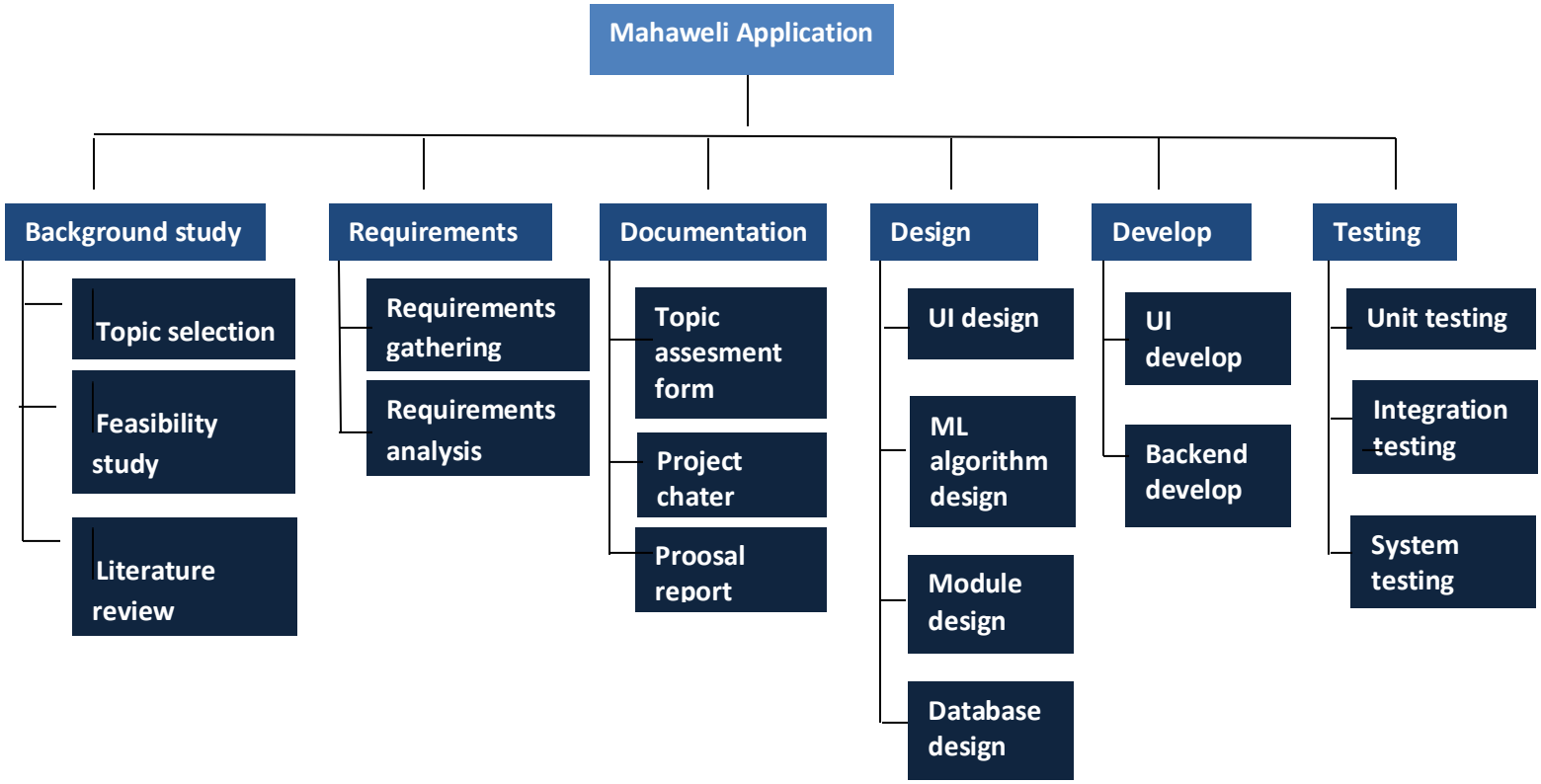
9.4 Use case diagram



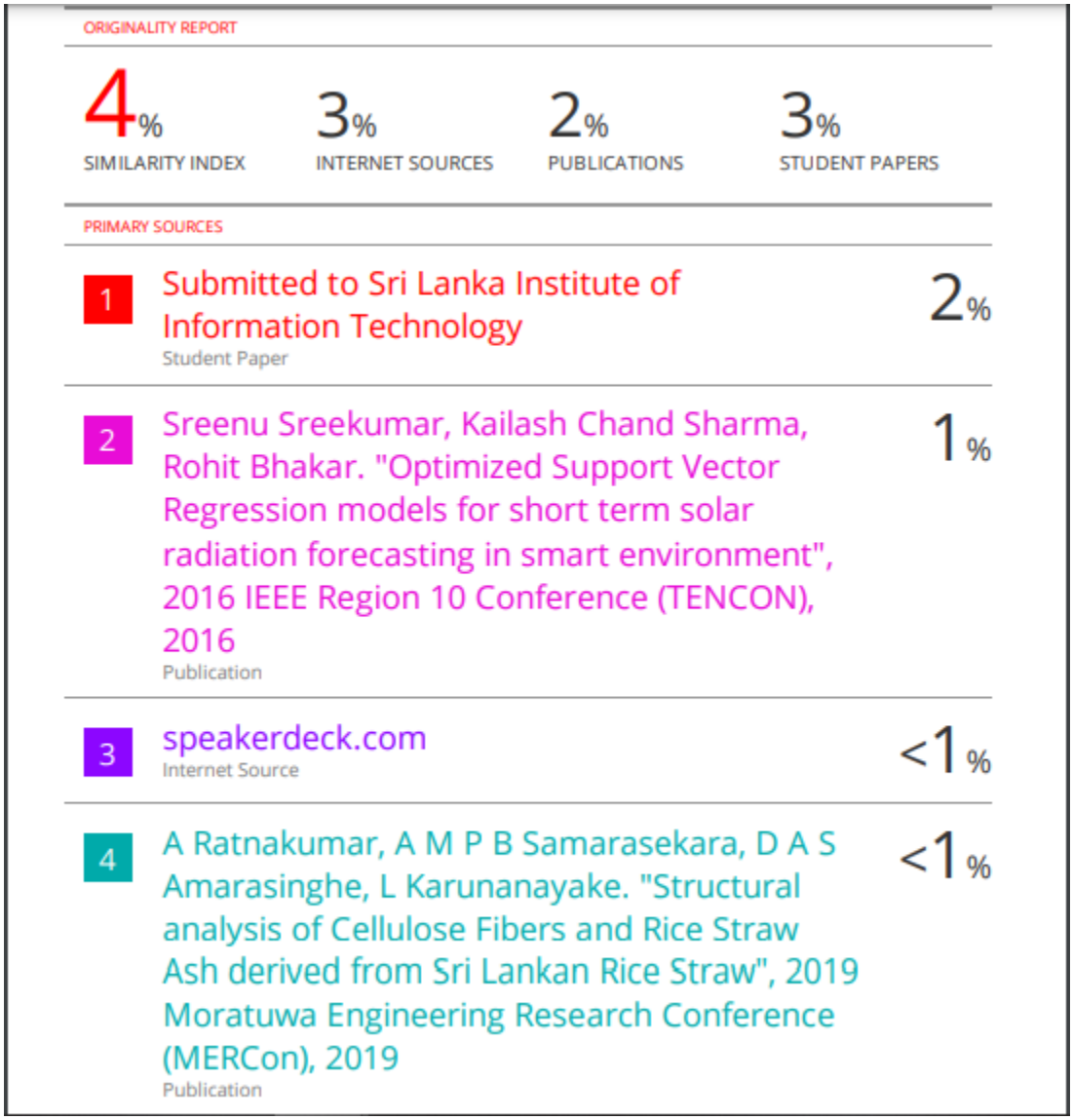
9.5 Sequence diagram



9.6 Workflow diagram



9.7 Turnitin



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9.8 Stock Market data

		date	close	high	low	open	volume	adjClose	adjHigh	adjLow	adjOpen	adjVolume	divCash	splitFactor
2	0	2015-05-27 00:00:	132.045	132.26	130.05	130.34	45833246	121.6825575	121.880685	119.8441183	120.1113601	45833246	0	1
3	1	2015-05-28 00:00:	131.78	131.95	131.1	131.86	30733309	121.4383538	121.595013	120.8117179	121.5120757	30733309	0	1
4	2	2015-05-29 00:00:	130.28	131.45	129.9	131.23	50884452	120.0560687	121.134251	119.7058898	120.931516	50884452	0	1
5	3	2015-06-01 00:00:	130.535	131.39	130.05	131.2	32112797	120.2910572	121.07896	119.8441183	120.9038703	32112797	0	1
6	4	2015-06-02 00:00:	129.96	130.655	129.32	129.86	33667627	119.7611812	120.40164	119.1714063	119.6690289	33667627	0	1
7	5	2015-06-03 00:00:	130.12	130.94	129.9	130.66	30983542	119.908625	120.664274	119.7058898	120.4062476	30983542	0	1
8	6	2015-06-04 00:00:	129.36	130.58	128.91	129.58	38450118	119.2082672	120.332526	118.7935817	119.4110023	38450118	0	1
9	7	2015-06-05 00:00:	128.65	129.69	128.36	129.5	35626800	118.5539856	119.51237	118.2867438	119.3372805	35626800	0	1
10	8	2015-06-08 00:00:	127.8	129.21	126.83	128.9	52674786	117.7706907	119.070039	116.876813	118.7843664	52674786	0	1
11	9	2015-06-09 00:00:	127.42	128.08	125.62	126.7	56075420	117.4205118	118.028717	115.7617697	116.757015	56075420	0	1
12	10	2015-06-10 00:00:	128.88	129.34	127.85	127.92	39087250	118.765936	119.189837	117.8167669	117.8812735	39087250	0	1
13	11	2015-06-11 00:00:	128.59	130.18	128.475	129.18	35390887	118.4986942	119.963916	118.392719	119.042393	35390887	0	1
14	12	2015-06-12 00:00:	127.17	128.33	127.11	128.185	36886246	117.1901309	118.259098	117.1348395	118.1254772	36886246	0	1
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16	14	2015-06-16 00:00:	127.6	127.85	126.37	127.03	31494131	117.586386	117.816767	116.4529122	117.0611177	31494131	0	1
17	15	2015-06-17 00:00:	127.3	127.88	126.74	127.72	32918071	117.309929	117.844413	116.7938759	117.6969688	32918071	0	1
18	16	2015-06-18 00:00:	127.88	128.31	127.22	127.23	35407220	117.8444126	118.240668	117.2362071	117.2454224	35407220	0	1
19	17	2015-06-19 00:00:	126.6	127.82	126.4	127.71	54716887	116.6648626	117.789121	116.4805579	117.6877536	54716887	0	1
20	18	2015-06-22 00:00:	127.61	128.06	127.08	127.49	34039345	117.5956012	118.010287	117.1071938	117.4850184	34039345	0	1
21	19	2015-06-23 00:00:	127.03	127.61	126.8792	127.48	30268863	117.0611177	117.595601	116.9221519	117.4758032	30268863	0	1
22	20	2015-06-24 00:00:	128.11	129.8	127.12	127.21	55280855	118.0563629	119.613737	117.1440548	117.2269919	55280855	0	1
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27	25	2015-07-01 00:00:	126.6	126.94	125.99	126.9	30238811	116.6648626	116.978181	116.1027333	116.9413196	30238811	0	1
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30	28	2015-07-07 00:00:	125.69	126.15	123.77	125.89	46946811	115.8262763	116.250177	114.0569514	116.010581	46946811	0	1
31	29	2015-07-08 00:00:	122.57	124.64	122.54	124.48	60761614	112.9511233	114.858677	112.9234776	114.711233	60761614	0	1
32	30	2015-07-09 00:00:	120.07	124.06	119.22	123.85	78595038	110.6473148	114.324193	109.8640199	114.1306733	78595038	0	1
33	31	2015-07-10 00:00:	123.28	123.85	121.21	121.94	61354474	113.6054049	114.130673	111.6978515	112.3705636	61354474	0	1
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35	33	2015-07-14 00:00:	125.61	126.37	125.04	126.04	31768139	115.7525544	116.452912	115.2272861	116.1488095	31768139	0	1
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37	35	2015-07-16 00:00:	128.51	128.57	127.35	127.74	36222447	118.4249723	118.480264	117.3560052	117.7153993	36222447	0	1
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41	39	2015-07-22 00:00:	125.22	125.5	121.99	121.99	115450607	115.3931603	115.651187	112.4166397	112.4166397	115450607	0	1
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44	42	2015-07-27 00:00:	122.77	123.61	122.12	123.09	44455540	113.135428	113.909508	112.5364378	113.4303155	44455540	0	1
45	43	2015-07-28 00:00:	123.38	123.91	122.55	123.38	33618097	113.6975573	114.185965	112.9326928	113.6975573	33618097	0	1
46	44	2015-07-29 00:00:	122.99	123.5	122.27	123.15	37011653	113.3381631	113.80814	112.6746663	113.4856069	37011653	0	1
47	45	2015-07-30 00:00:	122.37	122.5699	121.71	122.32	33628268	112.7668186	112.951031	112.1586132	112.7207425	33628268	0	1
48	46	2015-07-31 00:00:	121.3	122.6425	120.91	122.6	42884953	111.7807886	113.017934	111.4213945	112.978769	42884953	0	1
49	47	2015-08-03 00:00:	118.44	122.57	117.52	121.5	69975968	109.1452317	112.951123	108.2974301	111.9650933	69975968	0	1

50	48	2015-08-04 00:00:	114.64	117.7	113.25	117.42	124138623	105.6434427	108.463304	104.3625252	108.2052778	124138623	0	1
51	49	2015-08-05 00:00:	115.4	117.44	112.1	112.95	98384461	106.3438005	108.223708	103.3027733	104.0860682	98384461	0	1
52	50	2015-08-06 00:00:	115.13	116.5	114.115	115.97	52903040	106.5741814	107.842371	105.6346105	107.3517573	52903040	0.52	1
53	51	2015-08-07 00:00:	115.52	116.25	114.5	114.58	38670405	106.9351987	107.610949	105.9909994	106.0650543	38670405	0	1
54	52	2015-08-10 00:00:	119.72	119.99	116.53	116.53	54951597	110.8230782	111.073013	107.8701412	107.8701412	54951597	0	1
55	53	2015-08-11 00:00:	113.49	118.18	113.33	117.81	97082814	105.056057	109.397522	104.9079473	109.0550187	97082814	0	1
56	54	2015-08-12 00:00:	115.24	115.42	109.63	112.53	101685610	106.6760068	106.84263	101.4829107	104.1673988	101685610	0	1
57	55	2015-08-13 00:00:	115.15	116.4	114.54	116.04	48535789	106.5926951	107.749802	106.0280269	107.4165552	48535789	0	1
58	56	2015-08-14 00:00:	115.96	116.31	114.01	114.32	42929516	107.3425004	107.66649	105.5374135	105.824376	42929516	0	1
59	57	2015-08-17 00:00:	117.16	117.65	115.5	116.04	40884745	108.4533231	108.906909	106.916685	107.4165552	40884745	0	1
60	58	2015-08-18 00:00:	116.5	117.44	116.01	116.43	34560708	107.8423706	108.712515	107.3887847	107.7775726	34560708	0	1
61	59	2015-08-19 00:00:	115.01	116.52	114.68	116.1	48286510	106.4630991	107.860884	106.1576229	107.4720964	48286510	0	1
62	60	2015-08-20 00:00:	112.65	114.35	111.63	114.08	68501622	104.2784811	105.852147	103.3342818	105.6022115	68501622	0	1
63	61	2015-08-21 00:00:	105.76	111.9	105.645	110.43	128275471	97.90050744	103.584217	97.7940536	102.2234591	128275471	0	1
64	62	2015-08-24 00:00:	103.12	108.8	92	94.87	162206292	95.45669749	100.714592	85.16307379	87.81979142	162206292	0	1
65	63	2015-08-25 00:00:	103.74	111.11	103.5	111.11	103601599	96.03062256	102.852925	95.80845802	102.8529253	103601599	0	1
66	64	2015-08-26 00:00:	109.69	109.89	105.05	107.085	96774611	101.5384518	101.723589	97.24327067	99.12704084	96774611	0	1
67	65	2015-08-27 00:00:	112.92	113.24	110.02	112.25	84616056	104.5284162	104.824636	101.843928	103.9082069	84616056	0	1
68	66	2015-08-28 00:00:	113.29	113.31	111.54	112.17	53164407	104.8709199	104.889434	103.2509701	103.834152	53164407	0	1
69	67	2015-08-31 00:00:	112.76	114.53	112	112.13	56229271	104.3803065	106.01877	103.6767855	103.7971246	56229271	0	1
70	68	2015-09-01 00:00:	107.72	111.88	107.36	110.18	76845860	99.71485118	103.565703	99.38160437	101.9920377	76845860	0	1
71	69	2015-09-02 00:00:	112.34	112.34	109.131	110	61888812	103.9915186	103.991519	101.0209935	101.8254143	61888812	0	1
72	70	2015-09-03 00:00:	110.37	112.78	110.04	112.49	53233940	102.167918	104.39882	101.8624417	104.1303714	53233940	0	1
73	71	2015-09-04 00:00:	109.27	110.45	108.51	108.97	49996311	101.1496638	102.241973	100.4461428	100.8719582	49996311	0	1
74	72	2015-09-08 00:00:	112.31	112.56	110.32	111.65	54843626	103.963748	104.195169	102.1216337	103.3527955	54843626	0	1
75	73	2015-09-09 00:00:	110.15	114.02	109.77	113.76	85010804	101.9642672	105.54667	101.6125066	105.3059921	85010804	0	1
76	74	2015-09-10 00:00:	112.57	113.2825	109.9	110.27	62892831	104.2044263	104.863977	101.7328458	102.0753494	62892831	0	1
77	75	2015-09-11 00:00:	114.21	114.21	111.76	111.79	49915473	105.7225506	105.722551	103.4546209	103.4823915	49915473	0	1
78	76	2015-09-14 00:00:	115.31	116.89	114.86	116.58	58363431	106.7408048	108.203388	106.3242463	107.9164255	58363431	0	1
79	77	2015-09-15 00:00:	116.28	116.53	114.42	115.93	43341155	107.6387198	107.870141	105.9169446	107.3147298	43341155	0	1
80	78	2015-09-16 00:00:	116.41	116.54	115.44	116.25	37173489	107.7590589	107.879398	106.8611439	107.6109492	37173489	0	1
81	79	2015-09-17 00:00:	113.92	116.49	113.715	115.66	64112641	105.4541018	107.833114	105.2643363	107.0647947	64112641	0	1
82	80	2015-09-18 00:00:	113.45	114.3	111.87	112.21	74285291	105.0190296	105.805862	103.5564464	103.8711795	74285291	0	1
83	81	2015-09-21 00:00:	115.21	115.37	113.66	113.67	50221965	106.6482362	106.796346	105.2134236	105.2226804	50221965	0	1
84	82	2015-09-22 00:00:	113.4	114.18	112.5201	113.38	50346159	104.9727453	105.69478	104.1582346	104.9542316	50346159	0	1
85	83	2015-09-23 00:00:	114.32	114.72	113.3	113.63	35756716	105.824376	106.19465	104.8801767	105.185653	35756716	0	1
86	84	2015-09-24 00:00:	115	115.5	112.37	113.25	50219475	106.4538422	106.916685	104.0192892	104.8338925	50219475	0	1
87	85	2015-09-25 00:00:	114.71	116.69	114.02	116.44	56151926	106.1853934	108.018251	105.5466704	107.7868295	56151926	0	1
88	86	2015-09-28 00:00:	112.44	114.57	112.44	113.85	50782189	104.0840871	106.055797	104.0840871	105.3893038	50782189	0	1
89	87	2015-09-29 00:00:	109.06	113.51	107.86	112.83	73365384	100.9552699	105.074571	99.84444717	104.4451045	73365384	0	1
90	88	2015-09-30 00:00:	110.3	111.54	108.73	110.17	65041596	102.10312	103.25097	100.6497936	101.9827809	65041596	0	1
91	89	2015-10-01 00:00:	109.58	109.62	107.31	109.07	63929100	101.4366264	101.473654	99.33532009	100.9645267	63929100	0	1
92	90	2015-10-02 00:00:	110.38	111.0136	107.55	108.01	58019758	102.1771748	102.763689	99.55748463	99.9833	58019758	0	1
93	91	2015-10-05 00:00:	110.78	111.3698	109.07	109.88	52064743	102.5474491	103.093418	100.9645267	101.714332	52064743	0	1
94	92	2015-10-06 00:00:	111.31	111.74	109.765	110.63	48856977	103.0380624	103.436107	101.6078782	102.4085962	48856977	0	1
95	93	2015-10-07 00:00:	110.78	111.77	109.41	111.74	46765550	102.5474491	103.463878	101.2792598	103.4361072	46765550	0	1
96	94	2015-10-08 00:00:	109.5	110.19	108.21	110.19	61979577	101.3625715	102.001295	100.1684371	102.0012946	61979577	0	1
97	95	2015-10-09 00:00:	112.12	112.28	109.49	110	52766140	103.7878678	103.935977	101.3533147	101.8254143	52766140	0	1

98	96	2015-10-12 00:00:	111.6	112.75	111.44	112.73	30467204	103.3065113	104.37105	103.1584016	104.352536	30467204	0	1
99	97	2015-10-13 00:00:	111.79	112.45	110.68	110.82	33049256	103.4823915	104.093344	102.4548805	102.5844765	33049256	0	1
100	98	2015-10-14 00:00:	110.21	111.52	109.56	111.29	44462449	102.0198083	103.232456	101.4181127	103.0195487	44462449	0	1
101	99	2015-10-15 00:00:	111.86	112.1	110.49	110.93	37673452	103.5471895	103.769354	102.2790003	102.6863019	37673452	0	1
102	100	2015-10-16 00:00:	111.04	112	110.53	111.78	39232609	102.7881273	103.676785	102.3160277	103.4731347	39232609	0	1
103	101	2015-10-19 00:00:	111.73	111.75	110.11	110.8	29759153	103.4268504	103.445364	101.9272397	102.5659628	29759153	0	1
104	102	2015-10-20 00:00:	113.77	114.17	110.82	111.34	48967763	105.315249	105.685523	102.5844765	103.065833	48967763	0	1
105	103	2015-10-21 00:00:	113.76	115.58	113.7	114	42326974	105.3059921	106.99074	105.250451	105.5281567	42326974	0	1
106	104	2015-10-22 00:00:	115.5	115.5	114.1	114.33	41654089	106.916685	106.916685	105.6207252	105.8336329	41654089	0	1
107	105	2015-10-23 00:00:	119.08	119.228	116.33	116.7	59366914	110.2306394	110.367641	107.6850041	108.0275077	59366914	0	1
108	106	2015-10-26 00:00:	115.28	118.13	114.92	118.08	66333781	106.7130342	109.351238	106.3797874	109.3049538	66333781	0	1
109	107	2015-10-27 00:00:	114.55	116.54	113.99	115.4	69884400	106.0372837	107.879398	105.5188998	106.8241165	69884400	0	1
110	108	2015-10-28 00:00:	119.27	119.3	116.06	116.93	85551352	110.4065197	110.43429	107.435069	108.2404154	85551352	0	1
111	109	2015-10-29 00:00:	120.53	120.69	118.27	118.7	51227334	111.5728835	111.720993	109.4808341	109.8788789	51227334	0	1
112	110	2015-10-30 00:00:	119.5	121.22	119.45	120.99	49365254	110.6194274	112.211607	110.5731431	111.9986989	49365254	0	1
113	111	2015-11-02 00:00:	121.18	121.36	119.61	119.87	32203267	112.1745792	112.341203	110.7212528	110.961931	32203267	0	1
114	112	2015-11-03 00:00:	122.57	123.49	120.7	120.79	45518976	113.4612821	114.312913	111.7302501	111.8135618	45518976	0	1
115	113	2015-11-04 00:00:	122	123.82	121.62	123.13	44886050	112.9336413	114.618389	112.5818808	113.979666	44886050	0	1
116	114	2015-11-05 00:00:	120.92	122.69	120.18	121.85	39552680	112.4152574	114.060767	111.7273043	113.2798471	39552680	0.52	1
117	115	2015-11-06 00:00:	121.06	121.81	120.62	121.11	33042283	112.5454107	113.24266	112.1363575	112.591894	33042283	0	1
118	116	2015-11-09 00:00:	120.57	121.81	120.05	120.96	33871405	112.0898742	113.24266	111.6064477	112.4524441	33871405	0	1
119	117	2015-11-10 00:00:	116.77	118.07	116.061	116.9	59127931	108.557142	109.765708	107.8980085	108.6779986	59127931	0	1
120	118	2015-11-11 00:00:	116.11	117.42	115.21	116.37	45217971	107.9435622	109.161425	107.1068624	108.1852754	45217971	0	1
121	119	2015-11-12 00:00:	115.72	116.82	115.65	116.26	32525579	107.5809923	108.603625	107.5159156	108.0830121	32525579	0	1
122	120	2015-11-13 00:00:	112.34	115.57	112.27	115.2	45812403	104.43872	107.441542	104.3736433	107.0975658	45812403	0	1
123	121	2015-11-16 00:00:	114.175	114.24	111	111.38	38106701	106.1446577	106.205086	103.192967	103.5462402	38106701	0	1
124	122	2015-11-17 00:00:	113.69	115.05	113.32	114.92	27583101	105.6937696	106.958116	105.349793	106.8372592	27583101	0	1
125	123	2015-11-18 00:00:	117.29	117.49	115.5	115.76	46674697	109.0405685	109.226502	107.3764657	107.6181789	46674697	0	1
126	124	2015-11-19 00:00:	118.78	119.75	116.76	117.64	43295820	110.4257714	111.327548	108.5478453	109.3659517	43295820	0	1
127	125	2015-11-20 00:00:	119.3	119.92	118.85	119.2	34287096	110.9091979	111.485591	110.490848	110.8162313	34287096	0	1
128	126	2015-11-23 00:00:	117.75	119.73	117.34	119.27	32482528	109.468215	111.308954	109.0870518	110.8813079	32482528	0	1
129	127	2015-11-24 00:00:	118.88	119.35	117.12	117.33	42803172	110.518738	110.955681	108.8825252	109.0777551	42803172	0	1
130	128	2015-11-25 00:00:	118.03	119.23	117.92	119.21	21388308	109.7285216	110.844121	109.6262583	110.8255279	21388308	0	1
131	129	2015-11-27 00:00:	117.81	118.41	117.6	118.29	13046445	109.523995	110.081795	109.3287651	109.9702349	13046445	0	1
132	130	2015-11-30 00:00:	118.3	119.41	117.75	117.99	39180322	109.9795315	111.011461	109.468215	109.6913349	39180322	0	1
133	131	2015-12-01 00:00:	117.34	118.81	116.86	118.75	34852374	109.0870518	110.453661	108.6408119	110.3978814	34852374	0	1
134	132	2015-12-02 00:00:	116.28	118.11	116.08	117.05	33386563	108.1016055	109.802895	107.9156722	108.8174486	33386563	0	1
135	133	2015-12-03 00:00:	115.2	116.79	114.22	116.55	41569509	107.0975658	108.575735	106.1864927	108.3526154	41569509	0	1
136	134	2015-12-04 00:00:	119.03	119.25	115.11	115.29	57776977	110.658188	110.862715	107.0138958	107.1812357	57776977	0	1
137	135	2015-12-07 00:00:	118.28	119.86	117.81	118.98	32084249	109.9609382	111.429811	109.523995	110.6117046	32084249	0	1
138	136	2015-12-08 00:00:	118.23	118.6	116.86	117.52	34309450	109.9144549	110.258431	108.6408119	109.2543917	34309450	0	1
139	137	2015-12-09 00:00:	115.62	117.69	115.08	117.64	46361357	107.4880256	109.412435	106.9860058	109.3659517	46361357	0	1
140	138	2015-12-10 00:00:	116.17	116.94	115.51	116.04	29212727	107.9993422	108.715185	107.3857623	107.8784855	29212727	0	1
141	139	2015-12-11 00:00:	113.18	115.39	112.851	115.19	46886161	105.2196397	107.274202	104.9137795	107.0882691	46886161	0	1
142	140	2015-12-14 00:00:	112.48	112.68	109.79	112.18	65003609	104.5688732	104.754807	102.0680707	104.2899733	65003609	0	1
143	141	2015-12-15 00:00:	110.49	112.8	110.35	111.94	53323105	102.7188372	104.866366	102.5886839	104.0668534	53323105	0	1
144	142	2015-12-16 00:00:	111.34	111.99	108.8	111.07	56238467	103.5090536	104.113337	101.147701	103.2580437	56238467	0	1
145	143	2015-12-17 00:00:	108.98	112.25	108.98	112.02	44772827	101.315041	104.35505	101.315041	104.1412267	44772827	0	1
146	144	2015-12-18 00:00:	106.03	109.52	105.81	108.91	96453327	98.57252516	101.817061	98.36799856	101.2499643	96453327	0	1
147	145	2015-12-21 00:00:	107.33	107.37	105.57	107.28	47590610	99.78109144	99.8182781	98.14487863	99.73460813	47590610	0	1
148	146	2015-12-22 00:00:	107.23	107.72	106.451	107.4	32789367	99.68812481	100.143661	98.9639147	99.84616809	32789367	0	1
149	147	2015-12-23 00:00:	108.61	108.85	107.2	107.27	32657354	100.9710644	101.194184	99.66023482	99.72531146	32657354	0	1
150	148	2015-12-24 00:00:	108.03	109	107.95	109	13596680	100.4318579	101.333634	100.3574846	101.3336343	13596680	0	1
151	149	2015-12-28 00:00:	106.82	107.69	106.1807	107.59	26704210	99.3069616	100.115771	98.71262589	100.0228047	26704210	0	1
152	150	2015-12-29 00:00:	108.74	109.43	106.86	106.96	30931243	101.091921	101.733391	99.34414825	99.43711489	30931243	0	1
153	151	2015-12-30 00:00:	107.32	108.7	107.18	108.58	25213777	99.77179478	101.054734	99.64164149	100.9431744	25213777	0	1
154	152	2015-12-31 00:00:	105.26	107.03	104.82	107.01	40912316	97.85668206	99.5021915	97.44762886	99.48359821	40912316	0	1
155	153	2016-01-04 00:00:	105.35	105.368	102	102.61	67649387	97.94035203	97.957086	94.82596969	95.39306618	67649387	0	1
156	154	2016-01-05 00:00:	102.71	105.85	102.41	105.75	55790992	95.48603282	98.4051852	95.20713291	98.31221858	55790992	0	1
157	155	2016-01-06 00:00:	100.7	102.37	99.87	100.56	68457388	93.61740341	95.1699463	92.84578033	93.48725012	68457388	0	1
158	156	2016-01-07 00:00:	96.45	100.13	96.43	98.68	81094428	89.66632134	93.0874936	89.64772802	91.73947735	81094428	0	1
159	157	2016-01-08 00:00:	96.96	99.11	96.76	98.55	70798016	90.14045119	92.1392339	89.95451792	91.61862072	70798016	0	1
160	158	2016-01-11 00:00:	98.53	99.06	97.34	98.97	49739377	91.60002739	92.0927506	90.49372441	92.00908059	49739377	0	1
161	159	2016-01-12 00:00:	99.96	100.69	98.8399	100.55	49154227	92.9294503	93.6081067	91.888131	93.47795346	49154227	0	1
162	160	2016-01-13 00:00:	97.39	101.19	97.3	100.32	62439631	90.54020773	94.0729399	90.45653776	93.26413019	62439631	0	1
163	161	2016-01-14 00:00:	99.52	100.48	95.74	97.96	63170127	92.5203971	93.4128768	89.00625822	91.07011756	63170127	0	1
164	162	2016-01-15 00:00:	97.13	97.71	95.36	96.2	79833891	90.29849447	90.837701	88.652985	89.43390475	79833891	0	1
165	163	2016-01-19 00:00:	96.66	98.65	95.5	98.41	53087747	89.86155128	91.7115874	88.78313829	91.48846743	53087747	0	1
166	164	2016-01-20 00:00:	96.79	98.1897	93.42	95.1	72334416	89.98240791	91.2836619	86.84943224	88.41127174	72334416	0	1
167	165	2016-01-21 00:00:	96.3	97.88	94.94	97.06	52161463	89.52687139	90.9957443	88.26252512	90.23341783	52161463	0	1
168	166	2016-01-22 00:00:	101.42	101.46	98.37	98.63	65800467	94.2867632	94.3239499	91.45128077	91.69299403	65800467	0	1
169	167	2016-01-25 00:00:	99.44	101.53	99.21	101.52	51794525	92.44602379	94.3890265	92.23220052	94.37972984	51794525	0	1

170	168	2016-01-26 00:00:	99.99	100.88	98.07	99.93	75077002	92.95734029	93.7847434	91.17238086	92.90156031	75077002	0	1
171	169	2016-01-27 00:00:	93.42	96.6289	93.34	96.04	133369674	86.84943224	89.8326387	86.77505893	89.28515813	133369674	0	1
172	170	2016-01-28 00:00:	94.09	94.52	92.39	93.79	55678825	87.47230871	87.8720652	85.89187588	87.1934088	55678825	0	1
173	171	2016-01-29 00:00:	97.34	97.34	94.35	94.79	64416504	90.49372441	90.4937244	87.71402197	88.12307517	64416504	0	1
174	172	2016-02-01 00:00:	96.43	96.71	95.4	96.47	40943541	89.64772802	89.9080346	88.69017165	89.68491467	40943541	0	1
175	173	2016-02-02 00:00:	94.48	96.04	94.28	95.42	37357215	87.83487859	89.2851581	87.64894532	88.70876498	37357215	0	1
176	174	2016-02-03 00:00:	96.35	96.84	94.08	95	45964294	89.57335471	90.0288912	87.46301205	88.31830511	45964294	0	1
177	175	2016-02-04 00:00:	96.6	97.33	95.19	95.86	46471652	90.28919781	90.9715075	88.971312	89.59754143	46471652	0.52	1
178	176	2016-02-05 00:00:	94.02	96.92	93.69	96.52	46418064	87.87774719	90.5882925	87.56930583	90.21442415	46418064	0	1
179	177	2016-02-08 00:00:	95.01	95.7	93.04	93.13	54021375	88.80307126	89.4479941	86.96176982	87.04589019	54021375	0	1
180	178	2016-02-09 00:00:	94.99	95.94	93.93	94.29	44331195	88.78437785	89.6723151	87.79362682	88.1301083	44331195	0	1
181	179	2016-02-10 00:00:	94.27	96.35	94.1	95.92	42343601	88.11141488	90.0555301	87.95252085	89.65362168	42343601	0	1
182	180	2016-02-11 00:00:	93.7	94.72	92.59	93.79	50074711	87.57865253	88.5320167	86.54116796	87.66277291	50074711	0	1
183	181	2016-02-12 00:00:	93.99	94.5	93.01	94.19	40351381	87.84970706	88.3263892	86.93372969	88.03664122	40351381	0	1
184	182	2016-02-16 00:00:	96.64	96.85	94.61	95.02	49057916	90.32658464	90.5228655	88.42920295	88.81241797	49057916	0	1
185	183	2016-02-17 00:00:	98.12	98.21	96.15	96.67	44863243	91.7098974	91.7940178	89.86859596	90.35462477	44863243	0	1
186	184	2016-02-18 00:00:	96.26	98.89	96.091	98.84	39020983	89.97140974	92.4295939	89.81345038	92.38286037	39020983	0	1
187	185	2016-02-19 00:00:	96.04	96.7599	95.8	96	35374173	89.76578217	90.4386517	89.54146118	89.72839534	35374173	0	1
188	186	2016-02-22 00:00:	96.88	96.9	95.92	96.31	34280758	90.55090563	90.569599	89.65362168	90.01814328	34280758	0	1
189	187	2016-02-23 00:00:	94.69	96.5	94.55	96.4	31942633	88.50397661	90.1957307	88.3731227	90.10226365	31942633	0	1
190	188	2016-02-24 00:00:	96.1	96.38	93.32	93.98	36255745	89.82186242	90.0835702	87.22347764	87.84036035	36255745	0	1
191	189	2016-02-25 00:00:	96.76	96.76	95.25	96.05	27582659	90.43874514	90.4387451	89.02739225	89.77512888	27582659	0	1
192	190	2016-02-26 00:00:	96.91	98.0237	96.58	97.2	28991131	90.57894575	91.6198886	90.27050439	90.85000028	28991131	0	1
193	191	2016-02-29 00:00:	96.69	98.23	96.65	96.86	35216277	90.37331818	91.8127112	90.33593135	90.53221221	35216277	0	1

1		date	close	high	low	open	volume	adjClose	adjHigh	adjLow	adjOpen	adjVolume	divCash	splitFactor
194	192	2016-03-01 00:00:	100.53	100.77	97.42	97.65	50407147	93.96245399	94.186775	91.05562785	91.27060213	50407147	0	1
195	193	2016-03-02 00:00:	100.75	100.89	99.64	100.51	33169560	94.16808157	94.2989355	93.130597	93.94376058	33169560	0	1
196	194	2016-03-03 00:00:	101.5	101.7099	100.45	100.58	36955742	94.86908466	95.0652721	93.88768033	94.00918753	36955742	0	1
197	195	2016-03-04 00:00:	103.01	103.75	101.37	102.37	46055100	96.28043754	96.9720939	94.74757745	95.68224824	46055100	0	1
198	196	2016-03-07 00:00:	101.87	102.83	100.96	102.39	35915810	95.21491285	96.1121968	94.36436243	95.70094165	35915810	0	1
199	197	2016-03-08 00:00:	101.03	101.76	100.4	100.78	31182194	94.42978939	95.1120991	93.84094679	94.19612169	31182194	0	1
200	198	2016-03-09 00:00:	101.12	101.58	100.27	101.31	27201683	94.51390976	94.9438583	93.71943959	94.69149721	27201683	0	1
201	199	2016-03-10 00:00:	101.17	102.24	100.15	101.41	33513577	94.5606433	95.560741	93.6072791	94.78496429	33513577	0	1
202	200	2016-03-11 00:00:	102.26	102.28	101.5	102.24	27408237	95.57943445	95.5981279	94.86908466	95.56074104	27408237	0	1
203	201	2016-03-14 00:00:	102.52	102.91	101.78	101.91	25076062	95.82244886	96.1869705	95.13079248	95.25229968	25076062	0	1
204	202	2016-03-15 00:00:	104.58	105.18	103.85	103.96	40067734	97.74787067	98.3086731	97.065561	97.16837479	40067734	0	1
205	203	2016-03-16 00:00:	105.97	106.31	104.59	104.61	38303493	99.04706306	99.3648511	97.75721738	97.7759108	38303493	0	1
206	204	2016-03-17 00:00:	105.8	106.47	104.96	105.52	34420705	98.88816903	99.5143985	98.10304557	98.62646121	34420705	0	1
207	205	2016-03-18 00:00:	105.92	106.5	105.19	106.34	44205171	99.00032952	99.5424386	98.31801985	99.39289125	44205171	0	1
208	206	2016-03-21 00:00:	105.91	107.65	105.1401	105.93	35502678	98.99098282	100.61731	98.27137978	99.00967623	35502678	0	1
209	207	2016-03-22 00:00:	106.72	107.29	105.21	105.25	32444375	99.74806615	100.280828	98.33671327	98.3741001	32444375	0	1
210	208	2016-03-23 00:00:	106.13	107.07	105.9	106.48	25703495	99.19661039	100.075201	98.98163611	99.52374516	25703495	0	1
211	209	2016-03-24 00:00:	105.67	106.25	104.89	105.47	26132955	98.76666183	99.3087709	98.03761862	98.57972767	26132955	0	1
212	210	2016-03-28 00:00:	105.19	106.19	105.06	106	19411372	98.31801985	99.2526906	98.19651265	99.07510319	19411372	0	1
213	211	2016-03-29 00:00:	107.68	107.79	104.88	104.89	31190083	100.6453501	100.748164	98.02827191	98.03761862	31190083	0	1
214	212	2016-03-30 00:00:	109.56	110.42	108.6	108.65	45601149	102.4025312	103.206348	101.5052472	101.5519808	45601149	0	1
215	213	2016-03-31 00:00:	108.99	109.9	108.88	109.72	25888449	101.8697688	102.720319	101.766955	102.5520785	25888449	0	1
216	214	2016-04-01 00:00:	109.99	110	108.2	108.78	25873950	102.8044396	102.813786	101.1313789	101.673488	25873950	0	1
217	215	2016-04-04 00:00:	111.12	112.19	110.27	110.42	37356204	103.8606176	104.860715	103.0661474	103.2063481	37356204	0	1

218	216	2016-04-05 00:00:	109.81	110.73	109.42	109.51	26578652	102.6361989	103.496096	102.2716773	102.3557976	26578652	0	1
219	217	2016-04-06 00:00:	110.96	110.98	109.2	110.23	26404077	103.7110703	103.729764	102.0660497	103.0287606	26404077	0	1
220	218	2016-04-07 00:00:	108.54	110.42	108.121	109.95	31801870	101.449167	103.206348	101.0575399	102.7670528	31801870	0	1
221	219	2016-04-08 00:00:	108.66	109.77	108.17	108.91	23581740	101.5613275	102.598812	101.1033388	101.7949952	23581740	0	1
222	220	2016-04-11 00:00:	109.02	110.61	108.83	108.97	29407518	101.897809	103.383936	101.7202215	101.8510754	29407518	0	1
223	221	2016-04-12 00:00:	110.44	110.5	108.66	109.34	27232325	103.2250415	103.281122	101.5613275	102.1969036	27232325	0	1
224	222	2016-04-13 00:00:	112.04	112.34	110.8	110.8	33257316	104.7205147	105.000916	103.561523	103.561523	33257316	0	1
225	223	2016-04-14 00:00:	112.1	112.39	111.33	111.62	25473923	104.776595	105.04765	104.0568985	104.327953	25473923	0	1
226	224	2016-04-15 00:00:	109.85	112.3	109.73	112.11	46938969	102.6735857	104.963529	102.5614252	104.7859417	46938969	0	1
227	225	2016-04-18 00:00:	107.48	108.95	106.94	108.89	60821461	100.4584159	101.832382	99.95369373	101.7763018	60821461	0	1
228	226	2016-04-19 00:00:	106.91	108	106.23	107.88	32384879	99.9256536	100.944445	99.29007747	100.8322843	32384879	0	1
229	227	2016-04-20 00:00:	107.13	108.09	106.06	106.64	30611030	100.1312812	101.028565	99.13118343	99.67329249	30611030	0	1
230	228	2016-04-21 00:00:	105.97	106.93	105.52	106.93	31552525	99.04706306	99.944347	98.62646121	99.94434702	31552525	0	1
231	229	2016-04-22 00:00:	105.68	106.48	104.62	105.01	33683121	98.77600854	99.5237452	97.7852575	98.14977911	33683121	0	1
232	230	2016-04-25 00:00:	105.08	105.65	104.51	105	28031588	98.21520607	98.7479684	97.68244372	98.1404324	28031588	0	1
233	231	2016-04-26 00:00:	104.35	105.3	103.91	103.91	56016165	97.53289639	98.4208336	97.12164125	97.12164125	56016165	0	1
234	232	2016-04-27 00:00:	97.82	98.71	95.68	96	114602142	91.42949617	92.2613532	89.42930069	89.72839534	114602142	0	1
235	233	2016-04-28 00:00:	94.83	97.88	94.25	97.61	82242690	88.63483052	91.4855764	88.09272147	91.2332153	82242690	0	1
236	234	2016-04-29 00:00:	93.74	94.72	92.51	93.99	68531478	87.61603937	88.5320167	86.4663943	87.84970706	68531478	0	1
237	235	2016-05-02 00:00:	93.64	94.08	92.4	93.965	48160104	87.52257229	87.9338274	86.36358051	87.82634029	48160104	0	1
238	236	2016-05-03 00:00:	95.18	95.74	93.68	94.2	56831277	88.9619653	89.4853809	87.55995912	88.04598793	56831277	0	1
239	237	2016-05-04 00:00:	94.19	95.9	93.82	95.2	41025475	88.03664122	89.6349283	87.69081303	88.98065871	41025475	0	1
240	238	2016-05-05 00:00:	93.24	94.07	92.68	94	35890500	87.68146632	88.4619856	87.15485091	88.39615867	35890500	0.57	1
241	239	2016-05-06 00:00:	92.72	93.45	91.85	93.37	43699886	87.19246629	87.8789471	86.37433163	87.80371633	43699886	0	1

242	240	2016-05-09 00:00:	92.79	93.77	92.59	93	32936436	87.25829322	88.1798702	87.07021629	87.455774	32936436	0	1
243	241	2016-05-10 00:00:	93.42	93.57	92.11	93.33	33686836	87.85073556	87.9917933	86.61883165	87.76610094	33686836	0	1
244	242	2016-05-11 00:00:	92.51	93.57	92.46	93.48	28719109	86.99498551	87.9917933	86.94796628	87.90715864	28719109	0	1
245	243	2016-05-12 00:00:	90.34	92.78	89.47	92.72	76314690	84.95435079	87.2488894	84.13621613	87.19246629	76314690	0	1
246	244	2016-05-13 00:00:	90.52	91.67	90	90	44392765	85.12362003	86.2050624	84.63462	84.63462	44392765	0	1
247	245	2016-05-16 00:00:	93.88	94.39	91.65	92.39	61259756	88.28331251	88.7629087	86.1862547	86.88213935	61259756	0	1
248	246	2016-05-17 00:00:	93.49	94.7	93.01	94.55	46916939	87.91656249	89.0544279	87.46517785	88.91337023	46916939	0	1
249	247	2016-05-18 00:00:	94.56	95.21	93.89	94.16	42062391	88.92277408	89.5340241	88.29271635	88.54662021	42062391	0	1
250	248	2016-05-19 00:00:	94.2	94.64	93.57	94.64	30442100	88.5842356	88.9980049	87.99179326	88.99800485	30442100	0	1
251	249	2016-05-20 00:00:	95.22	95.43	94.52	94.64	32025968	89.54342796	89.7409087	88.88515869	88.99800485	32025968	0	1
252	250	2016-05-23 00:00:	96.43	97.19	95.67	95.87	38018643	90.68129341	91.3959858	89.96660106	90.15467799	38018643	0	1
253	251	2016-05-24 00:00:	97.9	98.09	96.84	97.22	35140174	92.06365887	92.242332	91.06685112	91.42419729	35140174	0	1
254	252	2016-05-25 00:00:	99.62	99.74	98.11	98.67	38642108	93.68112049	93.7939667	92.26113965	92.78775506	38642108	0	1
255	253	2016-05-26 00:00:	100.41	100.73	98.64	99.68	56331159	94.42402438	94.7249475	92.75954352	93.73754357	56331159	0	1
256	254	2016-05-27 00:00:	100.35	100.47	99.245	99.44	36341240	94.3676013	94.4804475	93.32847624	93.51185125	36341240	0	1
257	255	2016-05-31 00:00:	99.86	100.4	98.82	99.6	42307212	93.90681281	94.4146205	92.92881276	93.6623128	42307212	0	1
258	256	2016-06-01 00:00:	98.46	99.54	98.33	99.02	29173285	92.59027428	93.6058897	92.46802427	93.11688969	29173285	0	1
259	257	2016-06-02 00:00:	97.72	97.84	96.63	97.6	40191600	91.89438963	92.0072358	90.86937034	91.78154347	40191600	0	1
260	258	2016-06-03 00:00:	97.92	98.27	97.45	97.79	28504888	92.08246656	92.4116012	91.64048577	91.96021655	28504888	0	1
261	259	2016-06-06 00:00:	98.63	101.89	97.55	97.99	23292504	92.75013967	95.8157937	91.73452423	92.14829349	23292504	0	1
262	260	2016-06-07 00:00:	99.03	99.87	98.96	99.25	22409450	93.12629354	93.9162167	93.06046661	93.33317817	22409450	0	1
263	261	2016-06-08 00:00:	98.94	99.56	98.68	99.02	20848131	93.04165892	93.6246974	92.79715891	93.11688969	20848131	0	1
264	262	2016-06-09 00:00:	99.65	99.99	98.46	98.5	26601354	93.70933203	94.0290628	92.59027428	92.62788967	26601354	0	1
265	263	2016-06-10 00:00:	98.83	99.3457	98.48	98.53	31712936	92.93821661	93.423173	92.60908197	92.65610121	31712936	0	1
266	264	2016-06-13 00:00:	97.34	99.12	97.1	98.69	38020494	91.53704345	93.2109282	91.31135113	92.80656275	38020494	0	1
267	265	2016-06-14 00:00:	97.46	98.475	96.75	97.32	31931944	91.64988961	92.6043801	90.9822165	91.51823576	31931944	0	1
268	266	2016-06-15 00:00:	97.14	98.41	97.03	97.82	29445227	91.34896652	92.543255	91.24552421	91.98842809	29445227	0	1
269	267	2016-06-16 00:00:	97.55	97.75	96.07	96.45	31326815	91.73452423	91.9226012	90.34275493	90.7001011	31326815	0	1
270	268	2016-06-17 00:00:	95.33	96.65	95.3	96.62	61008219	89.64687027	90.888178	89.61865873	90.85996649	61008219	0	1
271	269	2016-06-20 00:00:	95.1	96.57	95.03	96	34411901	89.4305818	90.8129473	89.36475487	90.276928	34411901	0	1
272	270	2016-06-21 00:00:	95.91	96.35	94.676	94.94	35546358	90.19229338	90.6060626	89.0318587	89.28012025	35546358	0	1
273	271	2016-06-22 00:00:	95.55	96.89	95.35	96.25	29219122	89.8537549	91.1138704	89.66567797	90.51202417	29219122	0	1
274	272	2016-06-23 00:00:	96.1	96.29	95.25	95.94	32240187	90.37096647	90.5496396	89.5716395	90.22050492	32240187	0	1
275	273	2016-06-24 00:00:	93.4	94.655	92.65	92.91	75311356	87.83192787	89.0121106	87.12663937	87.37113938	75311356	0	1
276	274	2016-06-27 00:00:	92.04	93.05	91.5	93	46622188	86.55300472	87.5027932	86.045197	87.455774	46622188	0	1
277	275	2016-06-28 00:00:	93.59	93.66	92.14	92.9	40444914	88.01060095	88.0764279	86.64704319	87.36173553	40444914	0	1
278	276	2016-06-29 00:00:	94.4	94.55	93.63	93.97	36531006	88.77231253	88.9133702	88.04821634	88.36794713	36531006	0	1
279	277	2016-06-30 00:00:	95.6	95.77	94.3	94.44	35836356	89.90077413	90.0606395	88.67827407	88.80992792	35836356	0	1
280	278	2016-07-01 00:00:	95.89	96.465	95.33	95.49	26026540	90.17348569	90.7142069	89.64687027	89.79733182	26026540	0	1
281	279	2016-07-05 00:00:	94.99	95.4	94.46	95.39	27705210	89.32713949	89.7126972	88.82873561	89.70329335	27705210	0	1
282	280	2016-07-06 00:00:	95.53	95.66	94.37	94.6	30949090	89.83494721	89.9571972	88.74410099	88.96038947	30949090	0	1
283	281	2016-07-07 00:00:	95.94	96.5	95.62	95.7	25139558	90.22050492	90.7471203	89.91958183	89.9948126	25139558	0	1
284	282	2016-07-08 00:00:	96.68	96.89	96.05	96.49	28912103	90.91638957	91.1138704	90.32394723	90.73771649	28912103	0	1
285	283	2016-07-11 00:00:	96.98	97.65	96.73	96.75	23794945	91.19850497	91.8285627	90.96340881	90.9822165	23794945	0	1
286	284	2016-07-12 00:00:	97.42	97.7	97.12	97.17	24167463	91.61227423	91.8755819	91.33015883	91.37717806	24167463	0	1
287	285	2016-07-13 00:00:	96.87	97.67	96.84	97.41	25892171	91.09506266	91.8473704	91.06685112	91.60287038	25892171	0	1
288	286	2016-07-14 00:00:	98.79	98.99	97.32	97.39	38918997	92.90060122	93.0886782	91.51823576	91.58406269	38918997	0	1
289	287	2016-07-15 00:00:	98.78	99.3	98.5	98.92	30136990	92.89119737	93.3801974	92.62788967	93.02285123	30136990	0	1
290	288	2016-07-18 00:00:	99.83	100.13	98.6	98.7	36493867	93.87860127	94.1607167	92.72192813	92.8159666	36493867	0	1
291	289	2016-07-19 00:00:	99.87	100	99.34	99.56	23779924	93.91621666	94.0384667	93.41781279	93.62469741	23779924	0	1
292	290	2016-07-20 00:00:	99.96	100.46	99.735	100	26275968	94.00085128	94.4710436	93.78926473	94.03846667	26275968	0	1
293	291	2016-07-21 00:00:	99.43	101	99.13	99.83	32702028	93.50244741	94.9788513	93.22033201	93.87860127	32702028	0	1
294	292	2016-07-22 00:00:	98.66	99.3	98.31	99.26	28313669	92.77835121	93.3801974	92.44921658	93.34258201	28313669	0	1
295	293	2016-07-25 00:00:	97.34	98.84	96.92	98.25	40382921	91.53704345	92.9476205	91.14208189	92.3927935	40382921	0	1
296	294	2016-07-26 00:00:	96.67	97.97	96.42	96.82	56239822	90.90698573	92.1294858	90.67188956	91.04804343	56239822	0	1
297	295	2016-07-27 00:00:	102.95	104.35	102.75	104.265	92344820	96.81260143	98.12914	96.6245245	98.04920727	92344820	0	1
298	296	2016-07-28 00:00:	104.34	104.45	102.82	102.83	39869839	98.11973612	98.2231784	96.69035143	96.69975527	39869839	0	1
299	297	2016-07-29 00:00:	104.21	104.55	103.68	104.19	27733688	97.99748611	98.3172169	97.49908224	97.97867842	27733688	0	1
300	298	2016-08-01 00:00:	106.05	106.15	104.41	104.41	38167871	99.7277939	99.8218324	98.18556305	98.18556305	38167871	0	1
301	299	2016-08-02 00:00:	104.48	106.07	104	106.05	33816556	98.25138997	99.7466016	97.80000533	99.7277939	33816556	0	1
302	300	2016-08-03 00:00:	105.79	105.84	104.77	104.81	30202641	99.48329389	99.5303131	98.52410153	98.56171691	30202641	0	1
303	301	2016-08-04 00:00:	105.87	106	105.28	105.58	27408650	100.0945439	100.217452	99.5367298	99.8203641	27408650	0.57	1
304	302	2016-08-05 00:00:	107.48	107.65	106.18	106.27	40553402	101.6167147	101.777441	100.3876327	100.472723	40553402	0	1
305	303	2016-08-08 00:00:	108.37	108.37	107.16	107.52	28037220	102.4581631	102.458163	101.3141714	101.6545326	28037220	0	1
306	304	2016-08-09 00:00:	108.81	108.94	108.01	108.23	26315204	102.87416	102.997068	102.1178019	102.3258004	26315204	0	1
307	305	2016-08-10 00:00:	108	108.9	107.76	108.71	24008505	102.1083474	102.95925	101.88144	102.7796153	24008505	0	1
308	306	2016-08-11 00:00:	107.93	108.93	107.85	108.52	27484506	102.0421661	102.987614	101.9665303	102.5999802	27484506	0	1
309	307	2016-08-12 00:00:	108.18	108.44	107.78	107.78	18660434	102.278528	102.524344	101.900349	101.900349	18660434	0	1
310	308	2016-08-15 00:00:	109.48	109.54	108.08	108.14	25868209	103.50761	103.564337	102.1839833	102.2407101	25868209	0	1
311	309	2016-08-16 00:00:	109.38	110.23	109.21	109.63	33794448	103.4130652	104.216696	103.2523391	103.6494271	33794448	0	1
312	310	2016-08-17 00:00:	109.22	109.37	108.34	109.1	25355976	103.2617936	103.403611	102.4297996	103.1483399	25355976	0	1
313	311	2016-08-18 00:00:	109.08	109.6	109.02	109.23	21984703	103.1294309	103.621064	103.0727041	103.2712481	21984703	0	1