HIGH LEVEL DESIGN DOCUMENT

Bitcoin Investopedia - Chatbot, Market Predictor and Public Survey on Taxation

UE19CS390A – Capstone Project Phase – 1

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1. Introduction

1.1. Problem Statement

Deploying a web application with an integrated chatbot plugin which focuses primarily on assisting crypto enthusiasts looking forward to invest in cryptocurrencies and with additional tabs like bitcoin market predictions and a survey done based on the decision of the government to implement a tax of 30% on crypto gains and to provide an analysis of how this affects the long term investors invested during bear cycle

1.2. Abstract

Cryptocurrency, a virtual asset, is an exemplary phenomenon floating about in the present day. Since Cryptocurrency is considered as highly volatile, knowing its future is imperative for the investors to make wise decisions in their investment. So we take on the feat of Price Prediction of Bitcoin along with a chat bot, which clarifies the possible queries about investing in BTC, hence making the life of the users easier.

Also we conduct a survey based on the decision of the Indian government to fix a taxation of 30% on crypto profits to analyze the sentiments of the people.

2. Current System [if applicable]

- Predicting the Price of Bitcoin Using Machine Learning 26th Euromicro International Conference on Parallel, Distributed, and Network-Based Processing
  - ❖ Implementation of a Bayesian optimized recurrent neural network (RNN) and a Long Short Term Memory (LSTM) network. The popular ARIMA model for time series forecasting is implemented as a comparison to the deep learning models.
  - ❖ The LSTM achieves the highest classification accuracy of 52%. LSTM is more capable for recognising longer-term dependencies. But it couldn't guarantee good validation results and it takes longer time to train.

  We are trying to enhance the model by introducing EMA approach to the current System
- A Context-Centric Chatbot for Cryptocurrency World Academy of Science, Engineering and Technology International Journal of Economics and Management Engineering
  - ❖ Properly assist digital currency investors by directing them to the corresponding knowledge bases that can offer them help and increase the querying speed.
  - ❖ An intelligent chatbot for cryptocurrency using BERT is created. This System combines unsupervised and bi-drectional characteristics for pre-training NLP.
  - ❖ BERT can speed up retrieving the intended information well after data training.

  We are enhancing the model by introducing special features like multi-linguality, quicker response time etc.

3. Design Considerations

3.1. Design Goals

- To create an AI based chatbot, making it easier for the user to ask any number of personalized questions.
- To build Price predictor of bitcoin using LSTM and GRU model with EMA approach.
- To conduct a survey on the decision of the Indian government to implement a tax of 30% put upon the cryptocurrencies.

Guidelines:

- Website would run on https protocol to ensure security.
- Rest API is required to interact with machine learning algorithms with authentication headers.

Principles:

- In the Chatbot, we provide reliable and unbiased information on Bitcoin and the investment advice given will be customized to the user.
- To assist the investors in understanding the market cycle of Bitcoin,

Our Approach is Better:

- With EMA, the accuracy would be better.
- Multi-lingual support of the chatbot encourages native users to stay active much more than they actually intended.
- In Market prediction the user has an option to set the timeline as they desire.

3.2. Architecture Choices

- Currently we are using retrieval based architecture for building chatbot because it makes sure that there are no inappropriate or grammatically incorrect responses.
- Also this architecture is more practical at the moment which provides many APIs for developers.

Logical user groups:

- Site User
- Form Participant
- Admin

Application Components:

- Survey Component
- Chatbot Component
- Chart Component

Data Components:

- User Data
- Form Entries
- Chat Data
- Coin Data
- Participant Data

Interfacing Systems:

- Rest API

3.3. Constraints, Assumptions and Dependencies

Constraints:

- Since BTC is highly volatile, the prediction of price/market of bitcoin can not be highly accurate.
- Even if the investment advice given is tactful and credible, one cannot ensure or guarantee the profit.
- Incorporating linguistic diversity in the chatterbot can prove to be difficult

Assumptions:

- Real time response from the bot
- Getting favorable amount of responses in the survey conducted

Hardware limitations:

- Requires a lot of GPUs for training the prediction model.
- Good processor(atleast 1.3GHz i5) with 4GB RAM , 50GB hard disk

4. High Level System Design

Dataflow diagram:

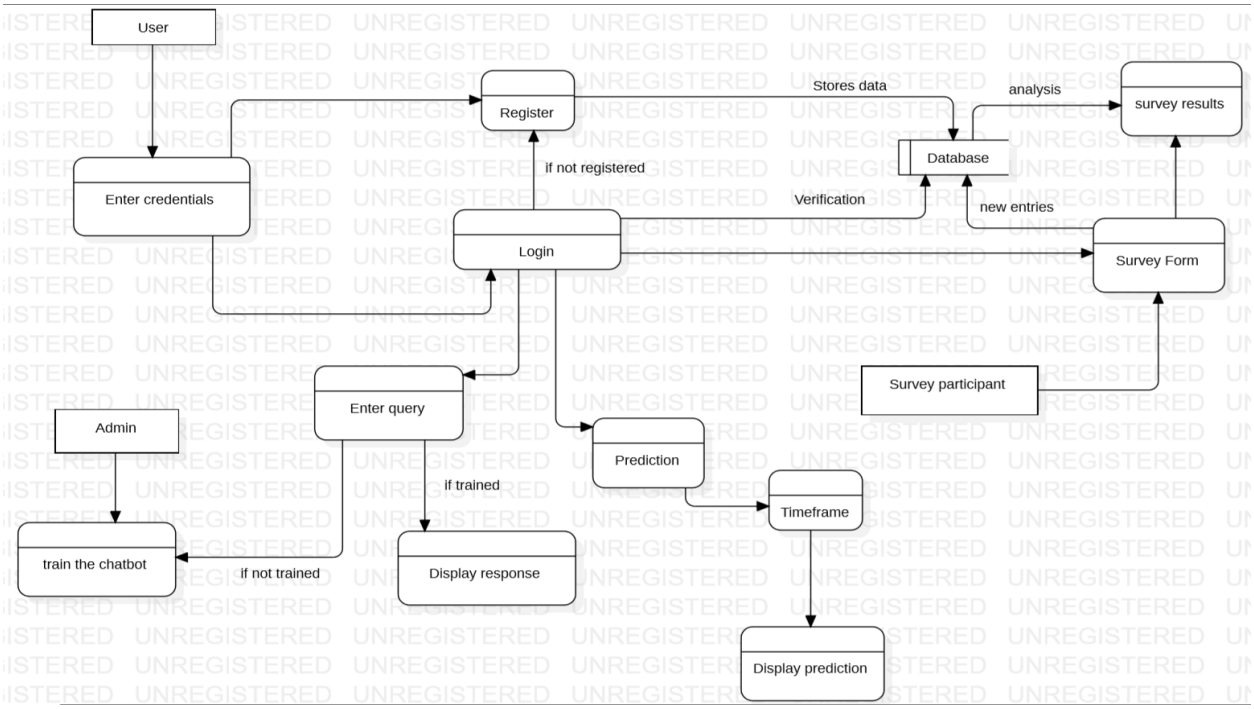

fig 4.1:Dataflow diagram

Frontend Modules:

- React JS, HTML, CSS, AXIOS

Backend Modules:

- Node JS for Server backend
- MongoDB, PostgreSQL for Database
- Flask and REACT

Deployment diagram:

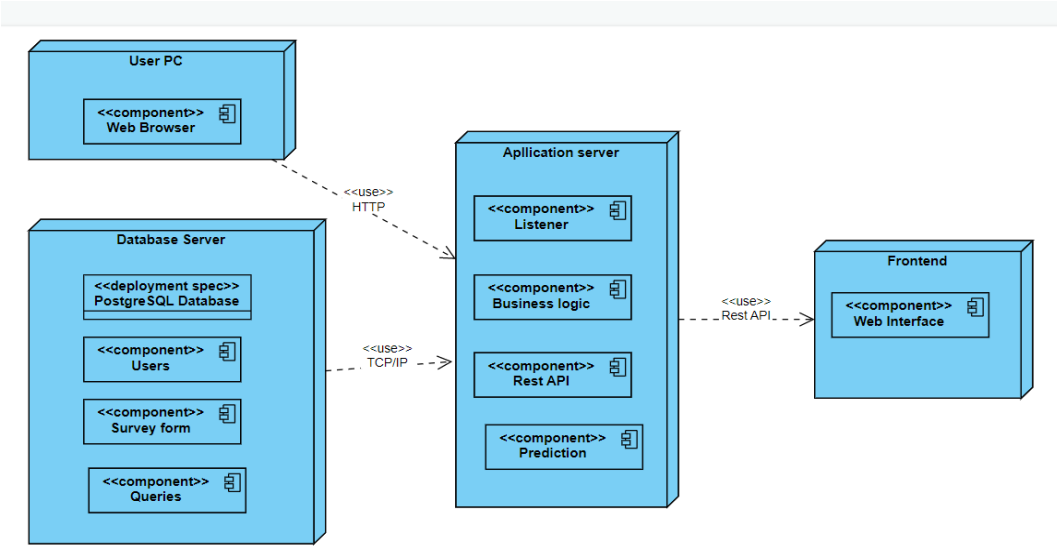

fig 4.2:Deployment diagram

5. Design Description

5.1. Reusability Considerations

- The Machine learning algorithm (LSTM and RNN) involving EMA could be reused in developing any applications that require EMA or even Moving Average in it.
- Each individual module for either chatbot, survey or Market prediction can be integrated with any other applications or can also be used as a single application

6. ER Diagram / Swimlane Diagram / State Diagram (include as appropriate)

Use case diagram:

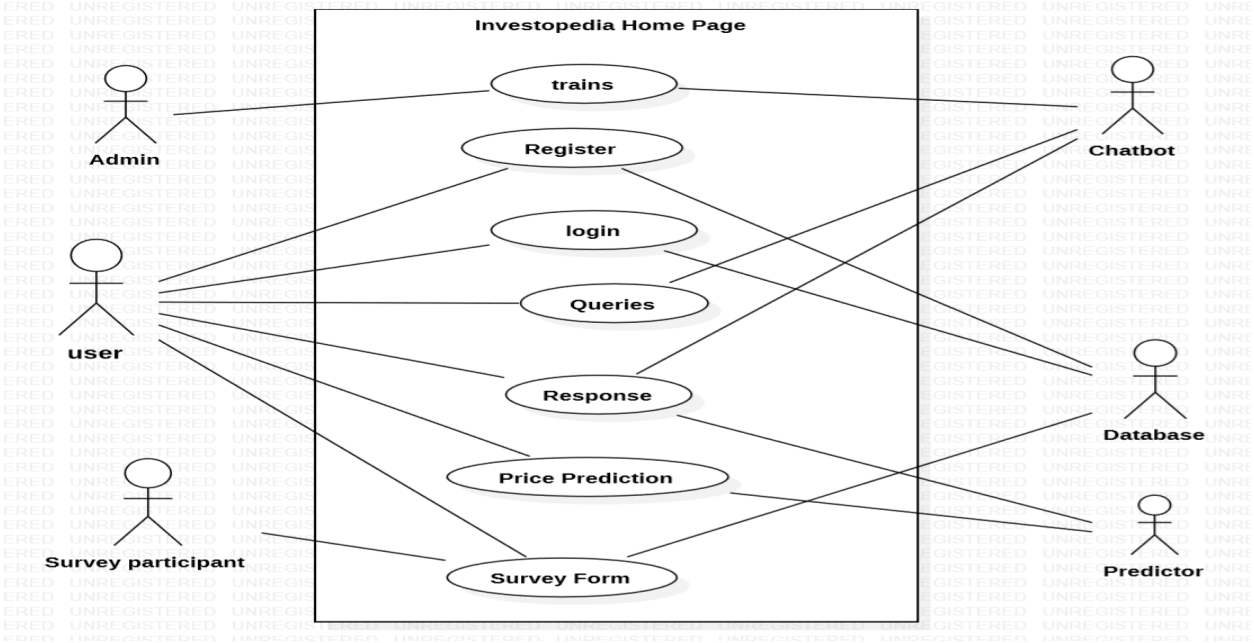

fig 6.1:Use case diagram

Activity diagram:

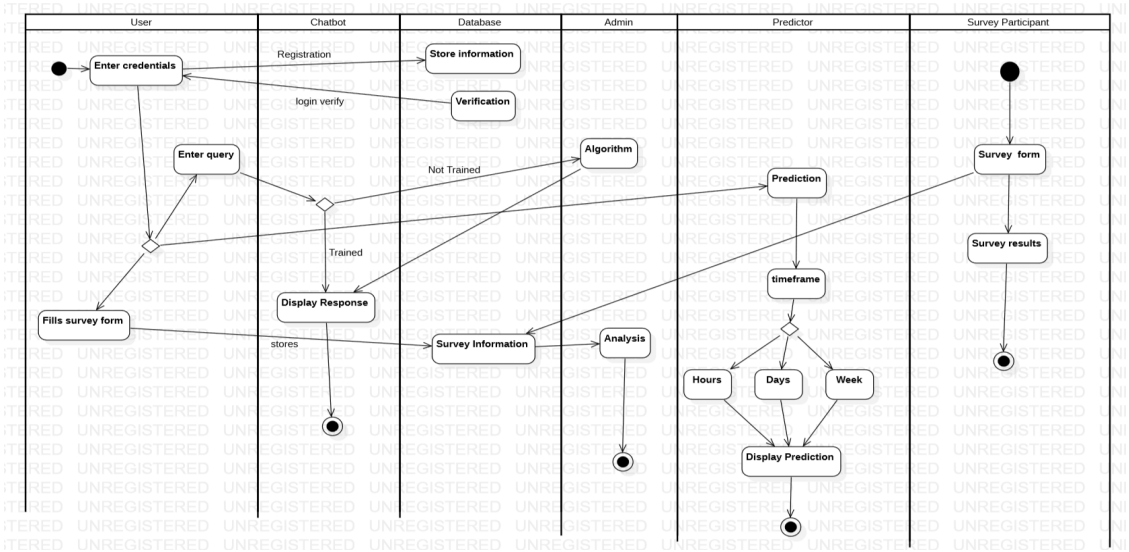

fig 6.2:Activity diagram

ER diagram:

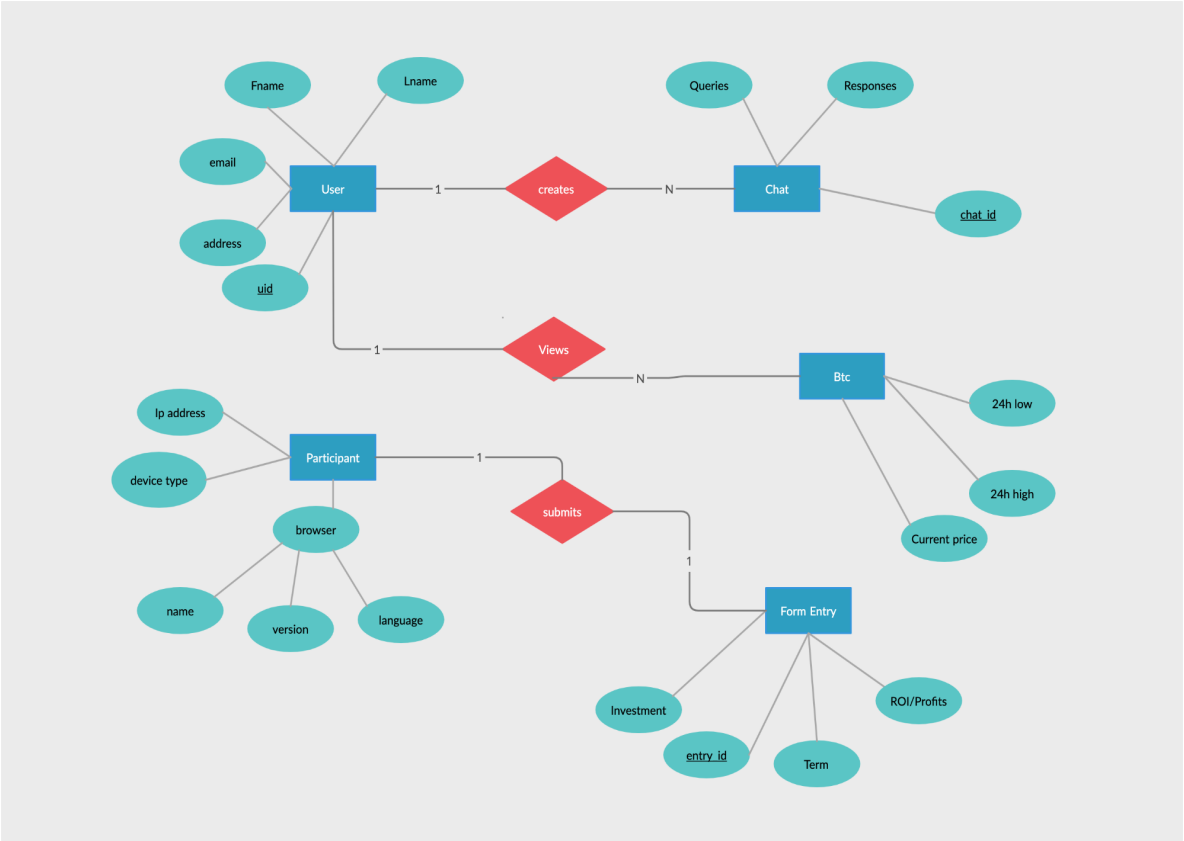

fig 6.3:ER diagram

#	Entity	Definition	Type
ENTITIES			
1.	User	It stores all the details of a user	Tangible entity
2.	BTC	It stores the details required to predict the price for the given timeframe.	Intangible entity
3.	Chat	It stores the information what has been received and what has to be sent.	Intangible entity
4.	Form Entry	It contains certain information which needs to be filled by the user for further analysis.	Intangible entity
5	Survey Participant	It stores details of the participant who will fill the survey form.	Tangible entity

#	Entity name	Attribute	Definition	Type (size)
DATA ELEMENTS				
1.	User	uid	Primary key Stores id of users	VARCHAR(10)
		Fname	It stores first name of all users	VARCHAR(25)
		Lname	It stores the last name of all users.	VARCHAR(25)
		email	It stores the email of users.	VARCHAR(25)
		address	It stores the address of users.	VARCHAR(50)

2.	BTC	currentPrice	It stores the current price of bitcoin for the given timeframe.	DOUBLE(25,5)
3	Chat	chat_id	Primary Key Stores the id of chats.	VARCHAR(10)
		queries	Stores queries sent by the user.	VARCHAR(500)
		responses	It stores responses that need to be sent to the user.	VARCHAR(500)
4	Form entry	entry_id	Primary Key Stores id of all the forms entered by participants.	VARCHAR(10)
		investment	stores the estimated investment given by the user.	DOUBLE(25,5)
		term	Indicates the term	INTEGER(2)
		ROI/Profits		DOUBLE(25,5)
5	Survey Participant	ip address	Indicates the ip address of the system.	VARCHAR(20)
		device type	Indicates the type of device.	VARCHAR(10)
		name	Stores the name of the participant.	VARCHAR(20)
		version	Stores version	FLOAT(3,3)
		language	It stores the language	VARCHAR(10)

7. User Interface Diagrams

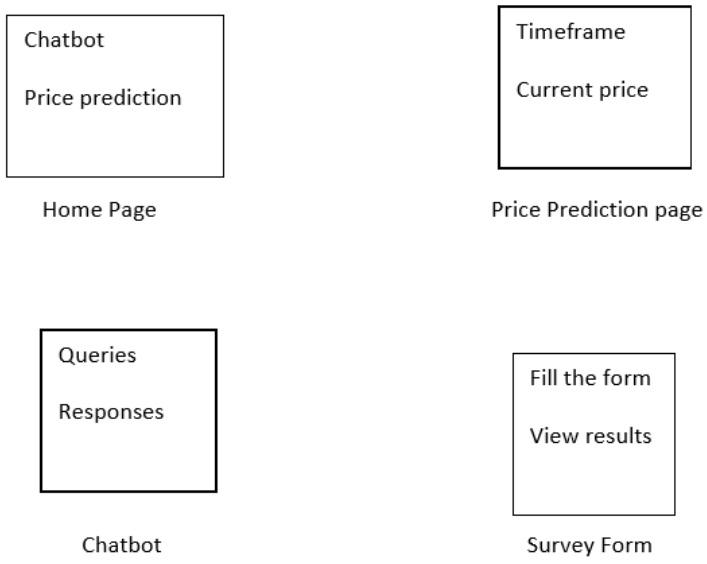

fig 7.1:User interface diagram

1.Home page:

a. User enters into his/her home page.

b. User will be given choice of creating chats with chatbot and find the current market trend in hours or days time frame

2.Price Prediction page:

User can get the information of current market price of bitcoins in days/week/hours.

3.Chatbot page:

Users can post queries related to the bitcoin investments and get the response back from the chatbot

4.Survey form:

Participant can fill survey form and can also view the results of survey

8. Report Layouts

Report Number	Report Name	Purpose	Description(references)
1	Literature Survey	To gain an understanding of the existing research relevant to a particular topic or area of study,	Papers : Appendix B: till[10]
2	Project Requirements Specification	A Project requirements specification document describes the intended purpose, requirements and nature of software to be developed	PRS: Appendix B:[11]
3	System Design	To provide sufficient detailed data and information about the system and its system elements to enable the implementation consistent with architectural entities as defined in models and views of the system architecture.	Current Document
4	Project Progress	Feasibility study, RISK factor analysis.	Feasibility study,

5	Current Approach	To get the expected result.	Database Creation, Rest API, BusinessLogic,Front end.

9. Packaging and Deployment Diagram

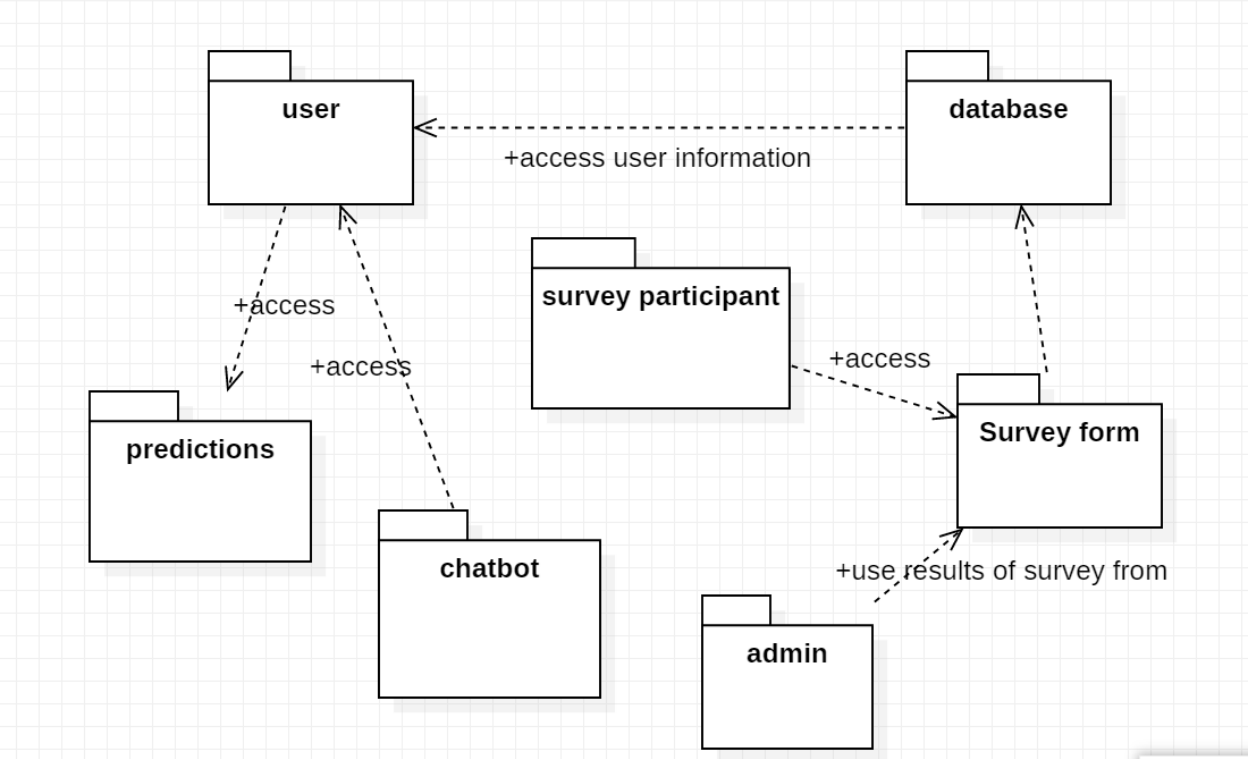

fig 9.1:Package diagram

10. Design Details

1.1. Novelty

- Market Prediction built using EMA to predict the market trend.
- Crypto Assist chatbot with features like better entry and exit price suggestions, better ROI etc. and using BERT model for bi-directional conversation.
- Studying how exactly is the new crypto taxation affecting investors.

1.2. Innovativeness

- Using the EMA algorithm for market prediction.
- Chatbot with advanced features related to cryptos.
- Integrating Multi lingual characteristics with the chat bot.

1.3. Security

- Website would run on https protocol.
- Rest API interactions will be made required for authentication and authorization headers.

1.4. Reliability

- SSL certificates will ensure there's no intervention of the third party

1.5. Portability

- Website migration feature of cloud computing ensures portability among multiple cloud environments.

1.6. Reusability

- The Machine learning algorithm (LSTM and RNN) involving EMA could be reused in developing any applications that require EMA or even Moving Average in it.
- Each individual module for either chatbot, survey or Market prediction can be integrated with any other applications or can also be used as a single application.

1.7. Application compatibility

- The website is compatible with any device that supports browsers like chrome, safari , firefox.

Appendix A: Definitions, Acronyms and Abbreviations

Acronyms:

- BTC:Bitcoin
- EMA : Exponential Moving Average
- GRU: Gated Recurrent Unit
- SSL:Secure Socket Layer
- ROI: Return On Investment
- API - Application Programming Interface
- ARIMA: Autoregressive Integrated Moving Average

Definitions:

- Tangible entity: Entities which exist in the real world physically
- Intangible entity: Entities that exist only logically and have no physical existence.
- Market cycle: A market cycle is where the price of an asset goes up (a bull market) and then comes down again (a bear market).

Appendix B: References

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[11] https://drive.google.com/drive/folders/1B150f-79_9pdqfh4kooA0BHA2SwnQchi?usp=sharing

Appendix C: Record of Change History

#	Date	Document Version No.	Change Description	Reason for Change
1.	**28-04-2022**	**1**	First Release	**-**
2.				
3.				

Appendix D: Traceability Matrix

Project Requirement Specification Reference Section No. and Name.	DESIGN / HLD Reference Section No. and Name.
4. Functional Requirements	6. ER-diagram/activity diagram
5.1 User Interfaces	7. User Interface diagram
5.3 Software Requirements	4. High level system design- Deployment diagram
5.4 Communication Interfaces	4. High level system design- Data flow diagram
6 Non-Functional Requirements	3. Design Considerations