Prashant M. Pawar · Babruvahan P. Ronge · Ranjitsinha R. Gidde · Meenakshi M. Pawar · Nitin D. Misal · Anupama S. Budhewar · Vrunal V. More · P. Venkata Reddy *Editors*

Techno-societal 2022

Proceedings of the 4th International Conference on Advanced Technologies for Societal Applications—Volume 1

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ISBN 978-3-031-34643-9 ISBN 978-3-031-34644-6 (eBook)
https://doi.org/10.1007/978-3-031-34644-6

This Springer imprint is published by the registered company Springer Nature Switzerland AG
The registered company address is: Gewerbestrasse 11, 6330 Cham, Switzerland

Preface

The technologies developed without consideration of social needs will not have a major impact on society. The useful societal technologies can only be developed through the interactions of an inspired and intellectual community having the background of science and engineering. The main goal of these interactions should be to develop techno-societal products, processes, and technologies. During these interactions, one may propose the technology for a particular domain or a region, which can be extended to other similar domains as well as regions. On the other hand, some of the theoretical researchers may have essential knowledge and theories, and through these interactions, applications of those technologies can be evolved. The applications developed through such interactions will not only create an impact by solving the societal problems but will also help in making these products sustainable. Some groups working closely for solving societal problems may be in need of technologies which can be identified through such multidisciplinary interactions. SVERI's College of Engineering has initiated these interactions under the series of International Conferences organized in alternate years with the title 'Techno-Societal.' Great response to the proceedings of our First International Conference 'Techno-Societal: 2016' was observed when articles of these proceedings were accessed more than 114,000 times. In the subsequent Second International Conference 'Techno-Societal: 2018,' the combined number of accesses for volume 1 and volume 2, was more than 139,000. In the Third International Conference 'Techno-Societal: 2020,' the accesses have crossed 87,000 till date for both the volumes. The editorial team has decided to publish the proceedings of the Fourth International Conference 'Techno-societal: 2022' in two volumes.

This book is a compendium of selected and best papers presented on December 9 and 10, 2022, during the International Conference 'Techno-societal: 2022' organized by SVERI's College of Engineering, Pandharpur, India. In this Fourth International Conference on Advanced Technologies for Societal Applications, more than 375 full papers of original works and 18 keynote addresses were presented from various areas of technology. The conference has offered various sessions under its name. Selected

208 papers are being published in the two volumes. Volume 1 is classified into the following seven topical areas:

1. Artificial Intelligence and Big Data
2. Commercially Successful Rural and Agricultural Technologies
3. Engineering for Rural Development
4. ICT-Based Societal Applications
5. Manufacturing and Fabrication Processes for Societal Applications
6. Material Science and Composites
7. Sensor, Image and Data-Driven Societal Technologies.

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Pandharpur, India — Vrunal V. More
Dubai, United Arab Emirates — P. Venkata Reddy

Contents

Artificial Intelligence and Big Data

Health Mitra: Digital Diagnose Suggestion and Disease Prediction Using Machine Learning and Microsoft Azure

Vaishali V. Rajmane, Bhushan Deshmukh, Shubham Sakhare, Chinmay Halsikar, Pranoj Gonjari, and Shreyas Patil

Abstract Innovation has modified the wellbeing field generally in this period of IT. The objective of this exploration is to make a determination model for various illnesses in light of their clinical data. To make such a model, this framework system uses Random forest. The savvy specialist is prepared utilizing datasets containing abundant information in regards to patient sicknesses that have been accumulated, refined, ordered, and used. In the wake of arranging the dataset into preparing and testing we constructed a model utilizing a random forest classifier. Model can predict disease in view of clinical data of the patient. The patient could then contact the specialist for additional treatment in view of the outcomes by utilizing AI Chatbot.

Keywords Random forest classifier [3] · Medical data · Classification · Data mining · Microsoft azure · Microsoft cognitive service · Knowledge base · AI Bot

1 Introduction

Even in the age of the internet and machine learning, we still treat diseases in the same manner. We develop a complete Machine Learning based healthcare system called Health Mitra as our response. It is a web application with a fantastic user-friendly GUI that was created with the aid of streamlet, an open source Python app framework, and a core concept that utilizes Microsoft Azure and machine learning. The suggested methodology here offers a better and more efficient substitute for randomly Googling a diagnosis and more correctly predicting disease than the traditional method. By only enrolling on a network, one may diagnose himself, receive the diagnosis, and find physicians' contact information. Using machine learning algorithms, HealthMitra is able to forecast and assist in the diagnosis of several diseases. A method for improving disease prediction accuracy can be created with the development of machine learning.

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P. M. Pawar et al. (eds.), *Techno-societal 2022*,
https://doi.org/10.1007/978-3-031-34644-6_1

Using existing medical information and Random forest. The patient can get in touch with the closest or dearest disease specialist with the aid of an AI Chatbot [4] for any additional therapies. This method enables free disease prediction and doctor consultation.

2 Motivation

- Our innovation takes inspiration from ancient Indian civilization; We are living in a country where the medical field is far ahead at that time.
- Need of the user is an accurate diagnosis for a disease, cheaper cost, and ease of availability so as per the user requirement.
- Our innovation strictly follows the principle—high accuracy and cheap medical facility for everyone and also it can easily be accessible to everyone at no cost.
- With the help of this innovation we can make some positive changes in the medical field.

3 Methodology

The diseases are expected naturally in the system utilizing a model, which has been prepared on a clinical dataset. This method additionally shows the prediction's score. Following the conclusion of the expected disease, the system suggests experts who spend significant time in that disease, permitting the patient to talk with them on the web (Figs. 1 and 2).

When clients visit this application, they can register as a patient. after the user has successfully registered on the network. They can login in this application as a patient (Figs. 3 and 4).

After login as patient

(A) On profile page users can see their ID, name, and email. They can also edit their information.
(B) There are three choices to predict the disease and consultation from AI Bot.
(C) At the point when they click on predict disease they will get a choice to multiple disease from the sidebar (Fig. 5).
(D) Depending upon the medical information of the patient, the model will predict the disease with high accuracy (Fig. 6).
(E) This application gives a connection that will guide the patient for better understanding of the predicted disease (Fig. 7).
(F) Furthermore, the main element of the proposed model is that alongside the visualization the framework offers the chance to associate with the specialist representing considerable authority in that specific field to the client who is enrolled in the organization alongside their contact subtleties.

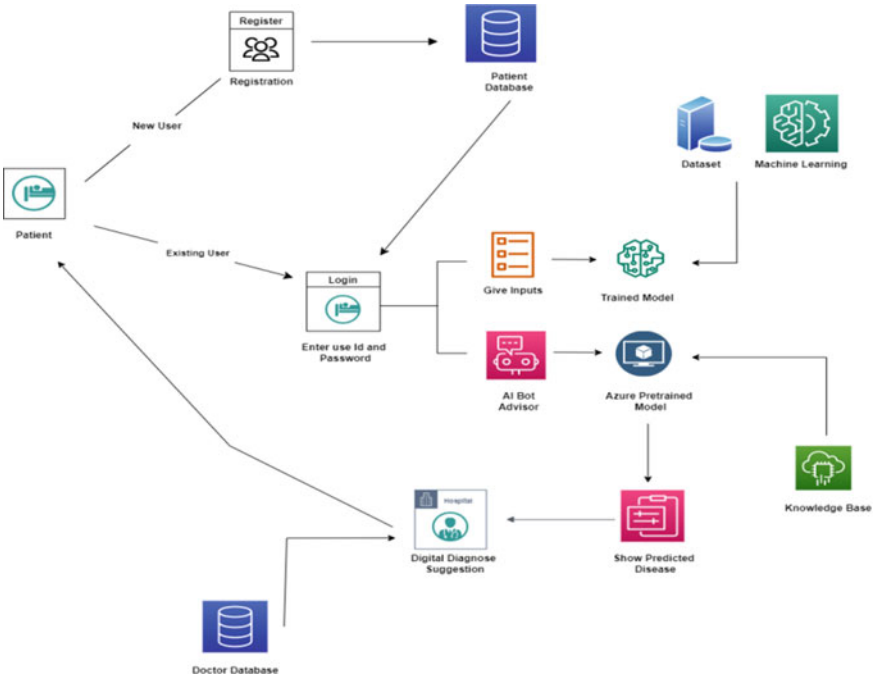

Fig. 1 Flow diagram

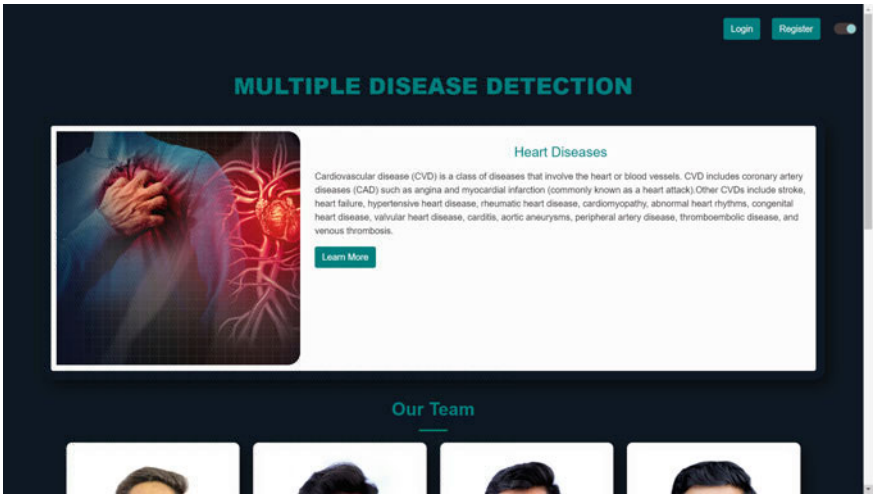

Fig. 2 Home page [1]

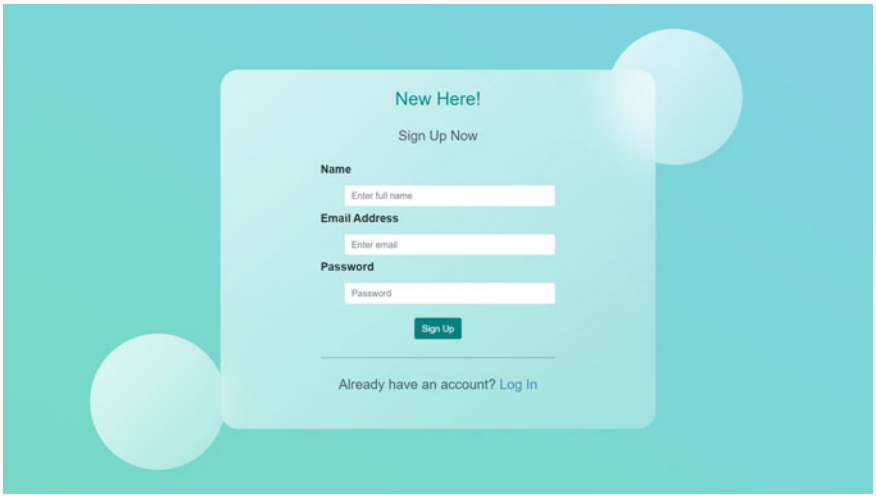

Fig. 3 Registration page [1]

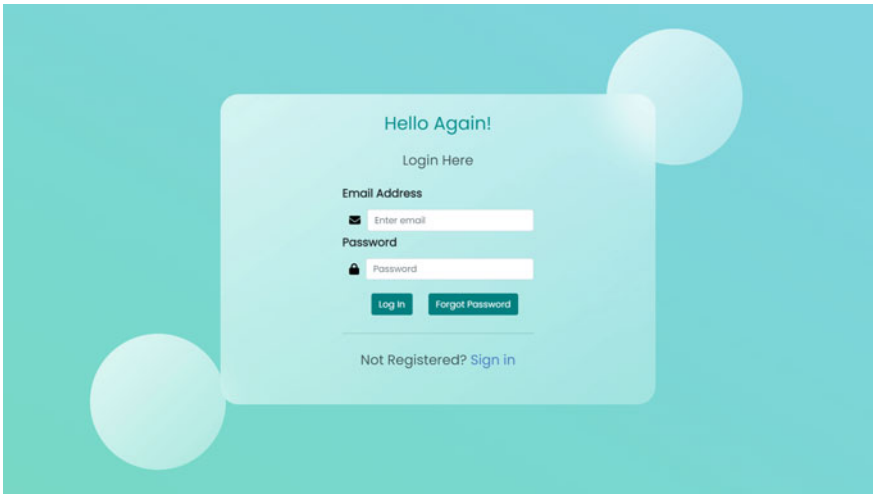

Fig. 4 Login page [1]

(G) Patients can get to a rundown of specialists who have practical experience in their field with assistance of Azure [6] cognitive service based intelligence Chatbot, simulated intelligence Chatbot will assist patients to get specialist data with geographic area (Fig. 8).
(H) User can contact us 24×7 for any kind of query (Fig. 9).

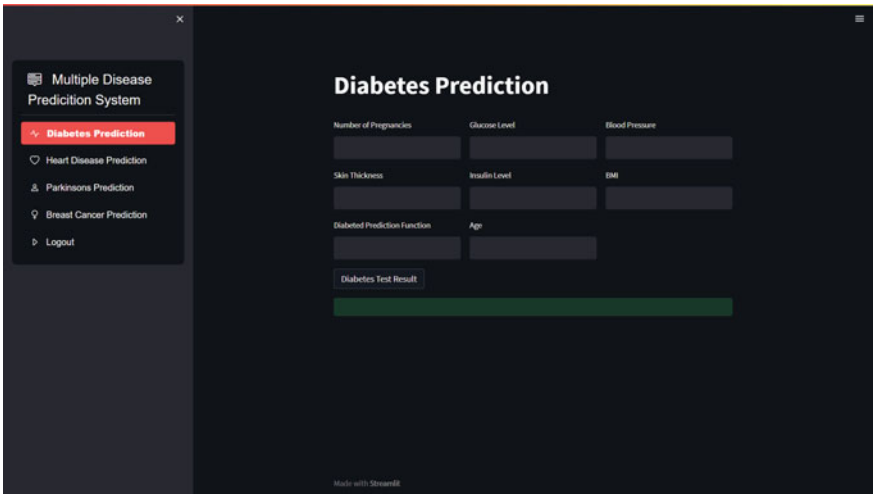

Fig. 5 Sidebar option [1]

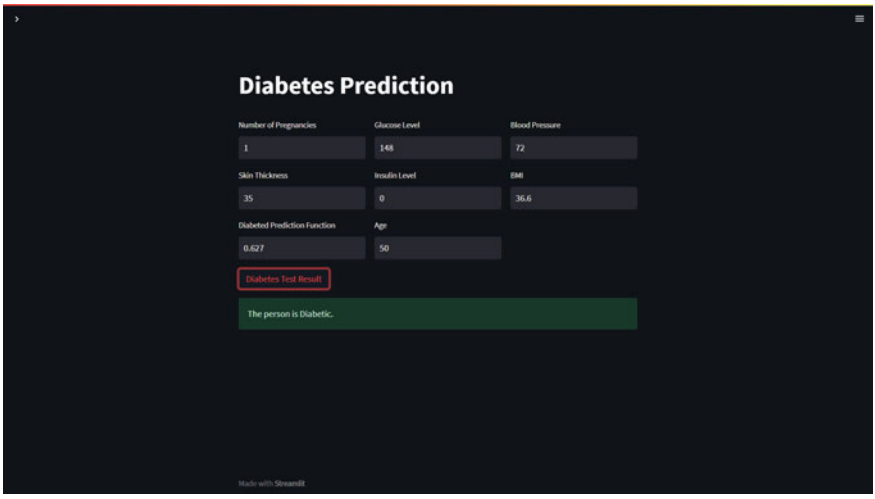

Fig. 6 Disease test result [1]

Data Preparation: The dataset is available on the Kaggle [5] website. The classification goal is to predict whether the patient has 10-years risk of multiple diseases. Dataset provides the information of the patient (Fig. 10).

Cleaning the Data: This is the most important stage in machine learning. Model quality of the model depends on the quality of the data. Data is cleaned before using it for the training of models. The sections in the dataset are all mathematical, with

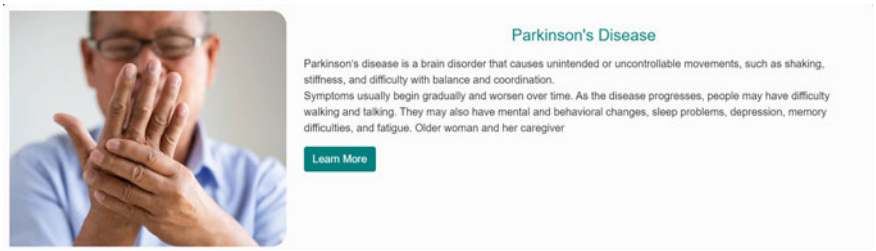

Fig. 7 Information about disease [2]

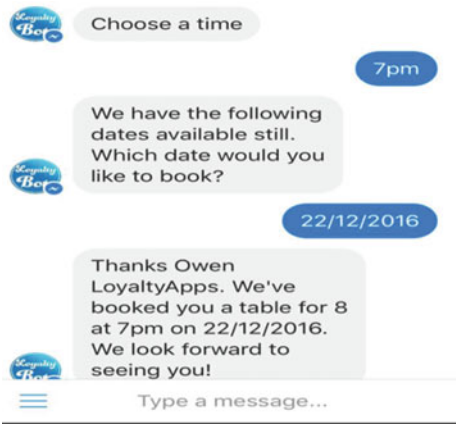

Fig. 8 AI Chatbot

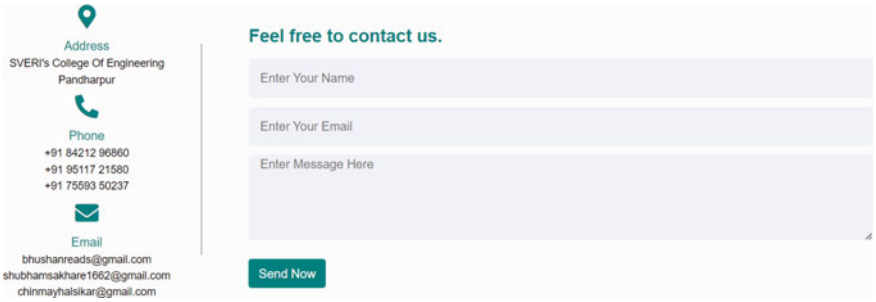

Fig. 9 Contact form

the exception of the objective segment, visualization, which is a literary sort that is encoded to mathematical structure utilizing a name encoder.

Dataset Splitting: Dataset is separated into two: Training dataset and Testing dataset.

Out[ ]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0	33.6	0.627	50	1
1	1	85	66	29	0	26.6	0.351	31	0
2	8	183	64	0	0	23.3	0.672	32	1
3	1	89	66	23	94	28.1	0.167	21	0
4	0	137	40	35	168	43.1	2.288	33	1

Fig. 10 Dataset

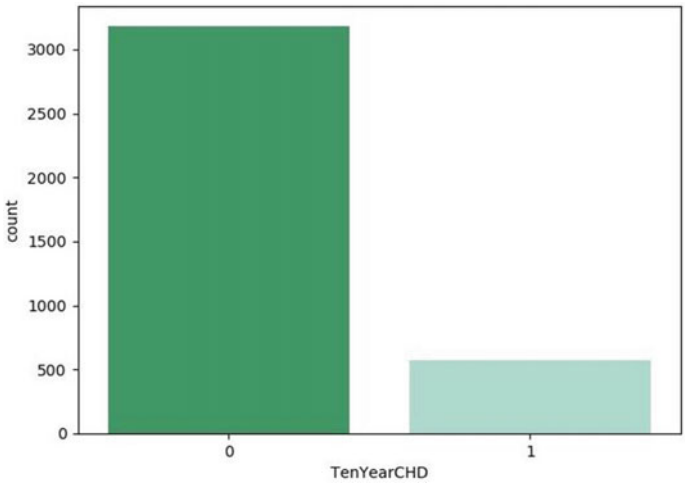

Fig. 11 Dataset splitting [2]

Data is divided into an 4:1 format, which means 80% of the information is utilized for training the model and remaining 20% is used to calculate the model's performance (Fig. 11).

Random Forest Classifier: Random forest contains a large number of single decision trees which operate as an ensemble. Every tree in the random forest produces a hypothesis, to fabricate a far reaching model two different factors are combined.

4 Result

When the patient is signed in, they will be able to do prediction of disease. This guarantees consistent a single tick answer for get a correct prediction (Fig. 12).

The high precision results as well as this ensures that not one clinical data element is subsidiary to disease prediction and the result is not biased.

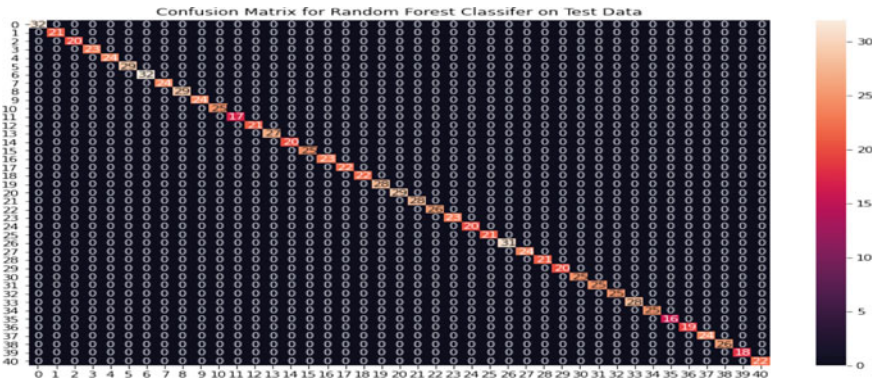

Fig. 12 Accuracy on the train data by random forest classifier

5 Future Scope

- Prime account option is available. We can add Video calling feature.
- The site's record connecting highlight permits clients to connect their record with other internet based administrations like Gmail and web-based entertainment.
- Map element to the site, such as adding a Programming interface for it. E. Cooperate with a drug store and furthermore give limits on the medication.

6 Conclusion

The machine learning model we have assembled is around 90–97% exact. The diseases for which there are no diagnostics strategies. Machine learning models can anticipate regardless of whether the individual has illness. This is the power of machine learning technology by utilizing which a large number of present reality issues can be solved.

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Cloud Based Intelligent Recommendation System for Company, Product and Service Selection

Amol C. Adamuthe, Amarjeet Kambale, and Vrushabh Kupwade

Abstract Identifying the right buyer and seller is a challenging problem for enterprises. To increase business profitability and efficiency there is need of solution, which create strong network so that companies can help/support each other. We have surveyed 65 small and medium scale industries from 5 MIDC/industrial estates in Maharashtra (India). Results shows that there is lack of connection between local industries in Maharashtra and outside Maharashtra. The main objective is to connect the industry on geological location for mutual benefit. It focuses on organizing the business information and leveraging technology to eliminate barriers between companies (provider/consumer). This paper presents a technological solution to the problem. Intelligent cloud computing-based solution is designed that recommends the suitable company, product and services. The system architecture, functional specifications, database design and working of recommendation engine is presented. The proposed keyword based recommendation system provides personalized service recommendation list and suggests the most appropriate services.

Keywords Business automation · Digital ecosystem · Recommendation system

1 Introduction and Related Work

In the current era, the number of products and information are increasing very rapidly. There is diversity in product and services available. It becomes challenging to provide right services/products to consumers. Many companies are spending their valuable time for finding better solutions for their requirements such as identifying expectations of buyers, buyer for their products, better vendor with good quality raw material, skilled labours, transportation facilities etc. In July 2015, the "Digital India

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P. M. Pawar et al. (eds.), *Techno-societal 2022*,
https://doi.org/10.1007/978-3-031-34644-6_2

Campaign" launched by the Government of India has provided the much-needed push towards a digital ecosystem (https://www.digitalindia.gov.in/). According to Maharashtra State e-Governance Policy 2011, government is planning integrated environment for delivering seamless services which are Government to Business (G2B), Government to Citizen (G2C), Government to Employees (G2E) and Government to Government (G2G) services in a cost-effective manner. The state is looking into the possibility of using cloud computing as its preferred method for carrying out all of its governance tasks. To help the state's decision support system, the state will put a priority on data warehousing and data mining (https://www.maharashtra.gov.in). There is need for such B2B solutions for enterprises also.

Recommendation system is necessary in today's era due to large number of options are available for any selection such as movie, product. The major hurdle for end user is to identify the best suitable option from available large pool [1–3]. These systems are used in different domains ranging from video services, product selections, content recommendations on social media, digital libraries, financial services [4–6]. Paper reported that recommendation systems research is popular and increasing from 1990 [7]. It is investigated in wide range of area. It is still evolving and developing. Different technology solutions are in development states. Current research is focusing of increasing the effectiveness of system with addressing wide range of challenges. Paper presented content-based product recommender systems. By comparing product descriptions from a catalogue with descriptions of client preferences and requirements, the system chooses products [8]. Paper presented review of different methods for fashion product recommendation [9]. Image based recommendation systems are investigated using different authors. The use of machine learning algorithms for classification, segmentation and parsing are increasing.

In present scenarios, small and medium scale companies are doing business in traditional way for getting raw material and selling product. They rely on fixed few companies for doing business from many years. Many times, they are unaware about better vendor and buyer.

Few reasons behind this problem are listed below:

- Non-existence of real-time geological data through which they can have details of those industries.
- Non-existence of global or generic communication, purchase and selling model through which they can do business (sending and receiving quotations and other product related information exchange between industries).

This paper provides digital ecosystem in the form of recommendation system. It is useful to providers and users of products/services in order to generate meaningful recommendations according to their requirements. Our proposed system provides strong network which helps industry for product/service-based marketing in cost effective way. It will help company to identify and focus on target audience. It helps industry to reach to clients in maximum possible way in minimum cost which increases its profit margin.

Main contributions of the paper are as follows.

1. Identified the real-world problem by surveying 65 small and medium scale industries in Maharashtra state India.
2. Front and backend design with recent technology stack.
3. Use and integration of cloud computing services in the proposed solution.
4. Novel recommendation system for company, product and service selection.

The rest of this paper is structured as follows. Section 2 is problem formulation. It presents the industry survey done in Maharashtra and features identification. Section 3 presents the design, implementation and working of proposed system. Section 4 presents conclusion.

2 Problem Formulation

2.1 Industry Survey in Maharashtra

The main purpose of preliminary survey is to identify the needs and problems of local industries for leveraging the profit. We have surveyed 65 small and medium scale industries from 5 MIDC/industrial estates in Maharashtra namely Kupwad MIDC, Miraj MIDC, Islampur industrial estate, Palus industrial estate and Ratnagiri MIDC. Types of industries visited are, agricultural equipment, food processing units, engineering job works and Fabricators, aluminium alloy manufacturers, foundry and dealers (submersible pump, solar panel, sewing machine, stone crusher, electrical goods, petrochemical, vehicle parts dealers, plywood dealers). Figures 1 and 2 shows statistical analysis of raw material purchase distribution chart and sell distribution chart of small scale packaging industry in Lote MIDC Dist. Ratnagiri, Maharashtra, India for year 2016–17 respectively. Purchase of raw material from out of Maharashtra is more due to lack of connectivity in local industries in state. Sell out of Maharashtra is less due to less connectivity outside Maharashtra.

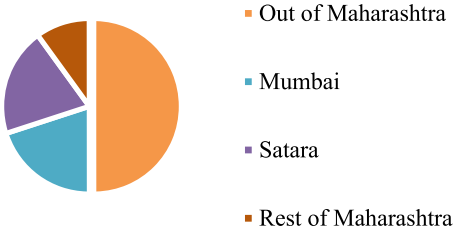

Fig. 1 Raw material purchase distribution chart

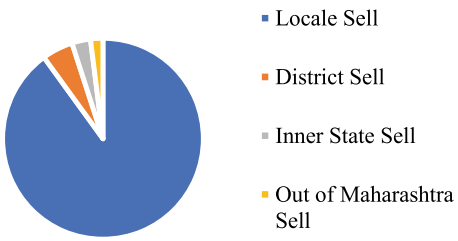

Fig. 2 Sell distribution chart

2.2 Feature Identification

Figures 3 and 4 shows the relationship between product-product and product-company respectively.

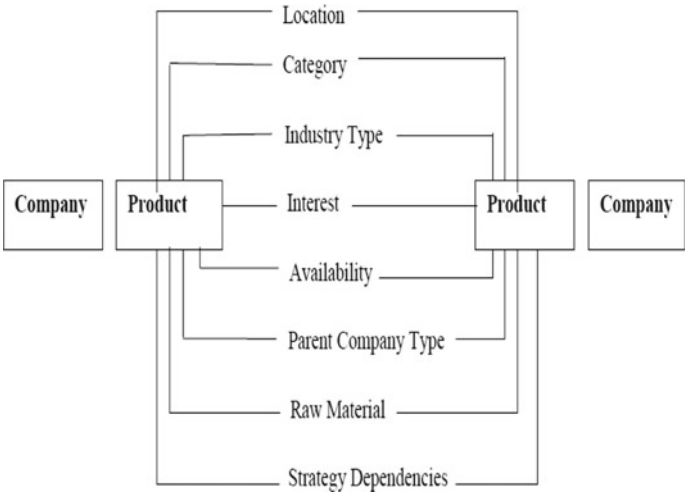

Fig. 3 Relationship between products