ARTIFICIAL INTELLIGENCE BASED GARBAGE MONITORING SYSTEM FOR WASTE MANAGEMENT USING SENSORS

A PROJECT REPORT

Submitted by

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BONAFIDE CERTIFICATE

Certificate that this project report **"ARTIFICIAL INTELLIGENCE BASED GARBAGE MONITORING SYSTEM FOR WASTE MANAGEMENT USING SENSORS"** is the benefited work of **R. RAGINI (810015205061) , M.SUBASRI (810015205084)** who carried out the project under my supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

ii

DECLARATION

I hereby that the work entitled" **ARTIFICIAL INTELLIGENCE BASED GARBAGE MONITORING SYSTEM FOR WASTE MANAGEMENT USING SENSORS"** is submitted in partial fulfilment of the requirements for the award of the degree in B. Tech..Information Technology in University College of Engineering, Bharathidasan Institute of Technology (BIT), Tiruchirappalli, is a record of my own work carried out by me during the academic year 2018-2019 under the supervision and guidance of **Mrs.C.Gomathi**, Assistant Professor, Department of Information Technology, University College of Engineering, Bharathidasan Institute of Technology (BIT) Campus, Anna University, and Tiruchirappalli. The extend and sources of information are derived from the existing literature and have been indicated through the dissertation at the appropriate places.

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ABSTRACT

Waste management is one of the primary problem in real world .The main issues of waste management is that garbage bin at public place gets overflowed well in advanced. Thus overflow of garbage can affect harmful disease such as dengue, fever, pneumonia, etc. So they avoid all such harmful risk scenarios and mounted on garbage system. .This main theme of work is to develop a smart garbage alert system for proper garbage management. In the proposed system, the level of the garbage is filled in dust bin to detect with the help of ultra-sonic sensor and send the alert message to the municipal web service. Waste collective garbage is detected with the help of IR sensor and also hazardous gas is detected with help of Bio sensor. Before they collect the garbage how harmful disease can spread to the environment to display the LED monitor. After getting the notification of the municipal office through the web application and then they will avoid the overflowing of the garbage bins.

   This project is used to avoid harmful effects and clean city to develop a clean environment. By using this Artificial intelligence based garbage monitoring system people do not have to check all the systems manually but they will get a notification when the bin will get filled.

    To achieve or detect the harmful disease in wet garbage or dry garbage using fuzzy inference system based on the fuzzy rules. They are to find how harmful disease can affect the human being using the garbage monitoring system. We can check out the both Phpmyadmin and fuzzy system can be calculated for predict correct output.

TABLE OF CONTENT

LIST OF ABBREVIATION

ABBREVIATION		EXPANSION
DB	-	Data Base
ECOLI	-	Escherichia COLI
FIE	-	Fuzzy Inference Engine
FL	-	Fuzzy Logic
GPRS	-	Global Packet Radio Service
GSM	-	Global System for Mobile Communication
HTML	-	Hypertext Markup Language
IR	-	Infra-Red
IoT	-	Internet of Things
KB	-	Knowledge Base
LCD	-	Liquid Crystal Display
LED	-	Light Emitting Diode
MATLAB	-	Matrix Laboratory
MYSQL	-	My Structured Query Language
PDA	-	Personal Digital Assistant
PHP	-	Hypertext Preprocessor / Personal Home Page

PHPMA	-	PhpMyAdmin (Software)
SIM	-	Subscriber Identity Module
SMS	-	Short Message Service
PHPMA	-	Pool Heat Pump Manufacturers Association
SQL	-	Structured Query Language
XAMPP	-	Cross-Platform(**X**),Apache(**A**), Mysql (**M**), Php (**P**), Perl (**P**)
XML	-	Xtensible Markup Language
US	-	Ultrasonic Sensor
UML	-	Unified Modeling Language
Wi-Fi	-	Wireless Fidelity
WLAN	-	Wireless Local Area Network

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION OF GARBAGE MONITORING SYSTEM

Artificial intelligence of Internet of Things (IoT) is the latest trending technology in many fields especially in industries like manufacturing, Automation, Healthcare, Energy, Transport etc. In Artificial intelligence has to developed many project based on their garbage monitoring system like Internet of Things (IoT) Based Smart Garbage Monitoring System Using ESP8266 with GPS link, Smart Garbage Monitoring System for Waste Management, IoT (Internet of Things) based garbage monitoring system , Survey on Smart Garbage Monitoring System Using Internet of Things (IOT),etc.…

In recent years, waste has been a problem to many environments whereas the use of different strategies has been put in place to solve problem. The impacts of these wastes on the economy cannot be ignored and managing them has become a major problem. Waste management is the collection, transport or disposal, managing and monitoring of waste materials.

Garbage consists of unwanted materials left over the city, public places, school etc. Due to these waste can spread various disease such as dengue, pneumonia, etc. So to avoid all these disease and to maintain public cleanliness and health this work is mounted on smart garbage system. The theme of work is to develop an artificial intelligence based garbage monitoring system using sensors for proper garbage management. In this system, the level of garbage is filled in dustbin to detect with the help of ultrasonic sensors and send the alert message to the municipal web server and another is by using proximity sensors which detects the dry waste and moisture sensors to detect the wet waste.

Day by day increasing the garbage and then overflowed we can affect the human beings so this project to predict how harmful disease to spread the human beings. They will keep our environment green.

The environment has a limited capacity for waste assimilation therefore this assimilative capacity of the environment may be exceeded or put under too much stress to handle the large quantity of waste and this may result in pollution and resource degradation in the result of managing the waste we will decrease their effects on over health our surroundings and the environment.

1.2   FUZZY LOGIC

The word fuzzy refers to things which are not clear. Any event, process, or, function that is changing continuously cannot always be defined as either true or false, which means that we need to define such activities in a fuzzy manner. Fuzzy Logic (FL) is a method of reasoning that resembles human reasoning. The approach of imitates the way of decision making in human that involves all intermediate possibilities between digital values YES and NO. (Certainly yes, possibly yes, cannot say, possibly no, certainly no).

1.2.1 Fuzzy Logic System Components

Fuzzification Module: This is the first module in fuzzy system. It converts crisp values into fuzzy values. This involves a domain transformation where crisp inputs are transformation where crisp inputs are transformed into fuzzy input using membership function.

Defuzzification module: It is the process of converting a fuzzy output of interference engine into crisp output by using membership function.

(Ex) crisp value	fuzzy value
Excellent	0.75-1.0
Moderate	0.4-0.74
Weak	0.0.-0.39

Knowledge Base: It is the database used to store predefines IF-THEN rules.

Inference Engine: It simulates the reasoning process by making fuzzy inference on the inputs and IF-THEN rules.

1.2.2 Types of Fuzzy Inference Systems

You can implement two types of fuzzy inference systems in the toolbox:

- Mamdani
- Sugeno

Mamdani's fuzzy inference method is the most commonly seen fuzzy methodology. Mamdani's method was among the first control systems built using fuzzy set theory. It was proposed in 1975 by Ebrahim Mamdani as an attempt to control a steam engine and boiler combination by synthesizing a set of linguistic control rules obtained from experienced human operators. Mamdani's effort was based on Lotfi Zadeh's 1973 paper on fuzzy algorithms for complex systems and decision processes. Although the inference process described in the next few sections differs somewhat from the methods described in the original paper, the basic idea is much the same.

Mamdani-type inference, as defined for the toolbox, expects the output membership functions to be fuzzy sets. After the aggregation process, there is a fuzzy set for each output variable that needs Defuzzification.

It is possible, and in many cases much more efficient, to use a single spike as the output membership function rather than a distributed fuzzy set. This type of output is sometimes known as a *singleton* output membership function, and it can be thought of as a pre-defuzzified fuzzy set. It enhances the efficiency of the Defuzzification process because it greatly simplifies the computation required by the more general Mamdani method, which finds the centroid of a two-dimensional function. Rather than integrating across the two-dimensional function to find the centroid, you use the weighted average of a few data points. Sugeno-type systems support this type of model. In general, Sugeno-type systems can be used to model any inference system in which the output membership functions are either linear or constant.

Descriptions of fuzzy inference systems

Fuzzy inference systems have been successfully applied in fields such as automatic control, data classification, decision analysis, expert systems, and computer vision. Because of its multidisciplinary nature, fuzzy inference systems are associated with a number of names, such as fuzzy-rule-based systems, fuzzy expert systems, fuzzy modeling, fuzzy associative memory, fuzzy logic controllers, and simply (and ambiguously) fuzzy systems.

CHAPTER 2
LITERATURE SURVEY

The garbage monitoring in urban communities must be viably and effectively executed. The different proposition were advanced and some of them officially actualized. It can't be considered as a successful one. So a study was done among various review paper incorporates study among various waste administration in urban areas utilizing Internet of Things (IoT).

Alice Mary et.al [1] this project of this system is powered by solar cell and battery and also they have used organic light emitting diode screen to display the status of the level of garbage collected in the bin. Detect the garbage level continuously and accordingly the system provides the information send to the municipality office through web page and mobile application. After the garbage bin cleaning process and garbage bin level send to notification.

Anjali et.al[2] The ultrasonic sensors which is used to detect the level of the waste in the garbage bin ,detect the garbage level continuously and accordingly the system provides the information send to the municipality office through web page and mobile application. This will garbage bins to avoid the overflowing. Ultimately it will help us to keep our environment clean and also reduces the health issues. Key GPS (Global Positioning service) link will help to find the shortest path of that garbage bin. Thus futures work is we can use GPS through to visit all these street clean garbage and also only one time to visit.

In [3],this authors they achieve to reduce the unhealthy environment using the ESP8266 version of firmware. They can to find out the level of garbage bin through the ESP8266 firmware. The system provides the information send to the municipality office through web page and mobile application.

After garbage is filled and notification is send to particular control room The future work of system ultrasonic sensor is used but in future various other types of sensor can be used with ultrasonic to get more prices output.

Fetulhak Abdurahman et.al [4] this project has to identify what object is presence towards the system is consisted by the ultrasonic sensor to measure the waste level bin while garbage is full. After garbage is filled and notification is send to particular control room. The GSM module to send the SMS (Smart Message Service), and an Arduino Uno which controls the system operation. It supposes to generate and send the warning messages to the municipality via SMS when the waste bin is full or almost full, so the garbage can be collected immediately. Furthermore, it is expected to contribute to improving the efficiency of the solid waste disposal management. Thus the future work is they recommended to add camera to the system to capture the image of surrounding while people try to drop the garbage outside the bin.

In [5], they authors said to improve the garbage monitoring system using wireless sensors. This survey paper is related to the "Smart garbage monitoring system using Internet of Things (IoT)". So smart lifestyle and cleanliness is required. Then using Internet of Things (IoT) to helps us eradicate the garbage disposal problem, in which this is done using microcontrollers, transceivers for digital communication that will be able to communicate with one another [1].One of the approach is by using ultrasonic sensors which is used to detect the level of the waste in the bin and another is by using biosensors which detects the hazardous gases. The cities will become more cleaner and the smells of the garbage will be much less and will keep our environment green and can support swachh bharat .Thus future work is an android application is developed through which the user can find a bin near him to throw the trash.

In [6] the authors said, they used ardiuno base system having ultrasonic sensor along with central system showing the current status of garbage on display and web browser HTML page with WI-FI module.

Ms.Pranjali et.al [7] in the existing system has efficient method can support to sort the dry and wet garbage using moisturized sensor and ultrasonic sensors to detect the garbage bin level. We can also to get a notification through the mobile application. To send a control room. Thus future works is all surrounding area cleaning using various sensors.

S.Ravichandran [8] the present invention provides a smart garbage monitoring system that enables a cleaner, healthier safer and diseases free environment. They future works is how to spread diseases to find the using genetic algorithm.

Sapna Suryawanshi et.al [9] Cities develop rough algorithms for minimizing cost of various municipal services such as collecting trash. Rough algorithms are easy to find the minimum cost.

Prof.Dr.Sandeep et.al [10] Piston, switch, microcontroller. These all elements are used to create a smart garbage using Internet of Things (IoT). They can prevent accumulation of garbage along the road side to widespread of many diseases. It can prevent consumption of spread out garbage by street animals. Weight sensor can be used in project but they don't provide any information about the level of garbage bin.

CHAPTER 3

PROPOSED WORK: AIBGM SYSTEM DESCRIPTION

3.1 EXISTING SYSTEMS FOR WASTE MANAGEMENT

The European Commission research study13 and the report14 both advocate the importance of language to exporting successfully. They highlight the need for companies to develop language management measures in line with their exporting plans. Example of language management measures used by successful export companies include:

□ Use of local agents to solve language problems;

□ Creation of websites with special cultural and/or linguistic adaptations;

□ Use of linguistic audits;

□ Use of professional translators/interpreters;

□ Translation of promotional, sales and/or technical materials;

□ Language training and cultural briefing schemes;

□ Online language learning; employee selection and recruitment policy;

□ Encouraging cross-border staff mobility;

□ 'Buddying' with foreign colleagues and cross-border secondment schemes;

□ Forging links with local universities;

□ Taking on foreign students on placement;

□ Native-speaker recruitment;

□ E-commerce involving multilingual operations; and;

□ Product or packaging adaptation in line with local tastes and customs.

The RSM McClure Watters exporting surveys found that companies in Northern Ireland experienced the following barriers when either trying to export for the first time or expanding their exporting activities into new markets.

Non-exporting firms15:

- The cost of up-skilling their workforce (45.8%);

- The cost of recruiting staff with the relevant skills (44.4%); and

- Lack of supply of individuals with relevant skills (23.6%).

 Firms preparing to export16:

- Difficulty in establishing a dialogue with prospective customers/partners (50%);

- Obtaining information on an export market (46%);

- Staff not trained (32%);

- Language / cultural differences (29%); and

- Resource / staff constraints (29%).

Respondents highlighted significant gaps with existing staff with regard to marketing (strategic planning, tactical planning, PR, digital marketing) and to a lesser extent with sales (planning and identifying sales prospects). Qualitative evidence from the surveys also showed that non exporting firms were unclear on their exact difficulties and respondents spoke about needing access to experienced exporters to help guide them through the process.The feedback also demonstrated a low level of awareness by non-exporters of the programmes available to help them export. Less than 15% of companies were aware of available supports including Going Dutch, First Stop Shop and Trade Accelerator Vouchers.

Existing exporters highlighted the need for a programme that would facilitate the completion of cost effective research on market opportunities in export markets. Respondents spoke often about the explorers programme as an example of the type of support that would be most beneficial.
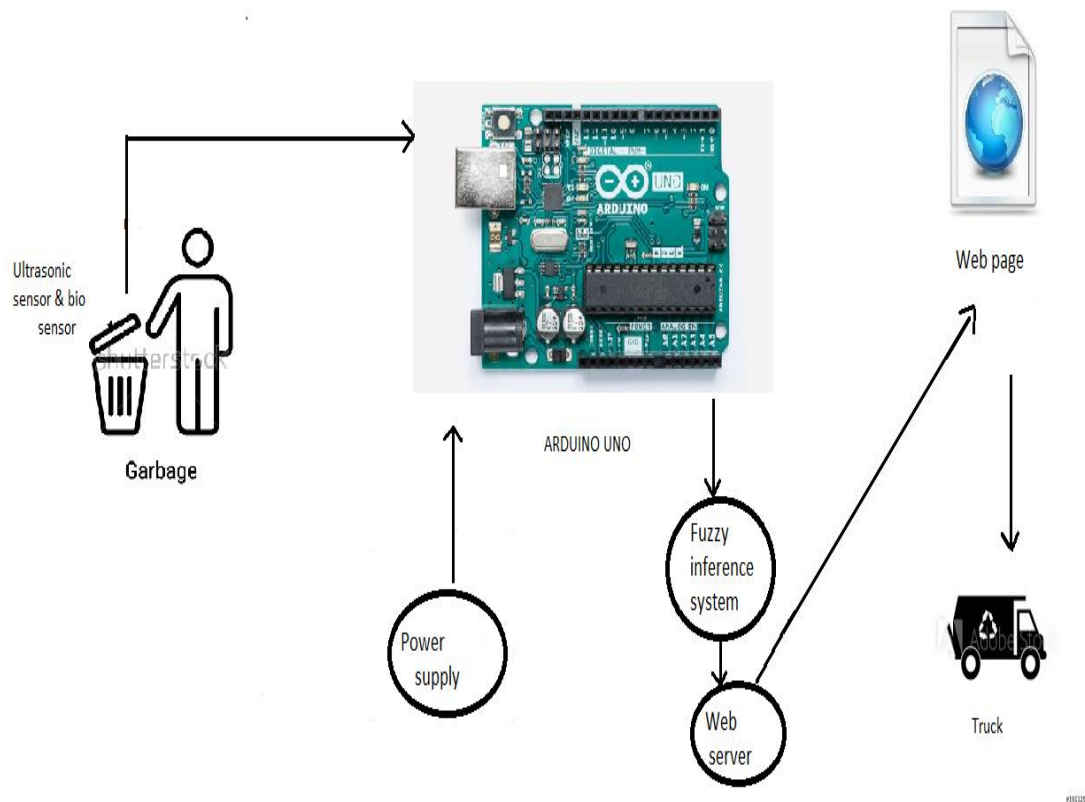
3.2.1 AIBGM System Architecture

Fig: 3.2.1 AIBGM System Architecture

Fig 3.2.1 shows the architecture of the garbage monitoring system. First of all, user throws the waste in the garbage bin and the garbage bin consists of ultrasonic sensor, proximity sensor and moisture sensor, arduino Uno, truck, web server. Ultrasonic sensor to detect the garbage level whether the garbage is filled or empty.

Humidity sensor is used to detect whether dry waste or wet waste. To detect how harmful disease to affect the human beings through the E.COLI dataset. These all information are send notification to the municipal web server through the web page. An SD card inserted into the slot on the board acts as the hard drive for the Arduino Nano. It is powered by USB and the video output can be hooked up to a traditional RCA TV set, a more modern monitor, or even a TV using the HDMI port. It is minimal effort gadget and open by all due to 'plug and play'

nature of the board. Gathering an arrangement of Arduino Nano to fill in as a server is more financially savvy than an ordinary server. A web service is any piece of software that makes itself available over the internet and uses a standardized XML messaging system. XML is used to encode all communications to a web service. Fuzzy inference is the process of formulating the mapping from a given input to an output using fuzzy logic. The mapping then provides a basis from which decisions can be made, or patterns discerned.

3.2.2 E.COLI Dataset Attribute Information

1. **SEQUENCE NAME**: Accession number for the SWISS-PROT database

2. **MCG**   : McGeoch's method for signal sequence recognition.

3. **GVH**   : Von Heijne's method for signal sequence

                              recognition.

4. **LIP**   : Von Heijne's Signal Peptidase II consensus score

                              sequence.

5. **CHG**   : Presence of charge on N-terminus of

                              predicted lipoproteins.

6. **AAC**   : Score of discriminant analysis of the amino acid

                              content of outer membrane and periplasmic proteins.

7. **ALM1**   : Score of the ALOM membrane spanning

                              region prediction program.

8. **ALM2**   : Score of ALOM program after excluding putative

                              cleavable Signal regions from the sequence.

3.2.3 Class Distribution of E.COLI Dataset

1. **Cp** (cytoplasm)

2. **Im** (inner membrane without signal sequence)

3. **Pp** (perisplasm)

4. **ImU** (inner membrane, uncleavable signal sequence)

5. **Om** (outer membrane)

6. **OmL** (outer membrane lipoprotein)

7. **ImL** (inner membrane lipoprotein)

8. **ImS** (inner membrane, cleavable signal sequence)

3.2.5 E.COLI symptoms: intestinal infection

1. Abdominal cramping.
2. Sudden, server watery diarrhea that may change to bloody stools.
3. Gas.
4. Loss of appetite or nausea.
5. Vomiting (uncommon)
6. Fatigue, Fever.
7. Symptoms can last anywhere from a few days to more than a week.
8. Symptoms of a severe E. coli infection may include:
9. Bloody urine
10. Decreased urine output
11. Pale skin & Bruising & Dehydration

3.2.6 Risk Factors of E.COLI:

1. While anyone can experience an E. COLI infection, some people are more at risk than others. Some risk factors include:

2. **Age**: Older adults and young children are more likely to experience serious complications from E. COLI.

3. **A weakened immune system**: People with weakened immune systems are more susceptible to E. COLI infections.

4. **Season**: E. COLI infections are more likely to occur during the summer months, June to September, for unknown reasons.

5. **Low stomach acid levels**: Medications used to decrease stomach acid levels can increase your risk of E. COLI infection.

6. **Certain foods**: Drinking unpasteurized milk or juices and eating undercooked meat can increase your risk of E. COLI.

CHAPTER 4
SYSTEM DESCRIPTION

Focus groups with students18 demonstrated that they were unaware of career opportunities and potential career paths within sales and marketing. They and their parents had negative perceptions of careers in sales and marketing. Their perceptions were based on the roles being focused on cold calling and on salaries being commission based and below norm levels for professional jobs. A review of salaries advertised by recruitment consultants for 130 sales and marketing positions in 2012, shows that starting and senior salaries where above the average for NI professional occupations.Our research found that there are qualification pathways for those following a career in marketing, but that none exist for those involved in sales. The need for sales qualifications was iterated by several stakeholders, including training organisations and professional bodies such as the Chartered Institute of Marketing and the Sales Institute of Ireland.

1.4.1 Education Provision

Language development at secondary level and FE level has decreased over the past three years, whereas those undertaking languages at HE level has increased. The FE sector provides language training at Belfast Metropolitan College in Polish, Russian, Mandarin, Japanese, Portuguese, Spanish, French and German. The HE sector provides language training in Spanish, French German and Portuguese. The analysis of FE and HE sales and marketing education provision has shown that there are 10 marketing courses ranging from QCF19 level 4 to post-graduate level (QCF levels 7 and 8). There are however fewer accredited sales courses leading to qualifications, with 4 sales courses available from the Chartered Institute of Marketing delivered through Belfast Metropolitan College leading to up to QCF level 7 qualifications20.

1.4.2 Supply of Workforce Development Programmes

There are a range of workforce development programmes, involving one to day courses, mentoring, seminars and workshops in sales, business development, marketing, and export skills. Funding is available from DEL and Invest NI to support the some of the costs involved with these programmes. Invest NI also offers to offset part of the costs of employing an export manager through the Key Worker Grant .
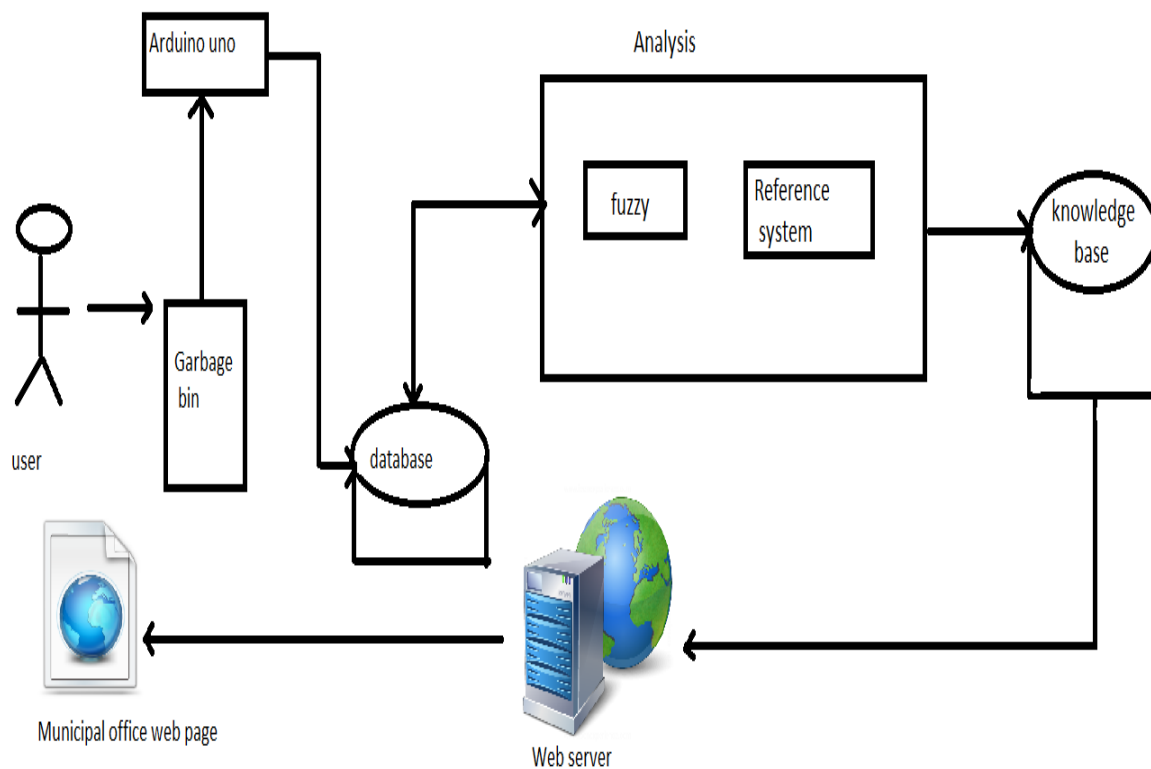
4.2 Block Diagram of AIBGM:

Fig: 4.2 Block diagram of AIBGM

Fig: 4.2 can be explained as the block diagram of AIBGM. This process is user can be used the garbage, the garbage bin has attached to arduino Uno, Thus

arduino Uno information is stored in database .Database information is to send all information to fuzzy of analysis process and send the knowledge base. This knowledge base information is stored in webserver to connect municipal office web page.

There are specific programmes geared to helping businesses focus on exporting to specific markets such as Going Dutch, Going South Africa and GoCanada, however no programmes specifically tailored for BRIC and Middle-East markets are currently available.Companies can also avail of workshops, mentoring and consultancy services through council funded programmes geared at supporting local SMEs prepare to export or increase exports to specific markets. The analysis of existing sales/marketing support programmes available from bodies including local government, Invest NI and DEL21 demonstrates that companies are not availing of all the training and development support available. Supply-side information22 demonstrated that there was a lack of uptake in programmes aimed at upskilling existing sales and marketing professionals.

Companies reported that their awareness of many of the existing supports aimed at helping companies to export or up-skill was particularly low,23 particularly with specific supports such as Going Dutch24. The availability of support for trade missions and trade exhibitions was more widely known, but in both cases almost half of the companies which responded were unaware that this support was available. The awareness of programmes aimed at supporting skills development in sales and marketing was also particularly low.25 Analysis of the support provided through BITP26 shows that companies are not using this assistance to develop in house staff in sales, marketing, language or cultural awareness.

There are a number of programmes available to provide graduates with language and cultural skills and experience, however only a small number of graduates use these programmes. They also are not focused on helping companies

export. For pre-employment development programmes, the number of graduates being developed annually as a % of the NI annual graduate population is small. If the number of students and graduates completing the programmes is combined,The above citated diagram is to explain the data flow of AIBGM. They can describe step-by-step process in our project. This process is garbage can monitoring through the ultrasonic sensor, they can detect the level .check whether the garbage bin is full or empty. Thus the garbage bin is full they can send notification to the municipal web server. After getting notification the cleaning process is started. Update the status of dustbin. Display the LCD monitor. Either the garbage bin is empty they can go again sensor level. Thus process is continued…

An analysis of current trends in exporting28, along with the responses to the surveys29 shows that the most important languages (excluding English) needed by companies exporting or expecting to export are: Arabic, Spanish, Russian, Hindi, Malay, Mandarin, Cantonese, Korean, Kurdish and Portuguese. The supply of language skills in Arabic, Hindi, Malay, Korean and Kurdish and associated cultural awareness skills is lacking in Northern Ireland, at second level education and FE30 through to HE31 level32.

Analysis of the data within the Working Futures model33 demonstrates that under a medium demand scenario34 without additional intervention there would be a likely demand for up to 270 graduates to fill entry-level export sales and marketing positions.

CHAPTER 5

SYSTEM REQUIREMENTS

Creating strategic sales and marketing plans;

☐ Preparing operational plans with regard to:

☐ *Market Entry and Market Growth;*

☐ *Channel Development and Sales Strategy;*

☐ *Promotion, digital/on line actions for each export market;*

☐ *Digital Marketing;*

☐ Delivering on operational plans;

☐ Creating strategic sales plans;

☐ Sales and pipeline forecasting;

☐ Customer Relationship Management;

☐ Closing sales skills.

Language and cultural awareness training should be provided as relevant to the export markets. Government funding should be used to subvent the cost of the programme (training and graduate salary) to the companies involved. The focus should be on the priority sectors by the NI Executive to ensure that the maximum benefit/ impact can be derived from the support.

Recommendation 1: Building the Sales and Marketing Function in companies operating in priority sectors.

1a: Build awareness at Owner Manager/ Board level of how to assess Sales/ Marketing competence

We recommend that Invest NI build awareness at Board/ Owner Manager level in client companies of the skills/ competencies required regarding professional sales and marketing.

2b: Develop existing Sales and Marketing Managers

We recommend that Invest NI encourage existing clients to assess the need to develop their sales and marketing staff and to provide accredited sales/ marketing programmes in order to build the competence of existing employees in these areas.

3c: Internationalisation of Existing Managers in Priority Sectors

We recommend that an Internationalisation Programme is devised for sales/ marketing managers already employed and who are working in export markets or who plan to work in export markets (particularly BRIC and Middle East). This programme should be for at least 50- 10042 managers per annum.

An Internationalisation Programme should be devised to equip managers with the skills and expertise needed to devise and implement both strategic and tactical sales and marketing plans in export markets whilst developing their knowledge and experience of the language/culture. The programme should be a mix of:

☐ Workshops to work through individual company export projects;

☐ Training in language and culture;

☐ Mentoring by an experienced exporter in the market place to support the development of networks/ identification of business partner; and

☐ Time spent in the market to identify and meet local partners/ potential customers.

Recommendation 2: Match 'Associates43' from Non EU/ Non English Export Markets with NI Export Companies

We recommend that a pool of experienced sector specific exporters based in the export markets44 is identified to work as associates to NI companies45 (that are unable to release a manager to go on the internationalisation programme) seeking to enter or expand in the non EU/ non English speaking export markets. This service should only be available to companies intending to export to BRIC, Asia or the Middle East for the first time. The resource is needed to help companies understand the culture and develop the relationships and networks they need to break into these markets. Invest NI should provide a matching service for NI companies and use existing Export Assistance to help with part payment of the costs.

Recommendation 3: Encourage and Support the Introduction of Language Management/Communication Strategies for Exporting Companies

We recommend that Invest NI encourage client companies to include Language Management/ Communication strategies in their company training plans, using the measures detailed in the PIMLICO study46.

The Invest NI Skills Accelerator Grant and Skills Growth Programmes provide the funding mechanism to support companies who wish to invest in language and cultural awareness development of their employees.

Recommendation 4: Increase the supply of students studying Foreign Language Skills

We recommend that schools implement the recommendations as set out in the DE strategy 'Languages for the Future' and increase the number of students leaving school able to speak 2 or more languages. The focus should be on the following languages: Arabic, Spanish, Russian, Hindi, Malay, Mandarin, Cantonese, Korean, Kurdish and Portuguese.

With the exception of Spanish, the supply of these language skills is lower that the projected demand47 for Northern Ireland. There is a need to build the pipeline of resource from second level education through to Higher Education level48.

Recommendation 5: Improve Awareness of Existing Support Mechanisms for Workforce Development

Invest NI, DEL and Councils should promote the range of programmes available to support the upskilling of employees in sales, marketing, language and culture. This should be actioned on a market basis, with case studies prepared setting out the process managers should undertake when planning to enter a new market and how part of that process involves assessing the training/ development needs of their staff and providing the support needed to ensure they are competent in the sales and marketing roles required.

This study was undertaken to evaluate the results of the PIMLICO69 survey which was commissioned by the European Commission Directorate-General for Education and Culture (DG EAC), as part of the European Commission's initiative to promote greater use of foreign languages by SME's. Forty SME's who were located across 27 EU member states and who had a language management strategy70 were interviewed over a six-month period during 2010. These were chosen from a sample of 160 companies,71 based on interviews and desk research conducted prior to the study.

Each had been qualitatively determined72 to be a model of good language management practice by the EU Commission DG EAC, and had achieved significant trade growth which they attributed to their LMS. They were questioned on how their LMS had contributed to increased trade in order to define a "best practice" approach.

CHAPTER 6

IMPLEMENTATION AND RESULTS

6.1 IMPLEMENTATION

```php
<?php

 void keyword(char str[10]) {

if(strcmp("for",str)==0||strcmp("while",str)==0||strcmp("do",str)==0||strcmp("int",str)==0||strcmp("float",str)==0||strcmp("char",str)==0||strcmp("double",str)==0||strcmp("static",str)==0||strcmp("switch",str )==0||strcmp("case",str)==0)

printf("\n%s is a keyword",str); else printf("\n%s is an identifier",str);

}

 main()

 {

FILE *f1,*f2,*f3;

char c,str[10],st1[10];

int num[100],lineno=0,tokenvalue=0,i=0,j=0,k=0;

printf("\nEnter the c program");/*gets(st1);

*/ f1=fopen("input","w");

while((c=getchar())!=EOF) putc(c,f1);

fclose(f1);
```

```
f1=fopen("input","r");

f2=fopen("identifier","w");

f3=fopen("specialchar","w");

while((c=getc(f1))!=EOF)

{

if(isdigit(c))

{

tokenvalue 2 c=getc(f1);

while(isdigit(c))

{

 tokenvalue*=10+c-'0';

c=getc(f1);

 }

num[i++]=tokenvalue;

 ungetc(c,f1);

}

 Else
```

```c
    if(isalpha(c))

    {

    putc(c,f2);

c=getc(f1);

    while(isdigit(c)||isalpha(c)||c=='_'||c=='$')

    {

putc(c,f2);

    c=getc(f1);

    }

    putc(' ',f2);

    ungetc(c,f1);

    }

    else if(c==' '||c=='\t') printf(" ");

else if(c=='\n') lineno++;

    else putc(c,f3);

    }

    fclose(f2);
```

```c
fclose(f3);

fclose(f1);

printf("\nThe no's in the program are");

for(j=0;j<3;j++)

{

char com[30];

int i=2,a=0;

clrscr();

printf("\n Enter comment:");

gets(com);

if(com[0]=='/') { if(com[1]=='/') printf("\n It is a comment");

else if(com[1]=='*')

{

for(i=2;i<=30;i++)

{

if(com[i]=='*'&&com[i+1]=='/')

{
```

```
  printf("\n It is a comment");

a=1; break;

  }

  else

continue;

  }

  if(a==0) printf("\n It is not a comment");

  }

  else printf("\n It is not a comment");

  }

  else printf("\n It is not a comment");

  getch();

}

}?>
```

6.1.1 SQL query

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 0 AND LIP=0 AND CHG=1 AND AAC=1 AND ALM1=1 AND ALM2=1Group By CLASS_DISTRIBUTION='IM'

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 4

AND GVH = 6 AND LIP=7 AND CHG=8 AND AAC=8 AND ALM1=7 AND ALM2=0 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 0 AND LIP=0 AND CHG=1 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=1 AND CHG=1 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 0 AND LIP=1 AND CHG=1 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 0 AND LIP=0 AND CHG=1 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=1 AND CHG=1 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=0 AND CHG=0 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=1 AND CHG=0 AND AAC=1 AND ALM1=0 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 0 AND LIP=0 AND CHG=0 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 0 AND LIP=0 AND CHG=1 AND AAC=1 AND ALM1=0 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 1 AND LIP=1 AND CHG=0 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME, (Count (SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=1 AND CHG=0 AND AAC=1 AND ALM1=1 AND ALM2=1 Group by CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=1 AND CHG=0 AND AAC=0 AND ALM1=1 AND ALM2=0 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 1 AND LIP=0 AND CHG=1 AND AAC=0 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 1 AND LIP=1 AND CHG=1 AND AAC=0 AND ALM1=0 AND ALM2=0 Group By CLASS_DISTRIBUTION

UNION

Select SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 1

AND GVH = 0 AND LIP=0 AND CHG=0 AND AAC=1 AND ALM1=1 AND ALM2=1 Group By CLASS_DISTRIBUTION

UNION

Select   SEQUENCE_NAME,(Count(SEQUENCE_NAME)* 100 / (Select Count(*) From ecolli)) as CLASS_DISTRIBUTION

From ecolli WHERE MCG = 0

AND GVH = 1 AND LIP=0 AND CHG=1 AND AAC=0 AND ALM1=0 AND ALM2=1 Group By CLASS_DISTRIBUTION

6.1.2 A Modified fuzzy rules for E.COLI datasets

1. If(GVH=low)AND(LIP=low)AND(CHG=low)AND(AAC=low)AND(ALM 1=low)AND(ALM2=low)THEN class distribution is CP.

2. If(GVH=medium)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=high)THEN class distribution is CP.

3. If(GVH=low)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(AL M1=high)AND(ALM2=high)THEN class distribution is CP.

4. If(GVH=medium)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=high)THEN class distribution is CP.

5. If(GVH=low)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(AL M1=medium)AND(ALM2=high)THEN class distribution is CP.

6. If(GVH=low)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(AL M1=medium)AND(ALM2=medium)THEN class distribution is IM.

7. If(GVH=low)AND(LIP=medium)AND(CHG=low)AND(AAC=high)AND(ALM1=high)AND(ALM2=high)THEN class distribution is IM.

8. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(AL M1=high)AND(ALM2=high)THEN class distribution is IM.

9. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=low)AND(AL M1=high)AND(ALM2=high)THEN class distribution is IM.

10. If(GVH=medium)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND (ALM1=high)AND(ALM2=high)THEN class distribution is IM.

11. If(GVH=low)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(AL M1=medium)AND(ALM2=high)THEN class distribution is IM.

12. If(GVH=medium)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(ALM1=high)AND(ALM2=high)THEN class distribution is IMS.

13. If(GVH=low)AND(LIP=high)AND(CHG=high)AND(AAC=high)AND(A LM1=medium)AND(ALM2=medium)THEN class distribution is IML.

14. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(A LM1=medium)AND(ALM2=medium)THEN class distribution is IML.

15. If(GVH=medium)AND(LIP=low)AND(CHG=low)AND(AAC=medium)A ND(ALM1=high)AND(ALM2=high)THEN class distribution is IMU.

16. If(GVH=medium)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=high)THEN class distribution is IMU.

17. If(GVH=high)AND(LIP=high)AND(CHG=low)AND(AAC=medium)AND(ALM1=high)AND(ALM2=high)THEN class distribution is IMU.

18. If(GVH=low)AND(LIP=high)AND(CHG=low)AND(AAC=medium)AND(ALM1=high)AND(ALM2=high)THEN class distribution is IMU.

19. If(GVH=medium)AND(LIP=high)AND(CHG=low)AND(AAC=low)AND(ALM1=high)AND(ALM2=low)THEN class distribution is OM.

20. If(GVH=medium)AND(LIP=high)AND(CHG=low)AND(AAC=medium)AND(ALM1=medium)AND(ALM2=high)THEN class distribution is OM.

21. If(GVH=high)AND(LIP=high)AND(CHG=low)AND(AAC=high)AND(ALM1=high)AND(ALM2=medium)THEN class distribution is OM.

22. If(GVH=low)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=low)THEN class distribution is OM.

23. If(GVH=low)AND(LIP=high)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=low)THEN class distribution is OM.

24. If(GVH=low)AND(LIP=high)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=high)THEN class distribution is OML.

25. If(GVH=low)AND(LIP=high)AND(CHG=low)AND(AAC=high)AND(ALM1=high)AND(ALM2=medium)THEN class distribution is OML.

26. If(GVH=high)AND(LIP=high)AND(CHG=low)AND(AAC=high)AND(ALM1=medium)AND(ALM2=high)THEN class distribution is OML.

27. If(GVH=medium)AND(LIP=high)AND(CHG=low)AND(AAC=high)AND(ALM1=high)AND(ALM2=low)THEN class distribution is OML.

28. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=low)AND(ALM1=medium)AND(ALM2=low)THEN class distribution is PP.

29. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=medium)AND(ALM1=high)AND(ALM2=low)THEN class distribution is pp.

30. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=low)AND(ALM1=high)AND(ALM2=low)THEN class distribution is PP.

31. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=low)AND(ALM1=low)AND(ALM2=low)THEN class distribution is PP.

32. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=high)AND(ALM1=low)AND(ALM2=low)THEN class distribution is PP.

33. If(GVH=high)AND(LIP=low)AND(CHG=low)AND(AAC=medium)AND(ALM1=low)AND(ALM2=low)THEN class distribution is PP.

34. If(GVH=medium)AND(LIP=medium)AND(CHG=medium)AND(AAC=medium)AND(ALM1=low)AND(ALM2=low)THEN class distribution is PP.

35. If(GVH=medium)AND(LIP=medium)AND(CHG=medium)AND(AAC =medium)AND(ALM1=medium)AND(ALM2=low) THEN class distribution is PP.

36. If (GVH=medium) AND (LIP=medium) AND (CHG=medium) AND (AAC=medium) AND (ALM1=medium) AND (ALM2=high) THEN class distribution is PP.

37. If (GVH=high) AND (LIP=medium) AND (CHG=medium) AND (AAC=medium) AND (ALM1=medium) AND (ALM2=high) THEN class distribution is PP.

38. If (GVH=medium) AND (LIP=medium) AND (CHG=medium) AND (AAC=high) AND (ALM1=medium) AND (ALM2=high) THEN class distribution is PP.

6.1.3 Algorithm

STEP1: Begin the procedure.

STEP2: Create the database –E.COLI dataset.

STEP3: Frame the rules.

STEP4: To check the rules through the MATLAB software.

STEP5: create the front end using Php.

STEP6: Interface with back end using MySQL and php.

STEP7: Framed rule execution.

For (i=0;i<40;i++)

If (gvh=low AND lip=low AND chg=medium AND aac= low AND alm1=medium AND alm2=low)

Print the value is class distribution.

Else
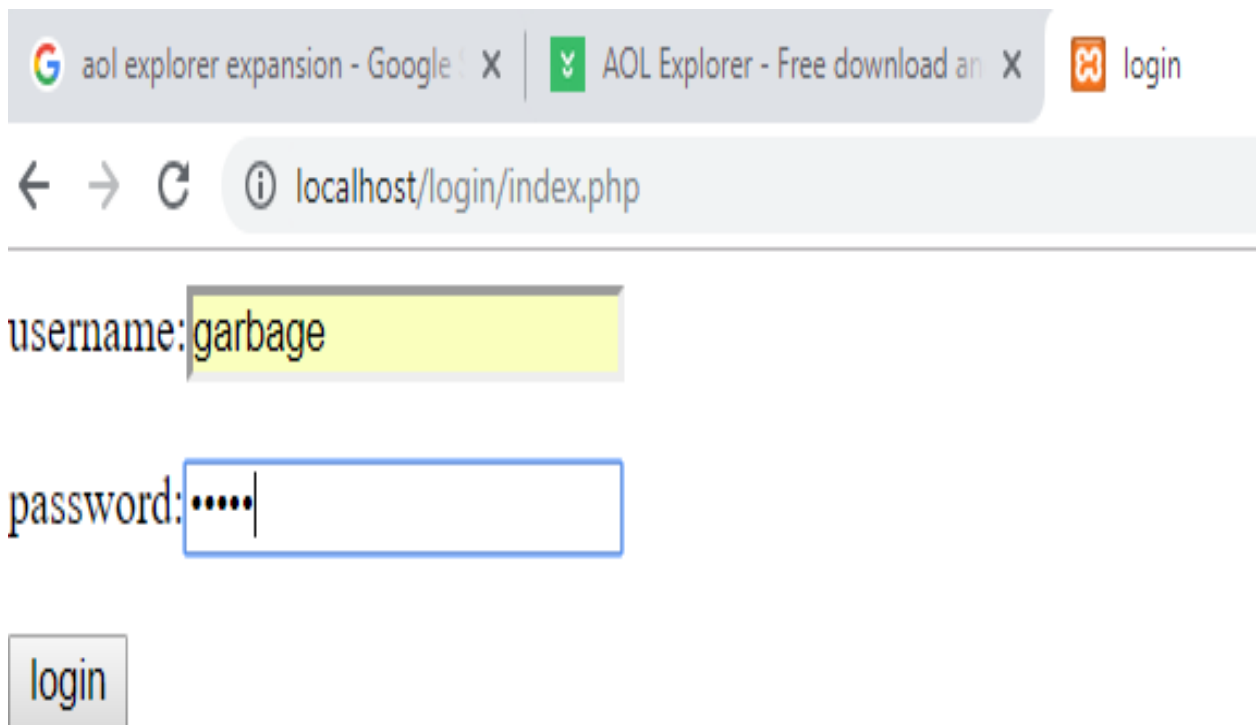
Print the value is not found.

STEP8: Result report to the user.

STEP9: End procedure.

6.2 RESULT

6.2.1 Login Page for AIBGM

Fig: 6.2.1 Login page for AIBGM

This is the first page of the system. Cleaning person or municipal web server need to login the system to clean the garbage bin. Both username and password are store in the server. Suppose the username or password is wrong again to type the correct username &password. After click login button, welcome is done by using the Database (DB).

6.2.2 Output Page for AIBGM
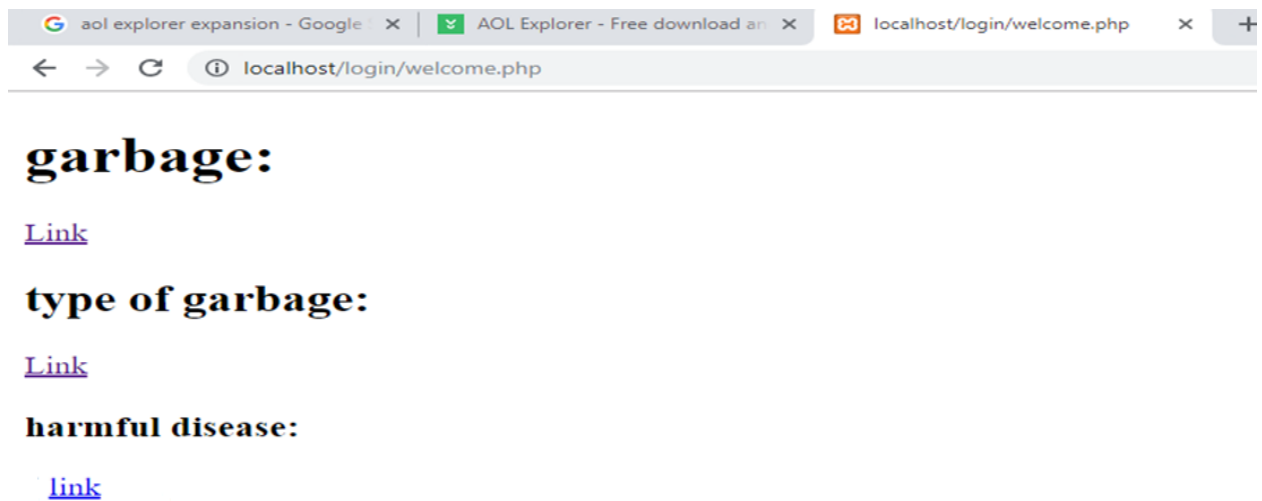
Fig: 6.2.2 Output page for AIBGM

This page is appear when click the login button is activated. The above cited page consist of garbage, type of garbage, harmful diseases. The above link will open when link has been activated by user. For example, the garbage link is activated means the content either empty or full will open for user reading purposes. In these way all other linker activated.

6.2.3 Garbage Page for AIBGM:
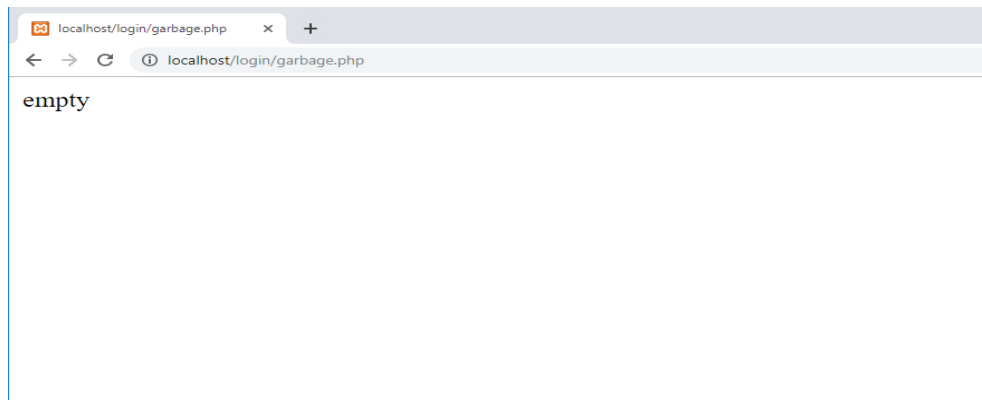
Fig: 6.2.3 garbage page for AIBGM

The above citated page is to describe the garbage link to above the output page.

6.2.4 Type of Garbage for AIBGM
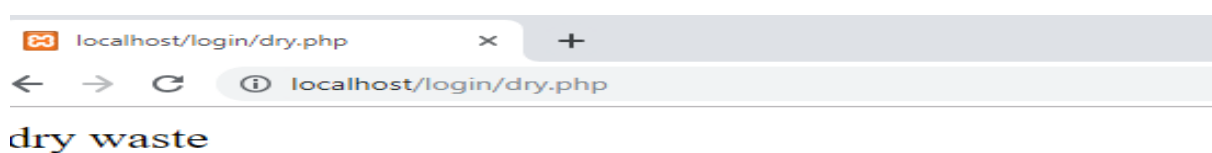
Fig: 6.2.4 Type of garbage for AIBGM

This page is appear for type of garbage to click above the output page for type of garbage link.

6.2.5 Harmful Disease Page of AIBGM

Fig: 6.2.5 Harmful disease Page of AIBGM

Fig 6.2.5 .In this above cited page can explain the harmful disease of AIBGM.This page can appear the output is sequence_name and the class_distribution of my executing the particular query.Then the other query can be changed also as the same procedure of this process.

6.3 MODIFIED FUZZY RULES

Fig: 6.3 Modified fuzzy rules

They can type IF and select the attribute in low or medium or high to click
to add rules they can generate fuzzy rules automatically.

6.4 MATLAB SIMULATION OF NOVEL FUZZY RULES ANALYZATION
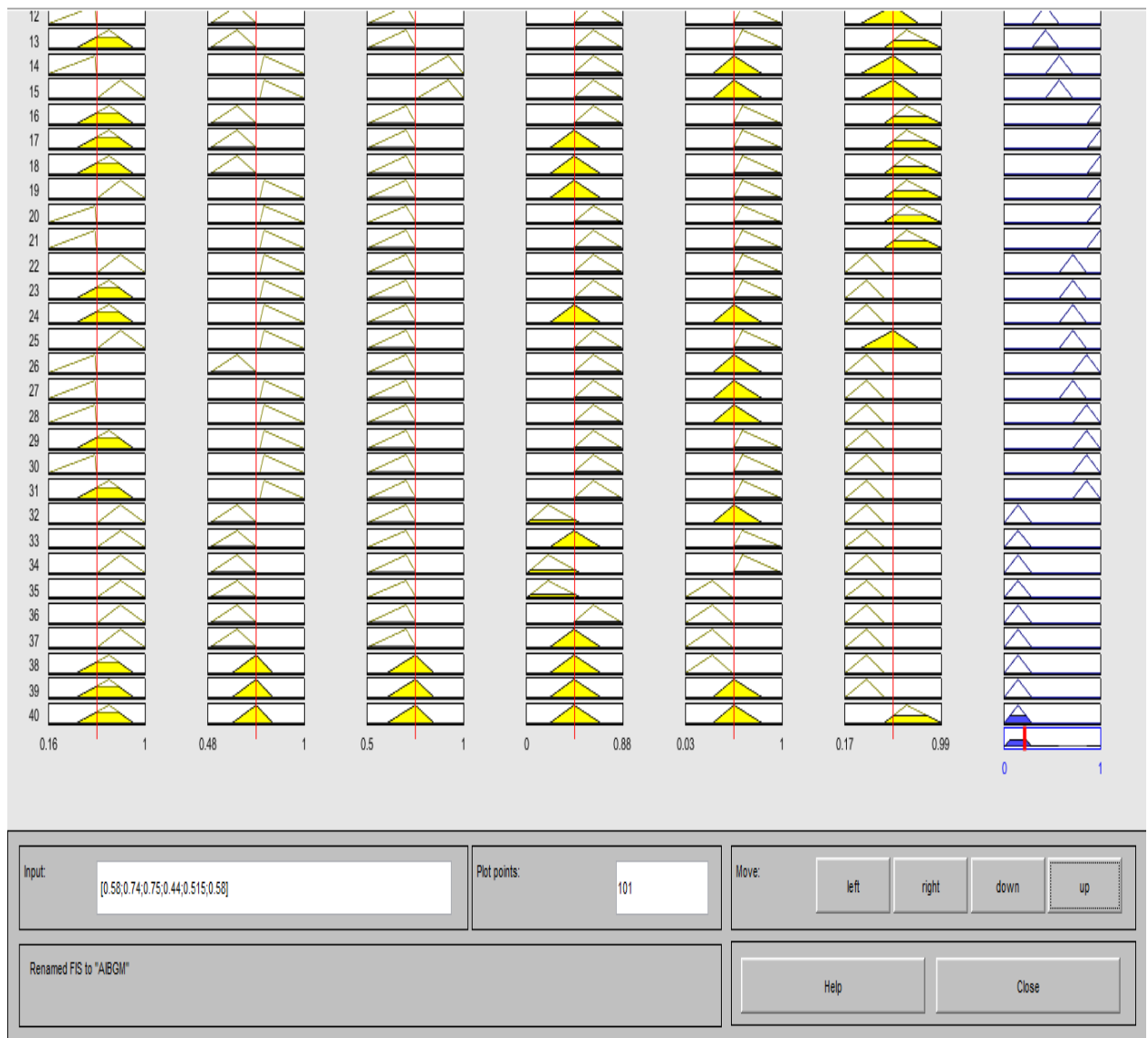

Fig: 6.4.1 Rules Viewer for MATLAB

Fig: 6.4.2 Rules Viewer for MATLAB

Fig: 6.4,fig:6.4.1 this page is used to predict the output is correct or incorrect to check my E.coli datasets. To find correct output for frame some rules to predict the valid output.

According the rules inference system in MATLAB generated the above pictorial representation.

43

CHAPTER 7

CONCLUSION AND FUTURE WORKS

This project is introduced the **ARTIFICIAL INTELLIGENCE BASED GARBAGE MONITORING SYSTEM FOR WASTE MANAGEMENT USING SENSORS**. It is easy way to remove the overflowed garbage after the bin is fill. It is very useful in improving the efficiency of waste management especially in the flat residential areas, where the garbage piles at the bins are one of the residents' major concerns owing to its ability to continuously measure the garbage level in the bin and alerting the municipality for immediate collection. The proposed system is suitable to be implemented in all our cities, residential areas, due to its practicality, reliability and reasonable cost. It will responsible to reduce the health related issues. Also to support the clean environment and SWACHH BHARATH.

Thus future work is reusage (or) recycling methods along with the garbage monitoring system.

LIMITATIONS

1. In this project only we can discuss the garbage level , whether the garbage is dry or wet garbage and also to find the harmful effects of human beings through the overflowed garbage.

2. we can predict only E.coli occur in garbage bin because they have no any other online datasets can occur in our database based on these bacteria categories.

3.They can predict how much E.coli disease can occur only in wet garbage.

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Appendix -- Plagiarism Report

Words	272	Date	March 29,2019
Characters	1594	Exclude Url	

0% Plagiarism	100% Unique	0 Plagiarized Sentences	13 Unique Sentences

Content Checked For Plagiarism

Waste management is one of the primary problem in real world .The main issues of waste management is that bin at public place gets overflowed well in advanced. Thus overflow of garbage can affect harmful disease dengue, fever, pneumonia, etc. So they avoid all such harmful risk scenarios and mounted on garbage syst main theme of work is to develop a smart garbage alert system for proper garbage management. In the propose the level of the garbage is filled in dust bin to detect with the help of ultra-sonic sensor and send the alert me the municipal web service. Waste collective garbage is detected with the help of IR sensor and also hazardo detected with help of Bio sensor. Before they collect the garbage how harmful disease can spread to the enviro display the LED monitor. After getting the notification of the municipal office through the web application and will avoid the overflowing of the garbage bins. This project is used to avoid harmful effects and clean city to clean environment. By using this Artificial intelligence based garbage monitoring system people do not have to the systems manually but they will get a notification when the bin will get filled. To achieve or detect the harmfu in wet garbage or dry garbage using fuzzy inference system based on the fuzzy rules. They are to find how disease can affect the human being using the garbage monitoring system. We can check out the both Phpmya fuzzy system can be calculated for predict correct output.

Sim