

Artificial Intelligence Markup Language for Interactive Service HR Department

Dheny Frizki, Indra Ranggadara, Amalia Fajar Wati

Abstract: Along with the development of information and communication technology systems in the era of free digitalization, people are asking for comfort and convenience by supporting their activities. One of them is easy to find artificial intelligence technology in various ways to support human activities. Artificial intelligence technology or often called Artificial Intelligence (AI) can be processed into various forms so that according to the adjusted method. Application of Artificial Intelligence Markup Language (AIML) with UML (Unified Modeling Language) design as an interactive media for personnel and employee services. The UML (Unified Modeling Language) design method is expected to help the personnel department in providing information to employees at PT. Dimensions of Indonesian Data. The information collected will be made into frequently asked questions and then adjusted to the AIML pattern.

Keywords : AIML, Media Interactive, PT. Dimension Data Indonesia, UML.

I. INTRODUCTION

The rapid development of information technology lately has entered almost all fields of life, this is marked by the number of computer users, both for the benefit of companies or businesses to things that are entertainment, education and health. Humans with high intelligence are able to change the ways and patterns of life that used to be primitive to be very modern like now. Humans are able to make machines that have intelligence so that they can work by themselves. This began to be realized after the creation of a sophisticated machine called a computer. Techniques that allow machines to think and can make their own decisions are called artificial intelligence (AI). By using artificial intelligence, it is not impossible that there will be machines that are truly capable of thinking, acting, listening, seeing, and speaking like humans[1]. Nowadays, other chatbot-chatbot (computer systems based on natural language) have emerged, which have been several steps ahead of ELIZA[2]. Like the chatbot named A.L.I.C.E, and there are still others. Although there have been many chatbots popping up, but the use of the chatbot itself has not been maximized. Chatbot contained on the website generally answers a question asked by the user. The scope in question is already limited so it does not go

beyond the specified scope. But there are also chatbot applications that do not have scope restrictions, so in terms of answering a question often does not match what is asked by the user.



Fig.1. Employee Complaints

From the problems that can be seen in Figure 1, among others:

1. Around 76% of employees complained about lack of communication with HRD.
2. About 15% of employees did not make a problem of the problem.
3. 9% of employees feel that this does not interfere with their performance.

Seeing this problem, researchers are interested in conducting research under the title "artificial intelligence markup language as an interactive service in the personnel department" because many employees complain that communication with HRD is very difficult. Therefore the researchers conducted a chatbot system design as a means of supporting communication between employees and HRD.

II. STUDY LITERATURE AND PREVIOUS RESEARCH

A. Human Resource Management

Human resource management is the study of how to manage the resources owned by an individual in an organization in creating work relationships for the achievement of a goal. Or Human Resource Management is all efforts and management of human resources (employees) in an organization carried out to add value to the human resources themselves in relation to achieving company goals.

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B. Personnel Empowerment

One of the elements that plays an important role in an organization is Humans. Because humans are the resources that drive the course of the organization. Effectively whether an organization depends on humans managing other resources in the organization. Therefore, humans (employees), must be managed properly. Nawawi (1992) explains 3 definitions of human resources, namely:

1. Human resources are people who work in the environment of an organization (often also called personnel, labor, employees or employees).
2. Human resources are human potential as an activator of an organization in realizing its existence.
3. Human resources are potentials and are assets and function as capital (non-material / non-financial) in the organization, which is realized into physical and non-physical potential in realizing the existence of the organization.

Thus human resources are the main factor for the sustainability of an organization and the most decisive measure of the success of achieving organizational goals. Human resources in question are people who are ready to use and have the ability to achieve organizational goals.

So that human resources in the organization can further improve the quality, loyalty and responsibility for the tasks they carry, it is necessary to do an empowerment for employees in the organizational structure. In this case, the leader holds the role to empower employees so that the goals set in a organization can be achieved.

C. Python

Python is an object oriented programming model scripting language. Python can be used for various software development purposes and can run on a variety of operating system platforms. Python is a programming language that is freeware or free devices in the true sense, there are no restrictions on copying or distributing them. Complete with source code, debugger and profiler, interface contained in it for service interface, system functions, GUI (graphical user interface), and its database. [3] Some features of Python are:

1. Has extensive literature; in the Python distribution modules have been provided.
2. Has clear grammar and is easy to learn.
3. Has source code layout rules that make it easy to check, reread and rewrite source code.
4. Object-oriented.
5. Can be built with Python or C / C ++.

D. Knowledge Base

Knowledge base on ChatBot is built with common conversation sentences that are considered often done by humans as users. Botmasters who act as creators / creators of the "brain" of the ChatBot program must be able to reason several common conversations by paying attention to the flow of user conversations[4].

E. Previous Research

The following are some of the results of research that have been conducted by discussing the same problems regarding management logistics and zachman framework.

The first research [5] to discuss AI, we use "program-o which is an AIML interpreter for the generation of responses of users

input. We have used this method for Android application chat, which will interact with users using text and voice responses. The research explains about Integration Of Aiml Chatter Bot For News Application On Whatsapp. In this Paper highlighted the importance of the conversational software development, more specifically the chatterbots as computational agents to establish natural language dialogs between humans and machines.

The second research [6] describes the Building an AIML Chatter Bot Knowledge-Base Starting from a FAQ and a Glossary. A methodology to develop automatically an AIML answering chatter bot to FAQ has been shown. Possible applications in e-learning could be to facilitate interaction with the user or user navigation through teaching material by means of a human digital assistant through a speaking avatar. The third research [2] describes implementing Indonesian Language Chatbot For Ecommerce Site Using Artificial Intelligence Markup Language (Aiml). This Chatbot is built using Artificial Intelligence Markup Language (AIML) and Pandorabots as the interpreter. This research aims to found right AIML interpreter which can be used in Indonesian language E-Commerce website. By holding experiment with respondent, its accuracy is measured. The result shows that the Chatbot still needs improvement. Chatbot knowledge pattern matching rules should be enriched based on the questions that customers input in order to construct rules.

The fourth research [7] describes the AIML Based Voice Enabled Artificial Intelligent Chatterbot. Objective of this paper is to show application of chatterbot that can be used in various fields like education, healthcare, and route assistance. It is statistical model and chatterbot is based on AIML (Artificial Intelligent Markup Language) structure for training the model and uses Microsoft voice synthesizer for providing speech recognition system and natural language processing.

III. METHOD

A. Location Research

This research was conducted at PT. Dimension Data Indonesia having its address at DBS Tower 22nd floor, Jalan Prof. Dr. Satrio Kav. 3 - 5, RT.18 / RW.4, Kuningan, Karet Kuningan, South Jakarta City, Special Capital Region of Jakarta 12940.

B. Research Flow

The researcher conducts research by carrying out the steps below, namely:

The first step is to determine the topic to be researched by observing the phenomena of existing problems in the unresolved field. The second step is to determine the formulation of the problem which then analyzes the problem using the SWOT method. The third step is to determine the objective formula to analyze how the steps solve the problem. The fourth step is to collect data and information from various sources such as literature reviews obtained through research books and journals that have been done before, The fifth step is to study the theoretical basis so that we can easily determine what method of analysis will be used, Step six is determining analytical method that is in accordance with the data collection and strong theoretical foundation so that the interaction media goes well,



The seventh step is to design and propose the design of the UML in existing problems in order to describe the int what is happening in a system, the eighth step is to design and propose AIML design on the existing problems based on the results of SWOT analysis with the aim of solving the problem, ninth step is to determine the writing of the interpreter code for this problem using pyAIML, the tenth step is creating documents AIML which will later be interpreted as a knowledge database, the eleventh step is module integration which was previously done in the ninth step with the main interpreter. Twelfth step is to do interactive media testing with employees, the thirteenth step is to make conclusions and suggestions to the research conducted.

C. SWOT

SWOT analysis is used to see the strengths, weaknesses, opportunities and threats that will be faced by the company [8]. SWOT analysis compares between external factors namely Opportunities and Threats with internal factors namely Strengths and Weaknesses [9]. By seeing the strengths owned and developing these strengths, it is certain that the company will be more advanced than existing competitors. Likewise, the weaknesses that are thought to be fixed so that the company can exist. Opportunities that must be utilized as well as possible by the company so that sales volume can increase, and threats that will be faced by the company must be faced by developing a good marketing strategy [8].

D. UML

According to Dennis, et al. (2015), UML (Unified Modeling Language) is a diagramming technique that can model every system development project from design analysis. In some cases, the same diagramming technique is used throughout the development process. In this case, the diagram starts as very conceptual and abstract. When the system was developed, diagrams evolved to include details which ultimately led to the creation and development of code. In other words, the diagram moves from documenting the requirements to laying out the design. Overall, consistent notation, integration between diagramming techniques, and application of diagrams throughout the development process makes UML a powerful and flexible language for analysts and developers.

Uml (Unified Modeling Language) is not just a diagram, but also tells the context. UML is applied for certain purposes, generally including:

1. Designing software.
2. Means of communication between software and business processes.
3. Describe the system in detail for analysis and look for what the system needs.
4. Documenting the existing system, processes and organizations.

UML has been applied in the areas of investment banking, health institutions, defense departments, distributed systems, work equipment support systems, retail, sales and suppliers.

E. AIML

Artificial Intelligence Markup Language (AIML) is a language that describes data objects and the behavior of the computer programs that process them. AIML itself is a derivative of Extensible Markup Language (XML). AIML

objects are composed of units called topics from categories, which contain both parsed and un-parsed data. Parsed data contains characters, some of which are character data, others can be AIML elements. The AIML element speculates knowledge in the form of stimulus-response in the document. AIML contains a collection of patterns and responses that can be used by chatbots to search for answers to each sentence given. AIML interpreters are needed to receive input and trace answers to AIML documents. Currently there are only AIML interpreters in various programming languages so that the process of making chatbots can be focused on compiling AIML documents. In addition, there are currently many ready-to-use AIML documents available for various fields of conversation[10].

The important parts of AIML [11] are as follows::

1. Category

At AIML, category is the basic unit of knowledge. A minimum category consists of two AIML elements, namely pattern and template. Here is an example of a simple category:

```
<category>
<pattern> what is your name </pattern>
<template> My name is BOT </template>
</category>
```

When the above category is loaded in memory, the AIML bot will answer the question "What is your name" with "My name is BOT".

2. Pattern

Pattern is a series of letters that are expected to match one or even more with user input. A pattern can use wildcards that will match one or more user entries. A pattern like the following:

```
What is the name *
```

matches the input "what is your name", "what is your lecturer name", and so on.

3. Template

A template determines the response of the appropriate pattern. A template can be in the form of a simple literary text like the following

```
My name is BOT.
```

A template can also use variables like

```
My name is <bot name = "name" />
```

The variable value is the same as the bot's name and is inserted into the sentence.

The template also allows to continue to another pattern by using an AIML element named srai. Srai elements can be used to implement the same meaning as in the following example:

```
<category>
<pattern> what is your name </pattern>
<template> My name is <bot name = "name" />. </template>
</category>
<category>
<pattern> what are you called </pattern>
<template>
<srai> what is your name </srai>
</template>
</category>
```

The first category will answer an entry "what's your name" with a statement about the bot's name. The second category will answer the input "what you are called" by forwarding the question to the first category that matches the input "what is your name" - in other words that the two phrases are equal or equal.

4. That

That is an AIML element that refers to previous responses or outputs. That is often used in making categories so that the response generated is still related to the previous question or answer.

IV. RESULT AND DISCUSSION

A. Current Systems Analysis

The following are the results of the analysis currently underway at the personnel department of PT. Dimension Data Indonesia, as follows:

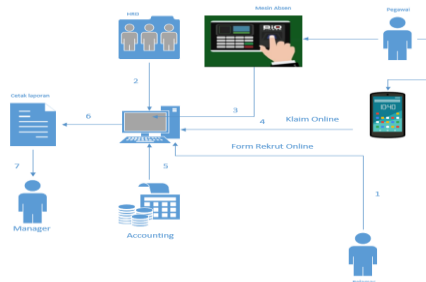


Fig.2. Rich Picture Diagram

In Figure 2 above explains the flow that is currently taking place in the personnel department of PT. Dimension Data Indonesia. Following are the process steps for the needs analysis system, the steps are as follows:

1. Applicants fill out the online recruitment form.
2. HRD manages applicant data in the application.
3. Employees make attendance and attendance data directly entered into the application system.
4. Employees can claim via android-based mobile phones.
5. Accounting checks and applies claims data via the application.
6. All managed data is applied can be printed for documentation
7. And the report is directly given to the Manager for inspection.

B. SWOT Analysis

Formulating the problem the writer identifies from a running process which is then detailed by the SWOT method as a comparison data or consideration for the proposed process. After identifying the background of the problems that exist in PT. Dimension Data Indonesia then, the problem will be analyzed using SWOT analysis (Strengths, Weakness, Opportunities, Threats), along with the SWOT analysis obtained:

Tabel- I: Analisa SWOT

OT	SW	<p>Strengths</p> <ul style="list-style-type: none"> • Employees easily access administration without having to wait for personnel employees to search • More efficient without having to make interactions with the personnel department 	<p>Weakness</p> <ul style="list-style-type: none"> • Database input still requires an administrator • Still have to adjust the Long pattern because you have to find the best template that matches the pattern
	Opportunity	SO	WO
	<p>The design of interactive media can create communicative communication media so that the delivery of information becomes efficient.</p>	<p>Creating interactive media design that can make it easier for employees to know the administrative status in the personnel department in a more flexible manner.</p>	<p>Use the application at the exhibition and property marketing booth.</p>
	Threats	ST	WT
	<ul style="list-style-type: none"> • Virus • Attack by hackers 	<p>Improve the high security system, so it is not easily attacked by viruses and hacked by irresponsible parties</p>	<p>Install security systems and anti-virus applications to prevent viruses that can interfere with performance</p>

C. System Design With UML

1) Use Case Diagram

Use cases are used to explain and document the interactions between the user and the system needed to complete the user's task. Use cases are created to help the development team understand more fully the steps involved in achieving user objectives [12].

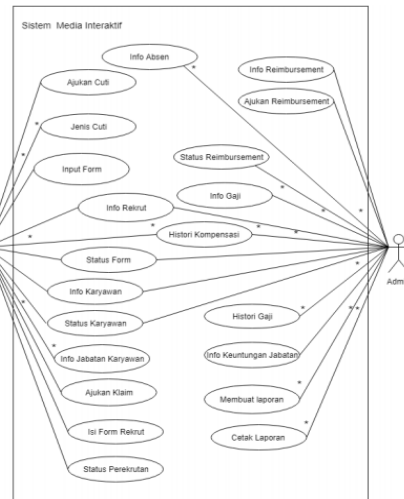


Fig.3. Use Case Diagram

In the use case diagram, above there are 2 actors, namely: admin and user. Admin can input, edit, and also delete data, different things from users who can only enter data and view data.

2) Class Diagram

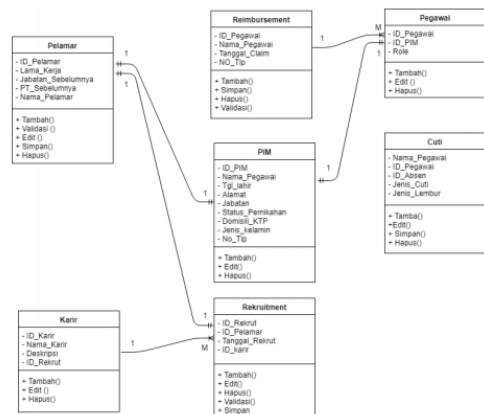


Fig.4. Class Diagram



In Figure 4, is a picture of the class diagram that will be implemented into the system to be made, class diagram is also used as a table design that will be used on the system. In this system has 6 tables, which include: applicant tables, reimbursement tables, employee tables, leave tables, PIM tables, recruitment tables, career tables. Each table has relationships with other tables and is structured in a database.

D. Perancangan Sistem Dengan AIML

1) Main Controller

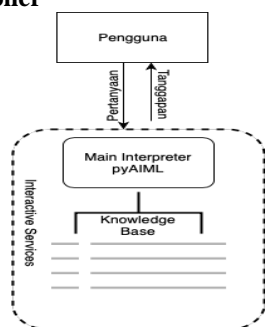


Fig.5. Main Controller

In Figure 5 above, the main way of working the main controller is that when the user gives a question, the pyAIML main interpreter will provide a response where the response is obtained from a knowledge base that is made to raise questions given in general or specific.

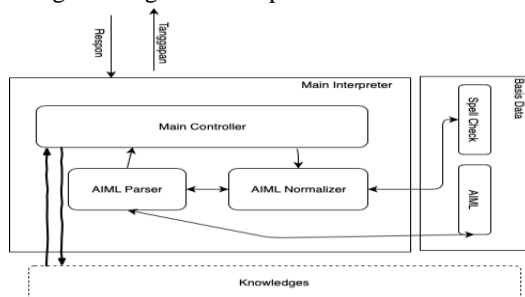


Fig.6. Main Design Interpreter Details

In Figure 6 explain the explanation in more detail the main controller as an access point whose job is to receive responses from users, prepare responses and send them back to the user. If the response is in the form of a command to contact a particular module, then the main controller must forward the stimulus to the module in question and receive the results and then send it to the user.

2) AIML Normalizer

AIML Normalizer has the duty to normalize responses before proceeding further by AIML Parser. In AIML Normalizer there are two sub processes, namely:

- Mark Removal

Mark Removal is a punctuation remover by using regular expression operations as follows:

Replace [!], [?], [.] , [] stimulus with ""

Replace [/s\s+] stimulus with [/s]

With the meaning of the change of operation above will be removed while the excess space will be made only a single space.

- Spell Correction

Spell Correction is justification of spelling by proceeding as below.

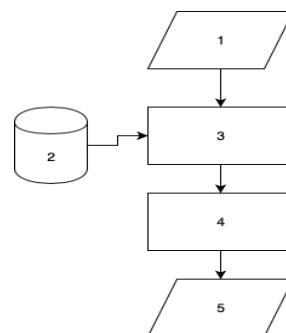


Fig.7. Flowchart from Spell Correction

Flowchart in the picture above explains as follows:

1. Begin the process of a question.
2. Then the response is directed to the spell check, where the spell check will see whether it is in accordance with the spelled database.
3. This numbered line will give an explanation of the process of taking the wrong word with justification.
4. In this line will replace all the wrong words with words that are adjusted with the words contained in the database in accordance with the 3rd line.
5. The results of a question.

3) AIML Praser

The question that has been normalized in the previous step is the AIML Normalizer which is forwarded to the AIML Parser for further processing. DiAIML Parser has the duty to match or match with the appropriate template. it relates to the AIML table data that has been entered. The included AIML table is Knowledge Based which is an embodiment of the AIML document. The process parsing flowchart is explained in the following image:



Fig.8 Flowchart AIML Parser

The picture above can be explained by pseudocode as follows:

1. Stimulus
2. Pattern ← stimulus
3. Star ← ""
4. Patt ← pattern_star{ }
5. Aimpl
6. IF patt[star] <> "" AND patt[pattern] <> ""
7. Star ← patt[star]
8. Pattern ← patt[pattern]
9. Rec ← SELECT template FROM aimpl WHERE pattern LIKE %pattern%
10. Template ← (REPLACE "*" IN rec:template WITH patt[star])
11. Srai ← LOAD srai IN template
12. IF srai <> ""

13. RESULT ← template

The entire pseudocode of the parsing process lies in operation at number 9, which is searching for templates in the database. The parsing process will be done recursively when the template found contains srail tags. Inspection of the srail tag occurred in operation number 12.

4) Table of Spell Check

Table Spell Check functions to store pairs of words that can occur typos and then corrected so that it matches the pattern contained in the database such as:

Table- II: Spell Check Structure

Column	Type	Description
id	Int	Code
misspelling	Varchar	Wrong Words
correction	Varchar	Error Corrcetion

5) Table of Aiml

AIML table contains several columns that represent documents from AIML that are typed in a text file and will be explained in table 3 below:

Tabel- III: Struktur AIML

Column	Type	Description
id	Int	Code
pattern	Varchar	Question Pattern
template	Varchar	Response Template
topic	Varchar	Topics

E. Testing AIML

```

1  from chatterbot.trainers import ListTrainer
2  from chatterbot import ChatBot
3  import os
4
5
6  bot = ChatBot('Dheny')
7
8  conv = open('chatss.txt', 'r').readlines()
9
10
11
12 |
13 while True:
14     request = input('You:')
15     response = bot.get_response(request)
16
17     print('Bot:', response)
18
19
```

Fig.9 Main Interpreter of pyAIML

In figure 9 above is main.py, a code that uses the AIML python language from an interactive application that is synchronized with a knowledge base that was created first.

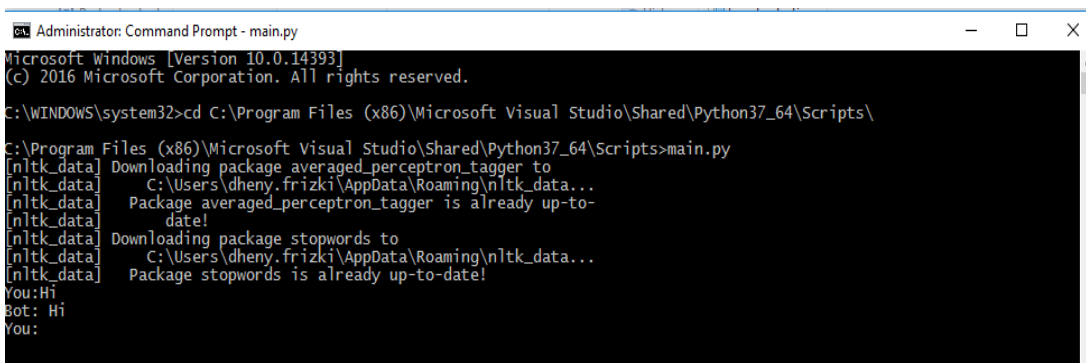


Fig.10 Result AIML

From Figure 10 above there is a pyAIML test where pyAIML works well as a conversation engine between the user and the bot by retrieving a database that uses the uml design.

V. CONCLUSION

Based on the research that has been done, researchers can make the results of the study and provide conclusions, as follows:

1. By using AIML (Artificial Intelligence Markup Language) as the basis for service design in the personnel department and combined with the UML (Unified Modeling Language) method to make the service design in the personnel department run effectively and facilitate or provide information to the employees of PT.Dimensi Data Indonesia.
2. Designing a business architecture to design a resource reference standard application using the UML (Unified

Modeling Language) method which has a function as a tool for the initial design of the system maker that starts with making diagrams from Usecase, Activity diagrams, Sequence diagrams, and class diagrams that are determine the database to be made into a system application resource. This study uses the AIML framework (markup intelligence language) that runs on this design to make companies more effective and make it easier to manage and do things related to the personnel department.

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