

Research Article

Chatbots in Python: A Practical Guide to Building and Deploying Conversational AI

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A B S T R A C T

A chatbot is a piece of computer software that may communicate verbally or in writing. This software is used to complete activities including promptly replying to users' inquiries, informing them, assisting with product purchases, improving customer service. Chatbots are computer programmes that utilise machine learning and artificial intelligence (AI). Currently, chatbots are more used in commercial settings since they may lower customer support expenses and manage several customers at once. However, in order to complete a variety of duties, chatbots must be as effective as feasible. In this project, we present the creation of a chatbot that uses the Latent Semantic Analysis (LSA) and Artificial Intelligence Markup Language (AIML) with Python platform to offer a sincere and accurate response to any enquiry.

Keywords: Artificial Intelligence Markup Language (AIML), Latent Semantic Analysis (LSA), Pattern Matching, Chatbot, Flask Web-Framework, HCI

Introduction

A chatbot is an automated piece of software that communicates with people. A simple computer programme that essentially mimics human talks is known as a chatbot. An artificial neural network used by a chatbot that uses AI and machine learning is modelled after the neural connections in the human brain. Chatbots are computer programmes that can readily mimic human speech. For instance, Facebook has a machine learning chatbot that provides businesses with a platform to communicate with customers via the Facebook Messenger app. Chatbots exploded in popularity on Messenger in 2016. It can be seen from the results that 2016 was the year of chatbots. Chatbots are where the software industry is primarily focused. Numerous chatbots are created by startups and deployed by businesses to enhance customer service by keeping customers waiting with polite conversation. According to research, chatbots are now employed in a variety of industries, including E-commerce, Insurance,

Banking, Healthcare, Finance, Legal, Telecom, Logistics, Retail, Auto, Leisure, Travel, Sports, Entertainment, Media, many more, to handle a variety of business functions. Thus, that was the appropriate time to consider chatbots as a novel communication technique. Today, many businesses use chatbots to swiftly and effectively respond to some frequently asked queries from their own consumers.

Review of Literature

The publication is primarily centred on an academic paper, presenting certain case studies and including a brief history of chatbots that dates back to the early experiments like ELIZA (about 1966), according to Bayan et al. The study focuses on building an AIML-based chatbot with ALICE.¹ A chatbot design that is built on a web-based architecture is presented by Lue et al. The Web Chat was a crowd-sourced project that could gather and annotate human chatbot encounters that was proposed by Lue Line, Luis Fernando D'Haro, Rafael E. Banchs in HAI 2016.¹²

Artificial Linguistic Internet Computer Entity (A.L.I.C.E.) and Artificial Intelligence Markup Language (A.I.M.L.) are presented technically by Dr. Richard S. Wallace, with philosophical and historical reflections on human consciousness acting as a backdrop.¹³

Thomas T provided the way by which the chatbot is planned in a manner that for a single template, it gives irregular responses. LSA based inquiries are giving the right reactions to random responses.¹⁸

Artificial Intelligence Markup Language

The foundation for the development of Artificial Intelligence Markup Language (AIML) is Extensible Markup Language (XML). The behaviour of computer programmes is described by a class of data objects called an AIML object. It is made up of things or tags referred to as themes and categories. Categories are the fundamental units of knowledge in AIML. Each category has a pattern with input and a template with the chatbot's response based on user requests. AIML is a flexible, understandable, universal language that is mostly needed to develop Chatbots. One of the popular methods that satisfies the demands based on general inquiries is AIML, a descendant of XML. It has the capacity to describe the partial conductance of the programmes it processes as well as the type of data object. These items are divided into two categories and subjects. As a result, these categories' data are either parsed or unparsed. The goal of the AIML language is to make the "stimulus-response" process of conversational modelling easier. Additionally, it is a markup language based on XML and is reliant on tags, which are the identifiers that create snippets of code to convey commands into the Chatbot. The data object class is an AIML object specified by AIML, it is in charge of modelling conversational patterns. Each AIML object is a language tag that, when combined with patterns, links to a language command. List of parameters proposes the general structure of AIML objects. The category, pattern, template objects are the most crucial AIML objects. The category tag's job is to define the various patterns and the answer-based templates that go with them. These are the most common tags and the building blocks for designing AIML Chatbots with an intelligent response to natural language voice conversations: the pattern tag detects the input from the user, the template tag is responsible for responding to a specific user input.

Let's see the structure of category, pattern, template object which is shown below:

```
<category>
<pattern>User Input</pattern>
<template>
```

```
Corresponding Response to input
</template>
</category>
```

System Design

The process of establishing the architecture, parts, modules, interfaces, data for a specific system in order to meet predetermined requirements is known as systems design. The application of different systems theory to product development could be called systems design. The fields of systems analysis, systems architecture, system designing have some overlap.

A chatbot is a computer programme that uses patterns to mimic a conversation with human users, particularly online. They are our virtual assistants who provide a variety of services via online chat. You need an AIML package (Artificial Intelligence Markup Language) to create artificial intelligence chatbots in Python. Aiml B must first be loaded into the kernel and a standard starting file without any patterns must be created. Include unpredictable response patterns to keep the conversation interesting.

Now, check for some files that are already available to code your own AIML files. Take a look at the files on the Alice Bot website, for instance. The startup file we'll be making will function independently. We will therefore have more AIML files without changing the source code as a result. As soon as there are enough AIML files to load, the programme will begin to operate. This served as an introduction to creating Python-based AI chatbots. Let's go on and examine which specific library can be used to create an AI chatbot.

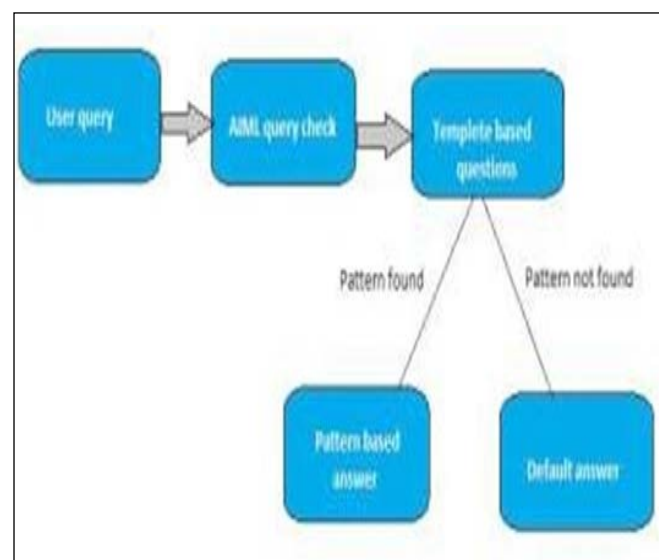


Figure 1. System Architecture

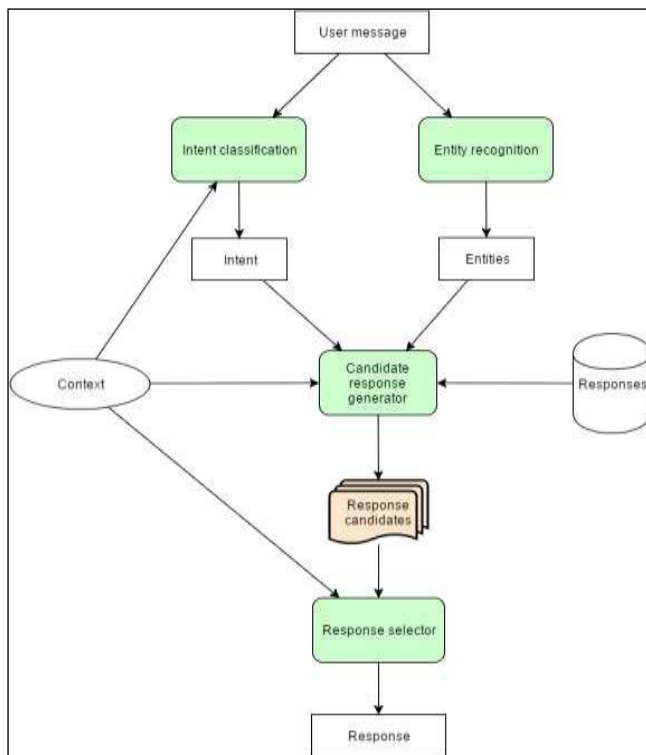


Figure 2. System Module

Proposed System

In this study, we used the Python Flask framework to create an interactive chatbot. Fig. 5.1 illustrates the workflow of the suggested framework. In general, user discussion starts with a simple greeting or general query. To determine whether the entered query is an AIML script or not, user enquiries are initially handled by an AIML check. General questions, queries, welcomes are typical of AIML and are answered using AIML formats.

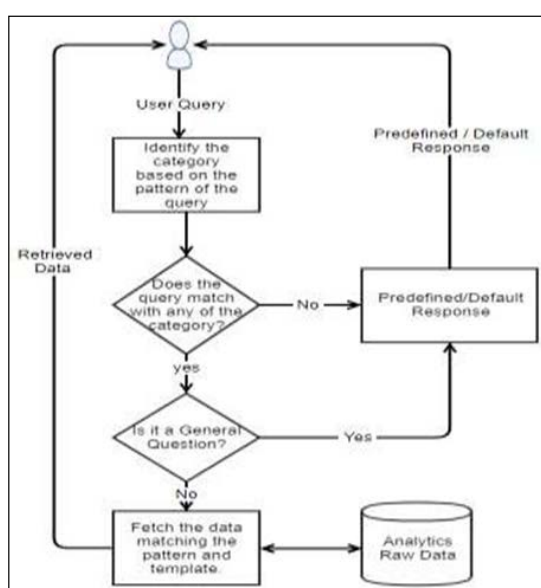


Figure 3. Proposed Model

The AIML-developed chatbot will detect the category that contains the question pattern as soon as the bot-user types the inquiry into the chat window. Here, it is assumed that the bot user will enter the query using a specific pattern. The template of the category containing the response is provided back to the bot-user once the query pattern has been matched.

Implementation

This section covers the design and implementation of a different module of the bot, which contains the design of the PYTHON module, the Translator API and the AIML module.



Figure 4. Conversation

We have included a chatbot that can communicate with users in this project. This chatbot can respond to user text input questions. AIML with program-o has been employed for this. Only questions for which the chatbot has an answer in its AIML dataset are eligible for an answer from it. Therefore, we may add the APIs of Wikipedia, the Weather Forecasting Department, Sports, News, Government, much more to the chatbot to improve its knowledge. The user will then be able to communicate and engage with the chatbot in any kind of domain under such circumstances. The chatbot will be able to respond to queries that aren't covered by its dataset but are taking place right now in the actual world by using APIs for things like weather, sports, news, government services.

The next stage in creating chatbots is to assist users in facilitating their work and interacting with computers through the use of natural language or their own set of rules. Future These chatbots, which are supported by machine learning, will be able to recall previous interactions and use what they've learned to respond to new ones. Communication with the many multiple users and bots would be difficult.

We can create an AIML and LSA-based chatbot as future work. A client will be able to communicate with a chatbot in a more natural way thanks to this technology. By adding and altering patterns and templates for AIML-based responses to common client inquiries, we may improve the discussion and ensure that the proper answer is provided more frequently than with LSA.

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