International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 08 Issue: 05 | May - 2024 SJIF Rating: 8.448 ISSN: 2582-3930

AI ASSISTANCE FOR HEALTHCARE USING NLP

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***Abstract*- Artificial Intelligence (AI) integration into healthcare has the potential to transform patient care, diagnostics, and treatment. This paper provides a detailed overview of AI support in healthcare, focusing on the intersection of (NLP) Natural Language Processing, (ML) Machine Learning, and (DS) Data Science. By employing the power of these slice- edge technologies, AI can offer intelligent, data- driven results to ameliorate healthcare delivery. Natural Language Processing(NLP) is employed to prize precious perceptivity from medical textbooks, clinical notes, and case records. This enables healthcare providers to more understand patient histories and make informed opinions. Machine literacy ways are abused to prognosticate complaint issues, identify anomalies, and epitomize treatment plans. also, data wisdom plays a vital part in aggregating and analysing large healthcare datasets, icing data security, and maintaining compliance with nonsupervisory norms. The paper explores colorful AI operations in healthcare, similar as automated opinion and triage, medical image analysis, medicine discovery, and patient monitoring. These operations have the eventuality to enhance clinical decision- timber, reduce medical crimes, and ameliorate patientoutcomes.AI backing in healthcare isn't without its challenges, including data sequestration enterprises, the need for robust model interpretability, and ethical considerations. The paper discusses these issues and presents strategies to address them. In conclusion, the integration of AI, NLP, Machine literacy, and Data Science in healthcare has the implicit to marshal in a new period of perfection drug and case- centred care. Then we used SVM Algorithm for training the data set and the delicacy position is 97 percent. This technology confluence is poised to revise healthcare by perfecting opinion delicacy, treatment efficacy-ity, and patient issues while icing data security and ethical use.**

INTRODUCTION:

Healthcare Chatbot – We've designed an automated medical chatbot that engages users through natural language processing, providing tailored medical assistance by leveraging the vast online information available. This chatbot solicits relevant user details like name and age, then proceeds to inquire about symptoms, systematically analyzing conversation patterns through AIML (Artificial Intelligence Markup Language) based on XML. It employs a progressive questioning approach to build a comprehensive assessment. The system comprises three core components: symptom recognition and extraction from user input, matching these symptoms to known conditions in the database, and referring cases to appropriate specialists if necessary. We conducted a comparative analysis against existing medical chatbots to showcase the superiority of our system in the field.

Objective

In addition to assessing cases, our system is capable of identifying an individual's condition or illness based on the symptoms provided. This entire process can be automated, including periodic regression tests to maintain the reliability of the system.

Motivation

Employing the power of NLP, machine literacy, and data wisdom, our AI- driven healthcare backing aims to empower providers by streamlining processes and furnishing perceptivity, eventually saving lives through hastily and more accurate judgments and treatments. Every line of law contributes to perfe-cting patient issues, optimizing treatment plans, prognosticating health pitfalls, and bodying care, enhancing the quality of life for innumerous individualities. By bridging gaps in healthcare access, offering remote consultations, individ-ualized recommendations, and abetting in early complaint discovery, our technology extends services to underserved communities, icing ace-ssible healthcare for all. also, the data perceptivity generated energy groundbreaking medical explo-ration, leading to new treatments and curatives, while also furnishing significant prof-itable benefits by lowering costs and making quality care more affordable. As we push the boundaries of technology, we are not only shaping a more effective and effective healthcare system but also laying the root for a brighter and further indifferent future for generations to come.

Problem Statement

All the conditioning inside a sanitarium are carried out manually. The cases need to register and the croakers can view the patient details and give the necessary treatment grounded on the symptoms of the case. All this requires a lot of mortal trouble and time and the performance isn't good. also, it's prone to a lot of crimes. To overcome these failings, an automatized medical chatbot has been designed. The chatbot will hear to stoner queries, converts speech to textbook, and give them with applicable answers. Chatbot keeps track of the case's status and provides suitable answers in relation to their conditions.

LITERATURE SURVEY

Flora Amato's paper focuses on using Deep Machine Learning and Artificial Intelligence to create applications that interact with patients similarly to doctors. The researcher utilized the Watson Conversation service, trained on the Blue mix platform, to develop this application [1].Divya, Indumathi, Ishwarya, and Priyasankari proposed a user dialogue-based system for symptom extraction, mapping, and diagnosis, distinguishing between major and minor diseases [2]. BenildaEleonor presented Pharma Bot, a chatbot designed as a Pediatric Generic Medicine Consultant, providing infor-mation and suggestions on generic medicines for children. The study employed a descriptive method and utilized Left and Right Parsing Algorithm [3]. Tobias Kowatsch's paper discusses the evolution from text-based chatbots to mobile coach applications, allowing patients to communicate with doctors for daily health advice and suggestions, with data integration from Google and doctors [4]. K. Oh, D. Lee, B. Ko, and H. Choi's study focuses on emotion classification using AI methods like recurrent neural networks (RNN), deep learning, and convolutional neural networks (CNN), integrating Natural Language Proce-ssing (NLP) and Natural-Language Gene-ration (NLG) for counseling purposes [5]. Du Preez, S.J., Lall, Manoj & Sinha developed a voice recognition chatbot, with unanswered questions processed by third-party expert systems. The study emphasizes the improvement in system capabilities with voice recognition and expert system integration [6]. Bayu Setiaji and Ferry Wahyu Wibowo proposed a chatbot using a knowledge database and bigram similarity scoring for sentence identification and response generation, storing knowledge in a relational database management system (RDBMS) [7]. Dahiya and Menal implemented a chatbot using pattern comparison for sentence order recognition and response generation, detailing the system's components and functiona-lity[8].C.P. Shabariram, V. Srinath, C.S. Indhuja, and Vidhya utilized n-gram techniques for word extraction and comparison, integra-ting phonemes and an expert system for analysis and response generation [9]. Shukla, V.K, Verma proposed an educational chatbot model using R language and AIML for interactive communication within university systems, focusing on enhancing student engagement [10].

Existing System

The system relies on the conversational input provided by the user during discussions. The main focus is to prioritize primary symptoms and the user's concerns. Once the automated medical chatbot gathers sufficient data from the initial conversation, it engages the user by asking questions and attempts to analyze conditions by converting input data into queries and executing them. Various challenges may arise during this process.

1. Complex interface
2. Inability to Understand
3. Time-consuming
4. Increase installation cost

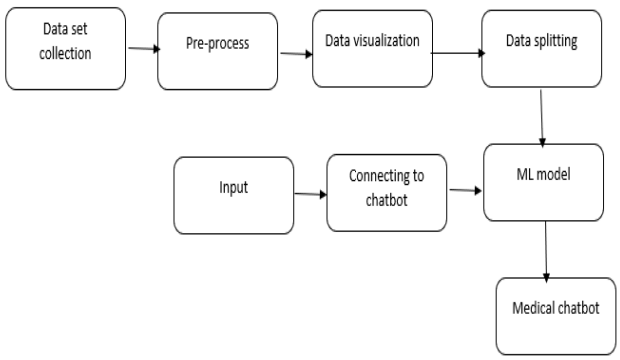
Proposed System:

1. Introducing the machine learning based chat bot.
2. This chat-bot will be based on NLP.

Advantages

1. Reduced time for commuting to the doctor's office.
2. Reduced expenses on unne-cessary treatments and tests.
3. Convenient access to the doc-tor with a simple button press.

Block Diagram:



Modules:

Data Set Collection

Depending on your objects and data sources, you may need to collect structured and unshaped data. This can involve web scraping, API integration, hookups with healthcare providers, or using being healthcare datasets.

Pre-Process

Clean and preprocess your data. This may include tasks similar as textbook cleaning(removing special characters, lowercasing), tokenization, and stemming or lemmatiza-tion.

Data Visualization

Fantasize case records to give a quick overview of a case's medical history, including demographics, judgments, specifics, and lab results. produce interactive dashboards that allow healthcare providers to sludge and explore patient data, relating trends and anomalies. Analise patient reviews and feedback using NLP to prize sentiment and satisfaction scores. fantasize sentiment trends and identify areas where healthcare services can be bettered.

Data Splitting

- **Train-Validation-Test Split:** Split your dataset into three segments: a training set, a validation set, and a test set. The standard distribution is usually around 70-80% for training, 10-15% for validation, and 10-15% for testing.

- **Stratified Sampling:** Ensure that each class or order is represented proportionally in all three sets. Stratified sampling helps help an imbalance that might lead to prejudiced model performance.

Randomization: A while back, rearrange the data arbitrarily to get rid of any underlying patterns or order-related predispositions.

Cross-Validation: In certain situations, particularly when working with a small dataset, you could decide to evaluate the model's performance more thoroughly by employing cross-validation methods like k-fold cross-validation.

Chatbot:

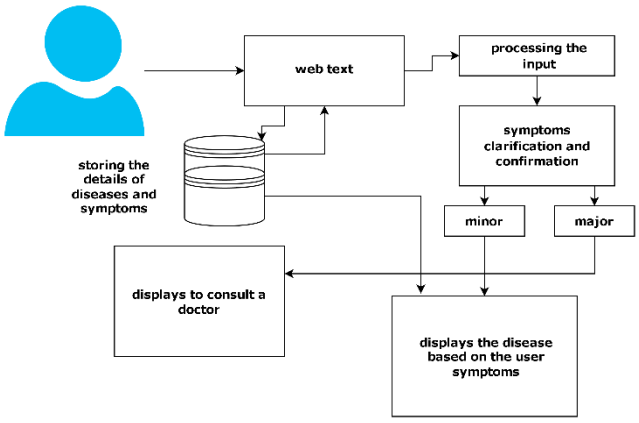
The human text is received and processed by a chatbot. It generates the appropriate result after receiving the user's input on the disease and any pertinent symptoms.

MODEL:

Create machine learning models to perform different tasks in healthcare:

• Diagnosis of diseases: Develop models that forecast illnesses based on patient history and symptoms.
• Medication recommendation: Create a system that makes recommendations for the right drugs.
• Question-answering system: Create an AI to respond to inquiries about medicine.
• Anomaly detection: Spot odd trends in patient information.
• Sentiment analysis: Evaluate the attitudes and comments of patients or doctors.

ARCHITECTURE



Here, the patient provides details about his ailments, which are then read by the chatbot, which then handles the data. The chatbot then divides the symptoms into minor and major symptoms based on the input. The chatbot will indicate that "you should consult a doctor" if the ailment is severe. In the event when the patient's symptoms are mild, the illness will be described and consultations will be provided.

Natural Language Processing (NLP) Technology:

Step 1: we have to install all NLTK packages. By using pip install NLTK.

Step 2: Import natural language toolkit into the code.

These are some common techniques used in NLP.

1. Tokenization: the act of dividing a text into separate words or sentences.
2. Part-of-speech tagging: the procedure of designating the grammatical part of speech for each word in a phrase.
3. Named entity recognition involves identifying and categorizing specific entities in text, such as individuals, places, and organizations.

4. Sentiment analysis entails determining the emotional tone of a text, including whether it is neutral, positive, or negative.

Machine translation refers to the automated process of translating text from one language to another.

Text classification involves categorizing texts based on predefined subjects or categories.

SVM Algorithm

SVM is used by us for training. With the aid of a decision tree classifier, we use this approach to train data sets. The trained data has a nearly 98 percent accuracy rate.

In order to determine the mean scores of the trained data, import SVM and call this machine learning model.

Flask:

A lightweight and adaptable Python web framework for creating web applications is called Flask. Because of its straightforward, adaptable, and easy-to-learn design, developers can create web apps fast and effectively. Flask provides essential tools and libraries to handle tasks such as routing, HTTP requests, sessions, and template rendering.

Key features of Flask include:

Routing: Flask makes it simple to establish routes and create endpoints for processing various HTTP methods, such as GET, POST, PUT, DELETE, etc. by mapping URLs to functions using decorators.

HTTP Request Handling: It provides request and response handling, enabling programmers to handle incoming HTTP requests and create pertinent answers.

Template Engine: Jinja2, a potent and intuitive template engine included with Flask, makes it easier to create dynamic webpages by separating HTML and Python code.

Extensions: Because of Flask's modular architecture, developers can incorporate a variety of extensions for features like form validation, user authentication, database integration (SQLAlchemy), etc.

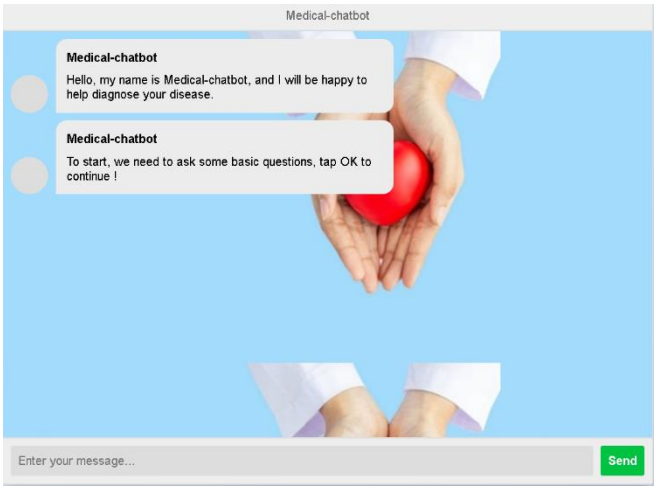
Scalability: Although Flask has a minimalistic design, it can be used to create both simple and complex online applications since it is scalable and can be expanded as needed by integrating other libraries and extensions.

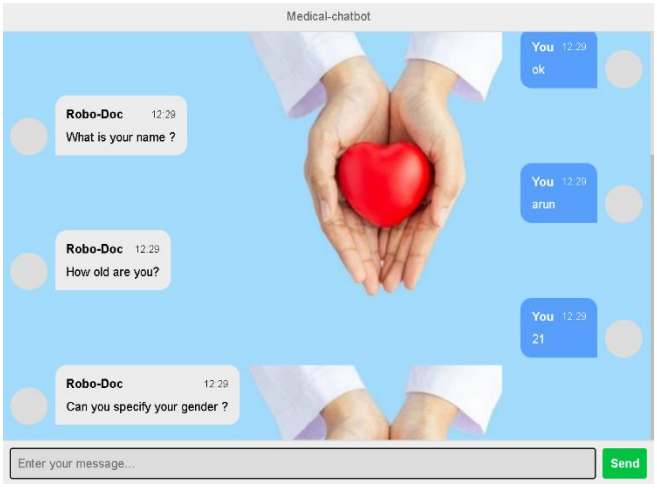
Werkzeug and Jinja2: Flask provides a solid foundation for Python web development by utilising the Jinja2 template engine and building upon the Werkzeug WSGI framework. .

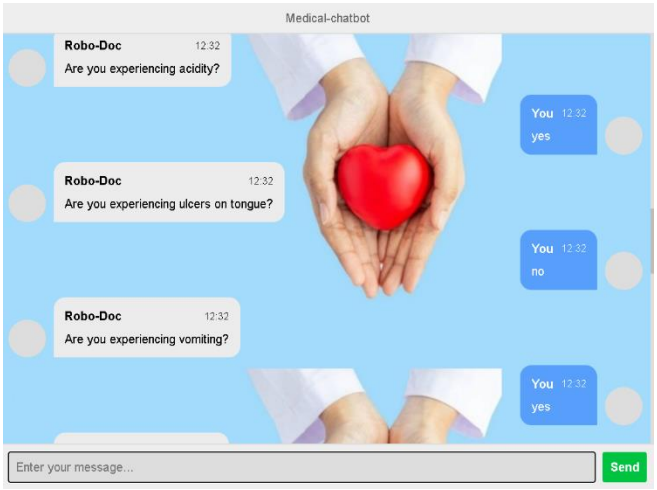
Overall, developers choose Flask above other options when creating web apps, RESTful APIs, and prototypes in Python due to its ease of use, versatility, and copious documentation.

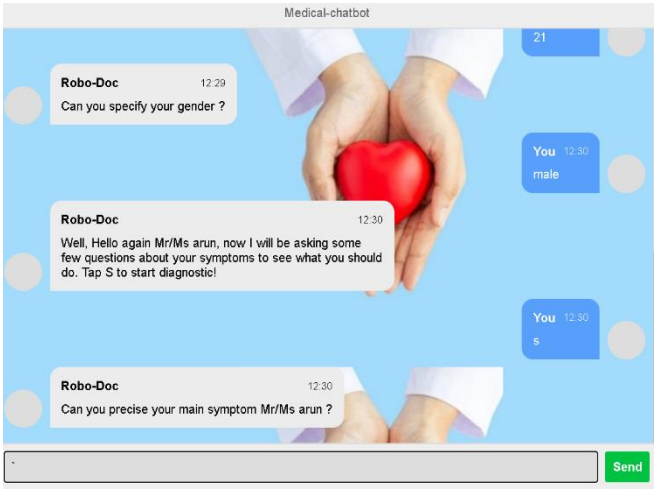
RESULT

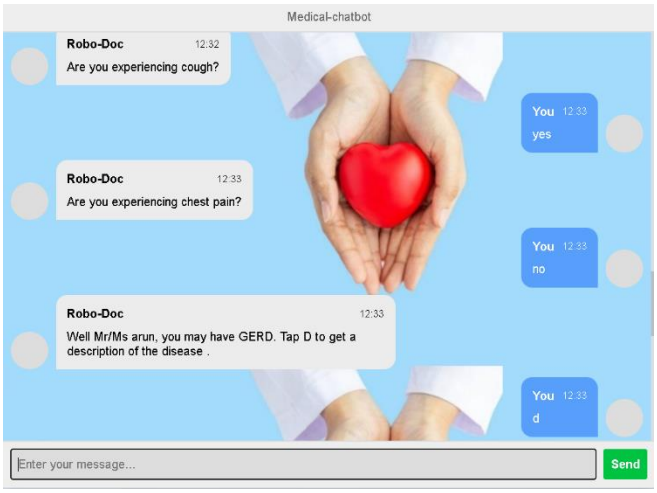
The webpage will display the results. We utilised HTML and CSS to develop a webpage. Here, the patient will engage in conversation with the chatbot, which will ask pertinent questions to address the symptoms mentioned by the patient. The chatbot will also describe the symptoms and recommend appropriate actions and precautions. It will indicate whether or not to consult a doctor based on the severity.

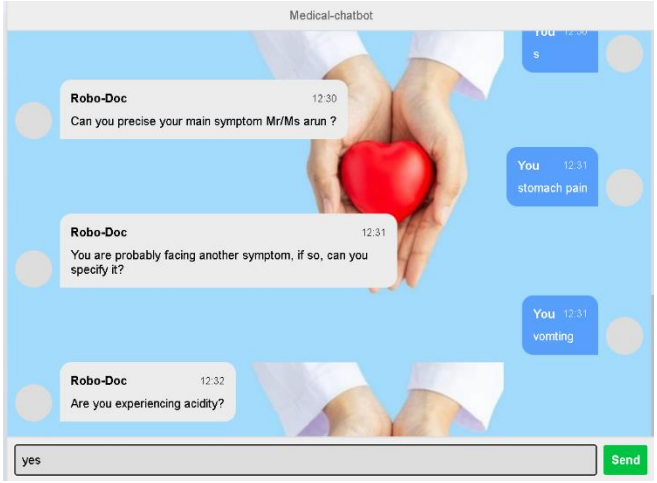


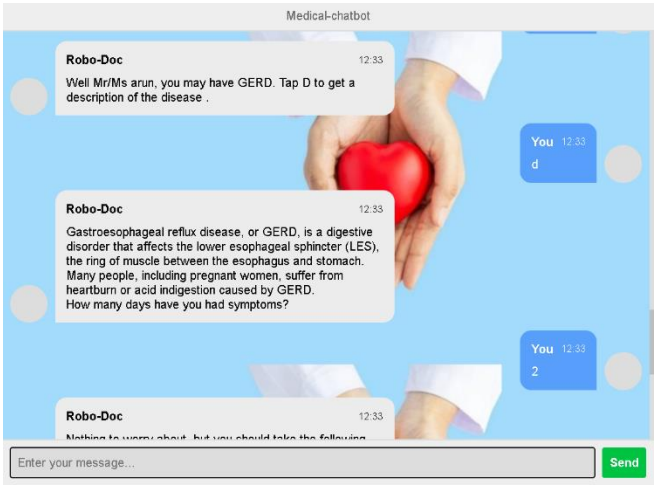

Medical-chatbot
Robo-Doc 12:29
What is your name ?
You 12:29
ok
Robo-Doc 12:29
How old are you?
You 12:29
arun
Robo-Doc 12:29
Can you specify your gender ?
You 12:29
21
Enter your message...
Send

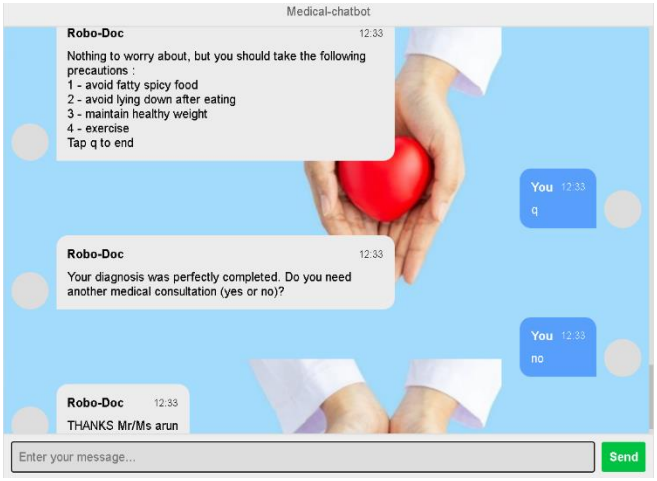

Medical-chatbot
Robo-Doc 12:32
Are you experiencing acidity?
You 12:32
yes
Robo-Doc 12:32
Are you experiencing ulcers on tongue?
You 12:32
no
Robo-Doc 12:32
Are you experiencing vomiting?
You 12:32
yes
Enter your message...
Send


Medical-chatbot
21
Robo-Doc 12:29
Can you specify your gender ?
You 12:30
male
Robo-Doc 12:30
Well, Hello again Mr/Ms arun, now I will be asking some few questions about your symptoms to see what you should do. Tap S to start diagnostic!
You 12:30
s
Robo-Doc 12:30
Can you precise your main symptom Mr/Ms arun ?
Send


Medical-chatbot
Robo-Doc 12:32
Are you experiencing cough?
You 12:33
yes
Robo-Doc 12:33
Are you experiencing chest pain?
You 12:33
no
Robo-Doc 12:33
Well Mr/Ms arun, you may have GERD. Tap D to get a description of the disease .
You 12:33
d
Enter your message...
Send


Medical-chatbot
Robo-Doc 12:30
Can you precise your main symptom Mr/Ms arun ?
You 12:31
stomach pain
Robo-Doc 12:31
You are probably facing another symptom, if so, can you specify it?
You 12:31
vomiting
Robo-Doc 12:32
Are you experiencing acidity?
yes
Send


Medical-chatbot
Robo-Doc 12:33
Well Mr/Ms arun, you may have GERD. Tap D to get a description of the disease .
You 12:33
d
Robo-Doc 12:33
Gastroesophageal reflux disease, or GERD, is a digestive disorder that affects the lower esophageal sphincter (LES), the ring of muscle between the esophagus and stomach. Many people, including pregnant women, suffer from heartburn or acid indigestion caused by GERD.
How many days have you had symptoms?
You 12:33
2
Robo-Doc 12:33
Enter your message...
Send



CONCLUSION

It's amazing to see our development with the symptom recognition automated medical chatbot! It's already showing benefits in providing a tailored method of comprehending any health issues. However, the use of a closed-source recognition engine is a crucial factor to be taken into account for future growth. Although it serves its purpose for the time being, this external engine functions somewhat as a mystery, making it more difficult to comprehend how it makes decisions in the future. There are two things we can do to fully realise the chatbot's potential. We may start from scratch and create our own internal recognition engine. With the control and transparency provided by this approach, we may customise it to our exact specifications and keep enhancing its diagnostic abilities. However, creating a reliable engine from the ground up is a big task.

FUTURE SCOPE

The health care system that gives you the ability to manage your own health. This sophisticated system does more than just interpret your symptoms. It is capable of analysing and interpreting your medical records and producing simple, lucid summaries. Say goodbye to translating complicated medical terms! The system extracts the most important information, including the purpose of the report (motivation), its observations and findings (information), and any test results (results). This gives you more power to comprehend your current state of health. However, it doesn't end there. This clever solution integrates with regional healthcare databases to go one step further. The technology may quickly obtain the addresses and contact details of local physicians who specialise in a given ailment or condition if it is included in the report. This saves the trouble of having to search.

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