Chatbot to respond to text queries pertaining to various Acts, Rules, and Regulations applicable to Mining industries

Artificial Intelligence and Machine Learning (PCCCS594)

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in
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Submitted by
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Developer Team

Bhaskar Saha _____

Abstract

The mining industry operates under a complex framework of laws, rules, regulations, and circulars, making it challenging for stakeholders to access relevant information efficiently. To address this, the proposed solution is the development of an AI-powered chatbot, designed to assist in answering queries related to various mining regulations and legal frameworks. Leveraging Natural Language Processing (NLP) and Artificial Intelligence (AI), the chatbot will provide 24/7 automated responses to stakeholders, including miners, management, and other relevant parties. It will support queries about Acts like The Coal Mines Act, 1952, The Indian Explosives Act, 1884, and various other mining-related rules and regulations, as well as land-related laws such as CBA, LA, and RandR. The chatbot aims to streamline access to critical information and enhance the overall efficiency of the mining industry's information management system.

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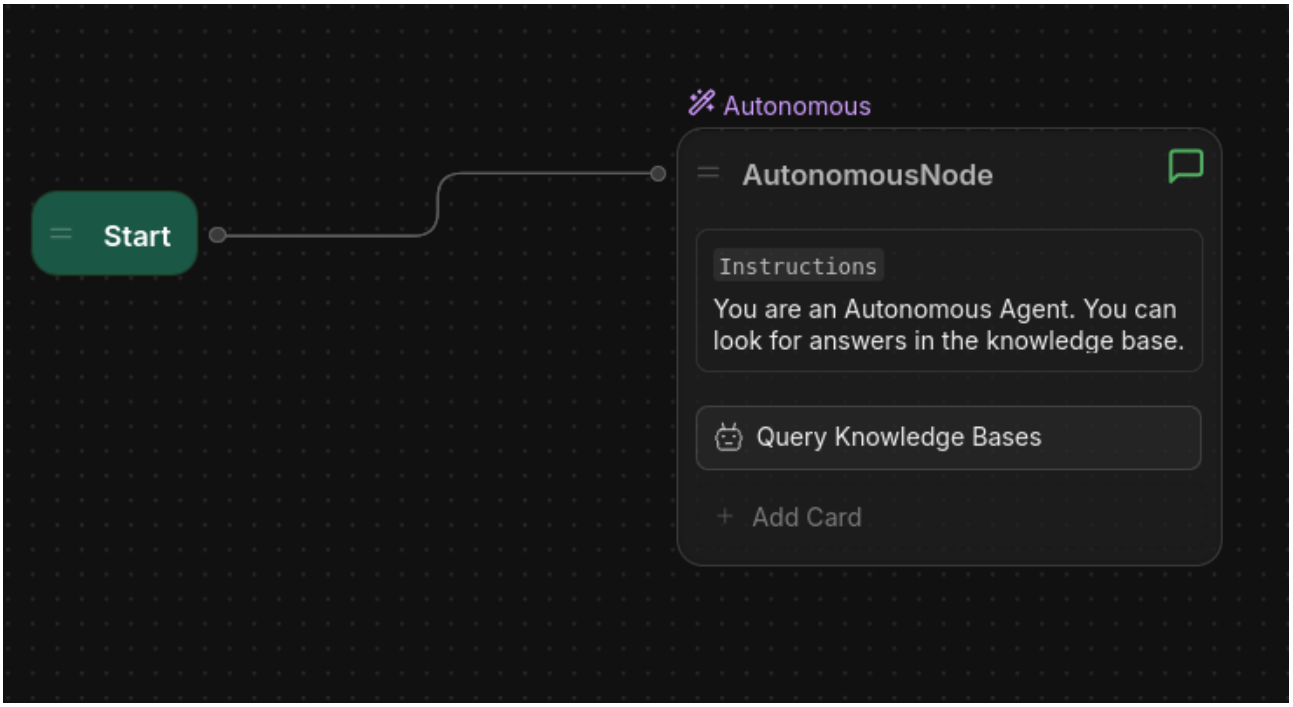
Introduction

The mining industry is highly regulated, with numerous legal provisions that govern operations, safety, and labor practices. These include national laws like The Coal Mines Act, 1952, The Indian Explosives Act, 1884, and The Coal Mines Regulations, 2017, among others. The complexity and sheer volume of these regulations often make it difficult for industry stakeholders to navigate and find specific information when needed. Traditional methods of manual inquiry or relying on human experts are not always efficient or scalable, particularly when access to information is needed quickly or outside of regular working hours.

To solve this problem, a chatbot powered by Artificial Intelligence (AI) and Natural Language Processing (NLP) is proposed. The chatbot will be designed to provide stakeholders with easy, on-demand access to the full spectrum of relevant mining laws and regulations. This would allow users to inquire about specific Acts, Circulars, Rules, and even land-related laws concerning compensation, rehabilitation, and acquisition (CBA, LA, RandR), enhancing the overall management of mining industry information. The implementation of such a system will not only improve operational efficiency but will also contribute to better compliance with legal standards, reducing the risk of errors and improving the industry's overall regulatory transparency.

Design Strategy

We used BotPress to ease up the process of making a bot. We first defined the following workflow in BotPress:



Then we populated its knowledge base using the following:

- Coal Mines Nationalisation Act, 1973
- Indian Explosives Act, 1884
- The Payment of Wages (Mines) Rules, 1956
- The Colliery Control Rules, 2004
- The Colliery Control Order, 2000
- Coal Mines Regulation, 2017
- The Payment of Wages (Mines) Rules Amendment, 2019

Then we noted the credentials to access the API of our bot and used it in a basic website we built using HTML and JavaScript.

Code

index.html

```html
<html>
  <head>
  <meta name="viewport" content="width=device-width, initial-scale=1 viewport-fit=cover, minimum-scale=1.0,
maximum-scale=1.0, user-scalable=no">
  </head>

  <body bgcolor="#CF9FFF">

    <script src="inject.js"></script>
    <script src="init.js"></script>

  </body>
</html>
```

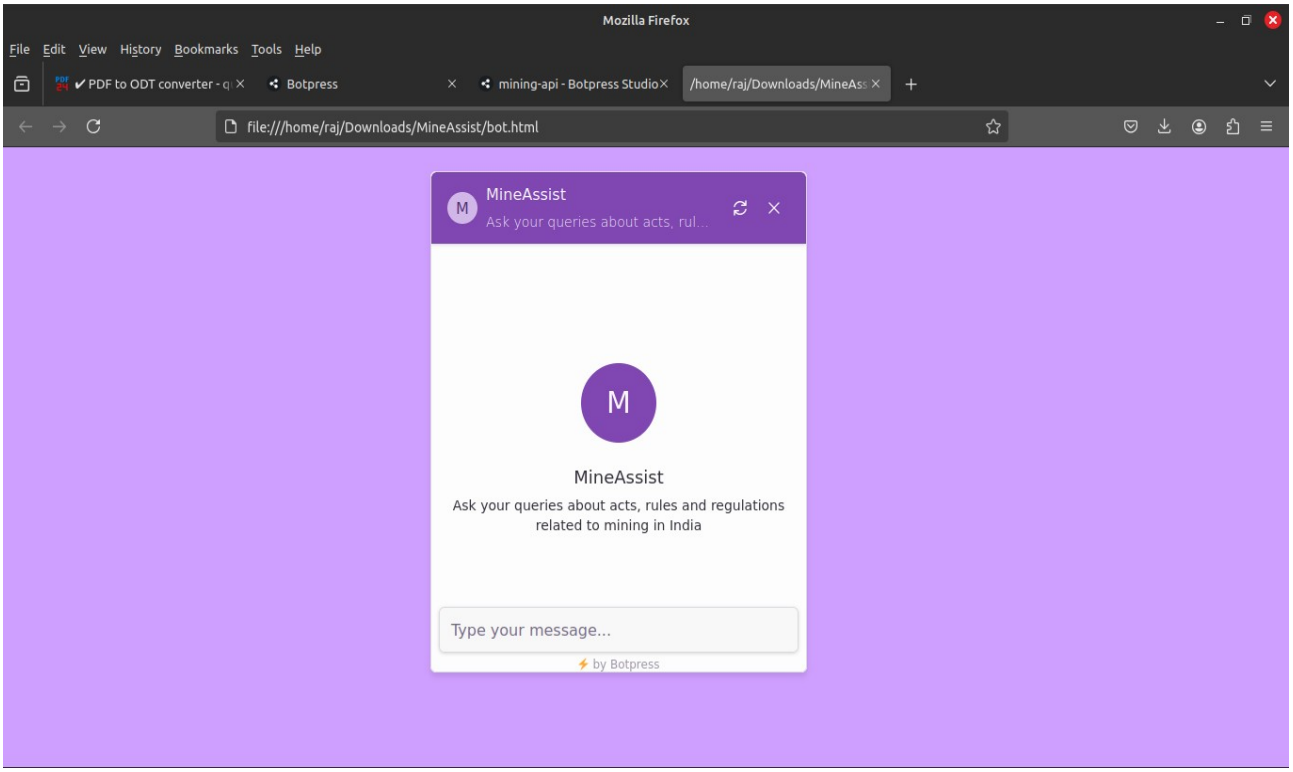
init.js

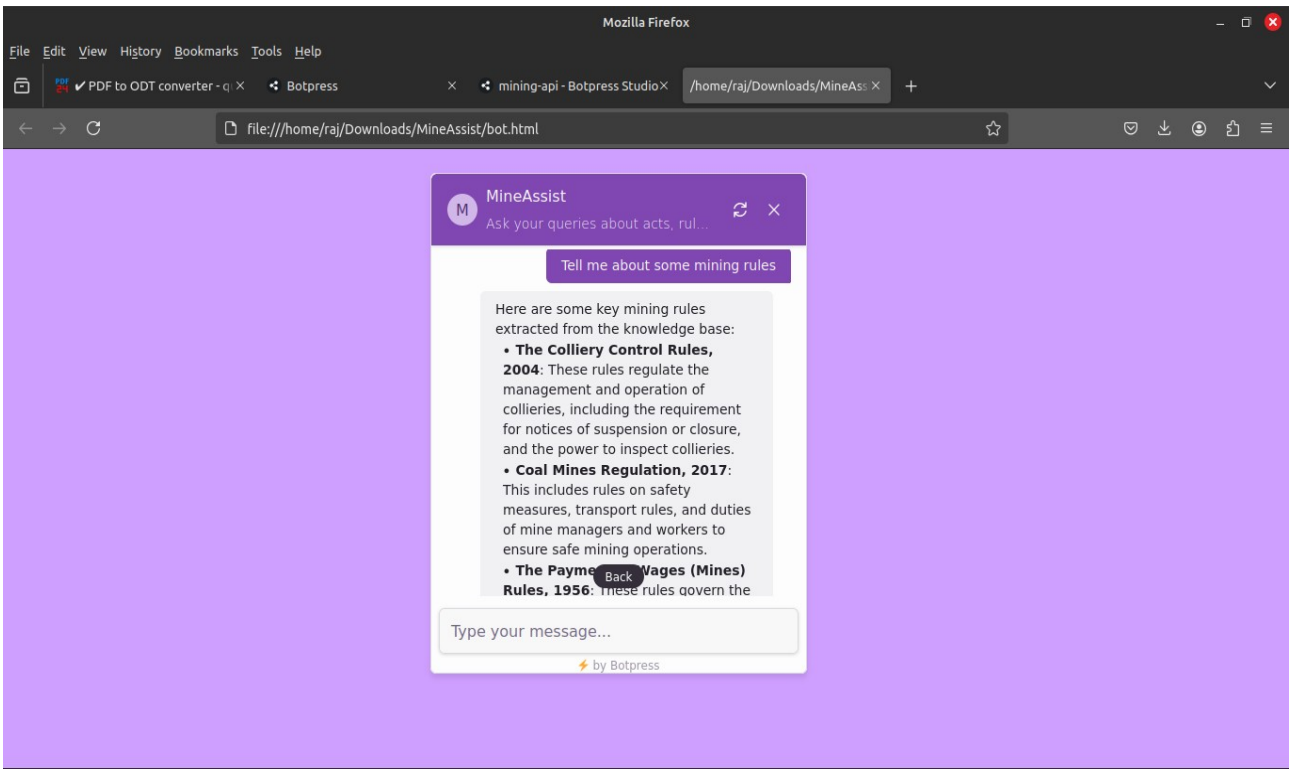
```javascript
window.botpress.init({
  "botId": "419de547-91a8-4ae7-8904-5a57f7ad0288",
  "configuration": {
    "botName": "MineAssist",
    "botDescription": "Ask your queries about acts, rules and regulations related to mining in India",
    "website": {},
    "email": {},
    "phone": {},
    "termsOfService": {},
    "privacyPolicy": {},
    "color": "#8e4ec6",
    "variant": "solid",
    "themeMode": "light",
    "fontFamily": "ibm",
    "radius": 1
  },
  "clientId": "de7bf45d-e661-4a6b-ae99-e68ddc2225bd"
});
```

inject.js

```
....
        }, zn = $c(), u = {
            initialized: !1,
            version: "2a326c166beff0be35ed96d5bd3b45b23db649ea",
            pushpinUrl: "https://webchat.botpress.cloud",
            clientId: "",
            botId: "",
            fabIframe: void 0,
            fabId: "fab-root",
            state: "initial",
            webchatIframe: void 0,
            webchatId: "webchat-root",
            configuration: void 0,
            user: void 0,
            allowFileUpload: void 0,
            open: Bc,
            close: Dc,
            toggle: Mc,
            init: Nc,
            config: Gc,
            sendEvent: Lc,
            sendMessage: Rc,
            updateUser: Hc,
            getUser: zc,
            on: zn.on,
            _emit: zn.emit
        };
    window.botpress = u;
})();
```

Results & Simulation





Conclusion

The development of an AI-powered chatbot for the mining industry presents a transformative solution to the challenges associated with navigating complex legal frameworks and regulatory compliance. By leveraging Artificial Intelligence (AI) and Natural Language Processing (NLP), the proposed chatbot will offer stakeholders a convenient, 24/7 automated tool for accessing information about mining-related laws, regulations, and circulars. This solution will streamline the process of retrieving critical information, reducing the burden on employees and legal teams, improving compliance, and enhancing operational efficiency. The chatbot will not only support queries related to Acts such as The Coal Mines Act, 1952, and The Indian Explosives Act, 1884 but also extend its capabilities to address land-related laws like CBA, LA, and RandR queries, making it a comprehensive tool for the mining sector. Ultimately, this system will serve as an essential resource for the mining industry, contributing to better-informed decision-making and more efficient regulatory management.

Future Scope

While the initial implementation of the chatbot will focus on addressing queries related to mining laws and regulations, its future scope extends far beyond. Several areas for further development include:

1. **Multi-Language Support**: Expanding the chatbot's capabilities to support multiple languages, especially regional languages, will make it accessible to a wider audience of stakeholders, including workers and management across different regions.
2. **Integration with External Databases**: The chatbot could be integrated with external regulatory databases, government portals, and legal repositories to provide real-time updates on new regulations, amendments, or circulars, ensuring stakeholders always have access to the most current information.
3. **Advanced Analytics**: Incorporating advanced data analytics into the chatbot could allow for the identification of trends in stakeholder queries, enabling mining companies to proactively address common concerns and optimize their regulatory processes.
4. **Personalized Recommendations**: Over time, the chatbot could evolve to offer personalized recommendations based on the user's specific role in the mining industry (e.g., safety officer, labor manager, or legal expert), providing tailored information to help make more informed decisions.
5. **Voice Integration**: In addition to text-based queries, voice recognition could be incorporated, allowing users to interact with the system via speech, making it more accessible, particularly for workers in the field who may find typing cumbersome.

References

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