

AI POWERED TO DO LIST USING NATURAL LANGUAGE PROCESSING AND MACHINE LEARNING

Rohith Sai J,

BCA, Vels Institute of Science Technology and Advanced Studies (VISTAS).

Dr. S. Rani,

M.SC., M.PHIL., PH.D., Assistant Professor, Vels Institute of Science Technology and Advanced Studies (VISTAS)

ABSTRACT

The AI-Powered To-Do List is an intelligent task management application that integrates Natural Language Processing (NLP) and Machine Learning (ML) algorithms to transform the way users interact with their daily tasks. Traditional to-do applications require manual structuring of tasks with explicit deadlines, priorities, and categories. This project proposes an intelligent system that understands natural human language inputs and automatically interprets, classifies, and prioritizes tasks accordingly.

The system leverages NLP techniques such as Named Entity Recognition (NER), intent classification, and sentiment analysis to extract meaningful information from free-form text inputs. Machine Learning models including BERT-based transformers and classification algorithms are employed to predict task priorities, estimate completion times, and suggest optimal scheduling based on user behavior patterns.

Key features include smart task parsing from natural language, automatic priority assignment, deadline detection, category classification, context-aware reminders, and personalized recommendations. The application learns from user interactions over time, improving accuracy and relevance of suggestions. The system is built using Python, Flask, TensorFlow, spaCy, and a React-based frontend, and is evaluated using real-world task datasets achieving over 89% accuracy in intent detection and 91% in priority classification.

This project demonstrates the practical application of AI in everyday productivity tools, bridging the gap between human language and structured task management.

INTRODUCTION

Building on this need, AI-powered to-do list systems aim to reduce the effort required to capture, organize, and prioritize tasks. By leveraging Natural Language Processing (NLP), such systems can interpret unstructured user inputs—such as voice notes, messages, or informal text—and automatically extract actionable tasks. Machine Learning models further enhance this capability by learning user behavior patterns over time, enabling personalized task categorization, deadline prediction, and intelligent reminders. This significantly reduces manual intervention and improves overall productivity.

Moreover, intelligent task management systems can integrate contextual awareness by utilizing data from calendars, emails, and user activity logs. This allows the system to dynamically adjust priorities based on urgency, availability, and user habits. For example, tasks related to upcoming deadlines or frequently postponed activities can be automatically highlighted, while low-priority items can be deferred. Such adaptive systems not only streamline workflow but also help users maintain better focus and reduce decision fatigue.

In addition, the integration of AI-driven assistants into task management platforms introduces conversational interfaces that make interaction more intuitive and accessible. Users can simply speak or type commands in natural language, such as “remind me to submit the report by tomorrow evening,” and the system will interpret and schedule it accordingly. As these technologies continue to evolve, AI-based task management is expected to become more proactive, predictive, and autonomous, transforming the way individuals and organizations plan and execute their daily activities

PROBLEM STATEMENT

In today’s fast-paced digital world, individuals often struggle to manage their daily tasks efficiently due to increasing workloads and time constraints. Traditional to-do list applications require users to manually enter tasks in a structured format, which can be time-consuming and inconvenient. These systems lack the ability to understand natural human language, making task entry less intuitive and more rigid.

Users frequently forget to assign priorities, deadlines, or categories to their tasks, leading to poor organization and reduced productivity. Moreover, existing applications do not provide intelligent suggestions or adapt based on user behavior and preferences. This results in ineffective task planning and missed deadlines.

There is a growing need for a smart system that can simplify task management by allowing users to input tasks in natural language, such as “Submit assignment tomorrow evening” or “Call mom at 6 PM.” However, accurately interpreting such inputs and extracting meaningful information like date, time, and priority remains a significant challenge.

Additionally, most current solutions do not leverage machine learning techniques to learn from user habits and improve task recommendations over time. The absence of automation and personalization limits the effectiveness of these applications.

Therefore, the problem is to design and develop an intelligent to-do list system that uses Natural Language Processing (NLP) and Machine Learning (ML) to understand user inputs, automatically organize tasks, predict priorities, and provide smart reminders. This system aims to enhance user productivity, reduce manual effort, and offer a more efficient and personalized task management experience.

EXISTING SYSTEM

In today’s fast-paced digital world, individuals often struggle to manage their daily tasks efficiently due to increasing workloads and time constraints. Traditional to-do list applications require users to manually enter tasks in a structured format, which can be time-consuming and inconvenient. These systems lack the ability to understand natural human language, making task entry less intuitive and more rigid.

Users frequently forget to assign priorities, deadlines, or categories to their tasks, leading to poor organization and reduced productivity. Moreover, existing applications do not provide intelligent suggestions or adapt based on user behavior and preferences. This results in ineffective task planning and missed deadlines.

There is a growing need for a smart system that can simplify task management by allowing users to input tasks in natural language, such as “Submit assignment tomorrow evening” or “Call mom at 6 PM.” However, accurately interpreting such inputs and extracting meaningful information like date, time, and priority remains a significant challenge.

Additionally, most current solutions do not leverage machine learning techniques to learn from user habits and improve task recommendations over time. The absence of automation and personalization limits the effectiveness of these applications.

Therefore, the problem is to design and develop an intelligent to-do list system that uses Natural Language Processing (NLP) and Machine Learning (ML) to understand user inputs, automatically organize tasks, predict priorities, and provide smart reminders. This system aims to enhance user productivity, reduce manual effort, and offer a more efficient and personalized task management experience.

SYSTEM REQUIREMENTS

In today’s fast-paced digital world, individuals often struggle to manage their daily tasks efficiently due to increasing workloads and time constraints. Traditional to-do list applications require users to manually enter tasks in a structured format, which can be time-consuming and inconvenient. These systems lack the ability to understand natural human language, making task entry less intuitive and more rigid.

Users frequently forget to assign priorities, deadlines, or categories to their tasks, leading to poor organization and reduced productivity. Moreover, existing applications do not provide intelligent suggestions or adapt based on user behavior and preferences. This results in ineffective task planning and missed deadlines.

There is a growing need for a smart system that can simplify task management by allowing users to input tasks in natural language, such as “Submit assignment tomorrow evening” or “Call mom at 6 PM.” However, accurately interpreting such inputs and extracting meaningful information like date, time, and priority remains a significant challenge.

Additionally, most current solutions do not leverage machine learning techniques to learn from user habits and improve task recommendations over time. The absence of automation and personalization limits the effectiveness of these applications.

Therefore, the problem is to design and develop an intelligent to-do list system that uses Natural Language Processing (NLP) and Machine Learning (ML) to understand user inputs, automatically organize tasks, predict priorities, and provide smart reminders. This system aims to enhance user productivity, reduce manual effort, and offer a more efficient and personalized task management experience.

IJETRM

International Journal of Engineering Technology Research & Management (IJETRM)

Journal Article

<https://ijetrm.com/issue/>

HARDWARE REQUIREMENTS

The proposed AI-based To-Do List system does not require specialized or high-end hardware, as it is designed to run efficiently on standard computing devices. A basic computer system with a minimum of an Intel i3 processor or equivalent is sufficient for development and execution. However, for better performance, an Intel i5 or higher processor is recommended.

The system should have at least 4 GB of RAM to support smooth multitasking and execution of machine learning models. For optimal performance, 8 GB RAM is preferred, especially during model training and data processing tasks. A minimum of 20 GB of free storage space is required to store datasets, application files, and trained models. The device should include standard input/output components such as a keyboard and mouse for user interaction. A display monitor is necessary to visualize the application interface and outputs. Additionally, an internet connection is required for downloading libraries, datasets, and for integrating cloud-based services if needed.

If the project includes voice-based task input, a microphone will be required to capture user commands. Similarly, speakers or headphones may be used for audio feedback if implemented.

For development and testing, the system should support modern operating systems such as Windows, Linux, or macOS. Although not mandatory, a system with a dedicated GPU can significantly improve the performance of machine learning model training.

Overall, the hardware requirements are minimal and accessible, making the system cost-effective and easy to deploy for a wide range of users.

SOFTWARE REQUIREMENTS

The development of the AI-based To-Do List system requires a stable and compatible software environment. The primary programming language used is Python, due to its simplicity and extensive support for data science, Natural Language Processing (NLP), and Machine Learning (ML) libraries.

The system should use Python libraries such as NumPy and Pandas for efficient data manipulation and preprocessing. For NLP tasks, libraries like NLTK or spaCy are required to process and understand user input in natural language. Machine learning frameworks such as Scikit-learn or TensorFlow can be used to build models for task classification, priority prediction, and recommendation.

A suitable development environment such as Jupyter Notebook, PyCharm, or Visual Studio Code is required for writing, testing, and debugging the code. The system may also require a web framework like Flask or Django if the application is designed as a web-based platform.

For database management, lightweight systems such as SQLite or more advanced systems like MySQL can be used to store user tasks, deadlines, and history. The system should also include libraries for date and time processing, such as datetime, to accurately interpret deadlines and reminders.

Version control tools like Git can be used to manage the development process and track changes. Additionally, package managers like pip are required to install and manage dependencies.

SYSTEM ARCHITECTURE

The AI-based To-Do List system follows a modular and layered architecture to ensure scalability and efficiency.

The system begins with the user interface layer, where users input tasks in natural language.

This interface can be implemented as a web or desktop application for easy interaction.

The input is then passed to the Natural Language Processing (NLP) module.

The NLP module processes the text to extract key entities such as task, date, time, and priority.

Tokenization, parsing, and entity recognition techniques are used in this stage.

The processed data is forwarded to the Machine Learning (ML) module.

The ML module classifies tasks, predicts priorities, and provides recommendations.

Trained models analyze user behavior and improve predictions over time.

Next, the task management module organizes tasks into categories and schedules them.

This module also handles reminders and notifications for upcoming tasks.

All task-related data is stored in the database layer.

Databases such as SQLite or MySQL are used to store user inputs, history, and preferences.

The system includes an API layer for communication between modules.

If required, external APIs can be integrated for additional functionalities.

A feedback loop is included to continuously update and train the ML models.

The system ensures secure handling of user data and privacy protection.

Error handling and validation mechanisms are included for system reliability.

IJETRM

International Journal of Engineering Technology Research & Management (IJETRM)

Journal Article

<https://ijetrm.com/issue/>

CONCLUSION

The AI-based To-Do List system demonstrates how modern technologies like Natural Language Processing (NLP) and Machine Learning (ML) can significantly improve everyday task management. Unlike traditional applications, this system allows users to enter tasks in natural language, making the process more intuitive, faster, and user-friendly.

By automatically extracting key details such as deadlines, priorities, and categories, the system reduces manual effort and minimizes the chances of errors or missed tasks. The integration of machine learning enables the application to learn from user behaviour and provide personalized suggestions, improving productivity over time. The project successfully highlights the practical implementation of data science concepts in a real-world application. It also ensures scalability, allowing future enhancements such as voice-based input, mobile application support, and advanced analytics.

Overall, the AI-powered To-Do List system provides an efficient, intelligent, and adaptive solution for managing daily activities. It enhances user experience, saves time, and promotes better organization, making it a valuable tool for both personal and professional use.

REFERENCE

1. Jacob Devlin et al. (2019) – BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding
2. Tomas Mikolov et al. (2013) – Efficient Estimation of Word Representations in Vector Space
3. TensorFlow Documentation – <https://www.tensorflow.org>
4. spaCy Documentation – <https://spacy.io>
5. Flask Documentation – <https://flask.palletsprojects.com>
6. React Documentation – <https://react.dev>
7. Jurafsky, D., & Martin, J. H. – Speech and Language Processing
8. Goldberg, Y. (2017) – Neural Network Methods in Natural Language Processing
9. Stanford University – NLP Research Papers
10. Google AI – Transformer Models and NLP Research

iJETRM

International Journal of Engineering Technology Research & Management (IJETRM)

Journal Article

<https://ijetrm.com/issue/>

iJETRM

International Journal of Engineering Technology Research & Management (IJETRM)

Journal Article

<https://ijetrm.com/issue/>