

# Hello!

We are HCMUS.IPYNB from the  
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## Who are we?

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# Our MVPs



Aspect-Based  
Sentiment Analyst

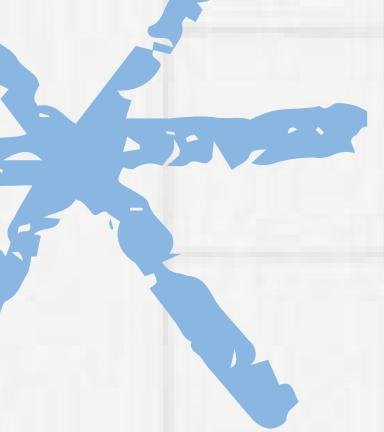


IKEA's Chatbot AI



Revenue forecast

# ASPECT-BASED SENTIMENT ANALYST



# Introduction

Our Minimum Viable Product (MVP) is an AI-based model designed to automatically analyze customer reviews. The core purpose of this MVP is to save valuable time and resources for manufacturers and retail providers by efficiently processing customer feedback.



# Problem Statement

- MVP addresses the challenge of interpreting complex and implicit customer reviews, aiming to significantly enhance accuracy in sentiment analysis
- The lack of a pre-existing dataset in the retail sector requires manual data collection and annotation, creating inefficiencies



# Solution Overview



- Present a high-level overview of the AI-based solution proposed in the MVP

The MVP provides an AI-powered solution that automatically analyzes customer reviews. It uses advanced language processing and neural networks to extract important information from text

# Solution Overview



- Explain how the solution leverages AI techniques, algorithms, or models

The solution utilizes embedding algorithms like Word2Vec to convert text into numerical vectors and employs Convolutional Neural Networks (CNN) and Long Short-Term Memory (LSTM) models for training. This approach enables effective Aspect-Based Sentiment Analysis (ABSA) by capturing semantic relationships in customer reviews and making sentiment predictions. It analyzes customer reviews using advanced language processing and neural networks to extract important information from text.

# Solution Overview



- Explain how this solution is innovative, highlighting its novelty either in terms of its technical aspects or its fulfillment of business needs

This innovative solution saves valuable time and resources for businesses by automating customer review analysis and providing real-time insights into customer sentiments, thus enhancing the retail experience

# Methodologies

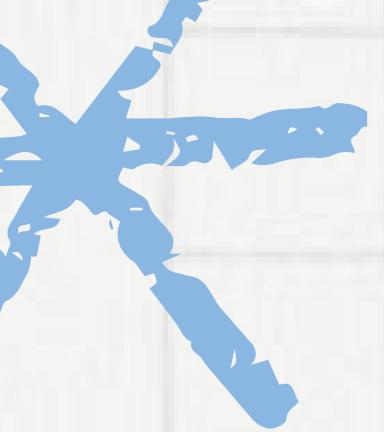


- Initially, we employ Embedding Algorithms like Word2Vec, GloVe, and FastText. Subsequently, these embeddings are integrated into either CNN or LSTM networks, utilizing the ReLU activation function ( $f(x) = \max(0, x)$ ), with the aim of identifying the most effective combinations for optimal results
- Convolutional Neural Network (CNN) Layer (Optional): this layer consists of convolutional and pooling layers. It applies convolutional filters to extract features from the embedded text data and then performs pooling operations to reduce dimensionality.

# Methodologies



- Embedding Layer: This layer utilizes embedding algorithms like Word2Vec, GloVe, and FastText to convert textual input into numerical vectors.
- Long Short-Term Memory (LSTM) Layer (Optional): this layer consists of LSTM cells. LSTM is a type of recurrent neural network (RNN) that can capture sequential dependencies in text data, making it suitable for tasks like sentiment analysis.
- Activation Function (ReLU): The Rectified Linear Unit (ReLU) activation function ( $f(x) = \max(0, x)$ ) is applied within the CNN or LSTM layers. It introduces non-linearity and helps the model learn complex patterns.



# Core Functionality

The MVP is trained to receive customer reviews as input and provide corresponding aspects and sentiments as output. This assists manufacturers and retailers in understanding customer opinions, enabling them to formulate appropriate business strategies



# Performance Metrics

- Define the key performance metrics that will be used to assess the MVP's success.

The key performance metrics used to assess the MVP's success include Macro-averaged F1-score and micro-averaged F1-score.

- Explain how the MVP's performance will be measured and evaluated.

Micro-averaged F1-score: This metric assesses overall performance based on the total number of true positives, false negatives, and false positives across all classes.

Macro-averaged F1-score: This method calculates the F1-score separately for each class and then averages these scores. It treats all classes equally, regardless of their frequency in the dataset.



# Timeline of Development and Roadmap

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<b>20/11-22/11</b>	<b>23/11-25/11</b>	<b>25/11-15/12</b>	<b>16/12 - 17/12</b>
Data Preparation: Crawling review data for each product on the list, Preprocessing, Normalizing.	Convert the format to meta-data (json type), transfer to Label Studio for data labeling.	Label approximately 5000 data. Concurrently participate in Workshops & Training and work with a mentor to develop the model.	Prepare the MVP for entry into the competition round.

# Conclusion

- Summarize the key points

Our MVP presents a cutting-edge solution for automatically detecting and analyzing customer reviews in the retail sector. By employing sophisticated natural language processing techniques, including Word2Vec, FastText, CNN, and LSTM, the model excels in Aspect-Based Sentiment Analysis (ABSA).rmance metrics that will be used to assess the MVP's success.

# Conclusion

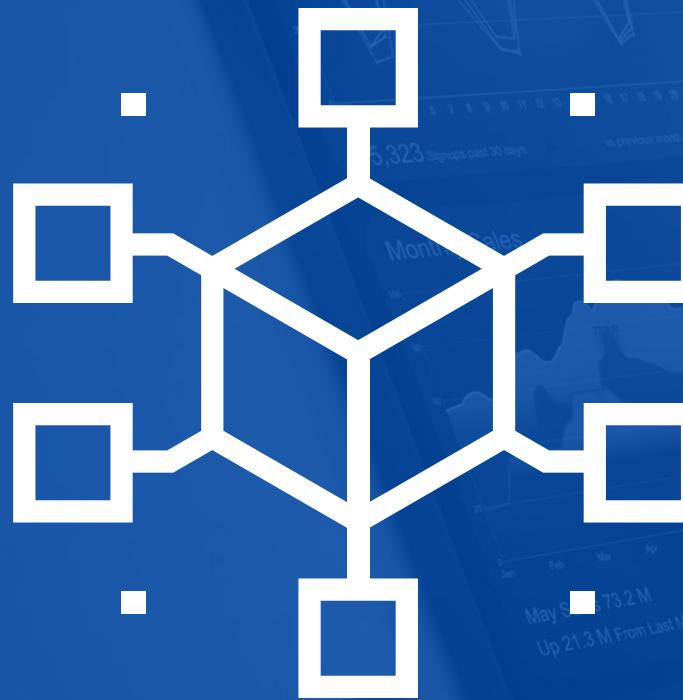
- Highlight the potential impact and benefits of the AI solution

Our MVP saves time and resources for manufacturers and retailers by offering deep insights into product feedback. These insights enable the development of targeted business strategies.

During the research process, we successfully extracted customer review data from 95 different items in the snapshot dataset. Despite the data being outdated, you were able to recover and utilize the information effectively

	product_id	review_id	userNickname	reviewTitle	reviewDate	reviewText	rating
0	IYQ89	148536815	Michelle	Great shirt for the gym!	August 18, 2022	Love the color! Shirt is comfortable and fits ...	4
1	IYQ89	140690418	Jhen	the quality is great but the price is affordable.	December 15, 2021	Provide great comfort because Nice texture. Go...	5
2	IYQ89	140473229	AdidasFan	I liked these so much I got two colors.	December 10, 2021	I love this shirt. It's nice and light which m...	5
3	IYQ89	139397255	LVL1	Terrific t-shirt	November 6, 2021	Very comfortable. Fits very well. I am happy I...	5
4	IYQ89	139063926	Mimi98	Love the mandala print	October 26, 2021	Love the way it hugs my body its true to size ...	5
...	...	...	...	...	...	...	...
7298	VM792	136049824	Hnice	Way too big	July 26, 2021	I am a small sized man (5'7) and ordered the X...	1
7299	VM792	136027224	Paulco	Great quality and price!	July 25, 2021	This top is everything I was looking for - war...	5
7300	VM792	135669582	MikeFlow	Comfortable	July 13, 2021	Very comfortable, warm and stylish. Can't go w...	5
7301	VM792	135617480	Jpt3075	Great purchase	July 11, 2021	Solid comfy hoody that is a mandatory staple f...	5
7302	VM792	135207868	Hintingkicks	Comfortable, discreet	June 28, 2021	Very cool minimalist jacket. Love it. Can wear...	5

7303 rows × 7 columns



# IKEA's Chatbot AI Product Consultant

# Introduction

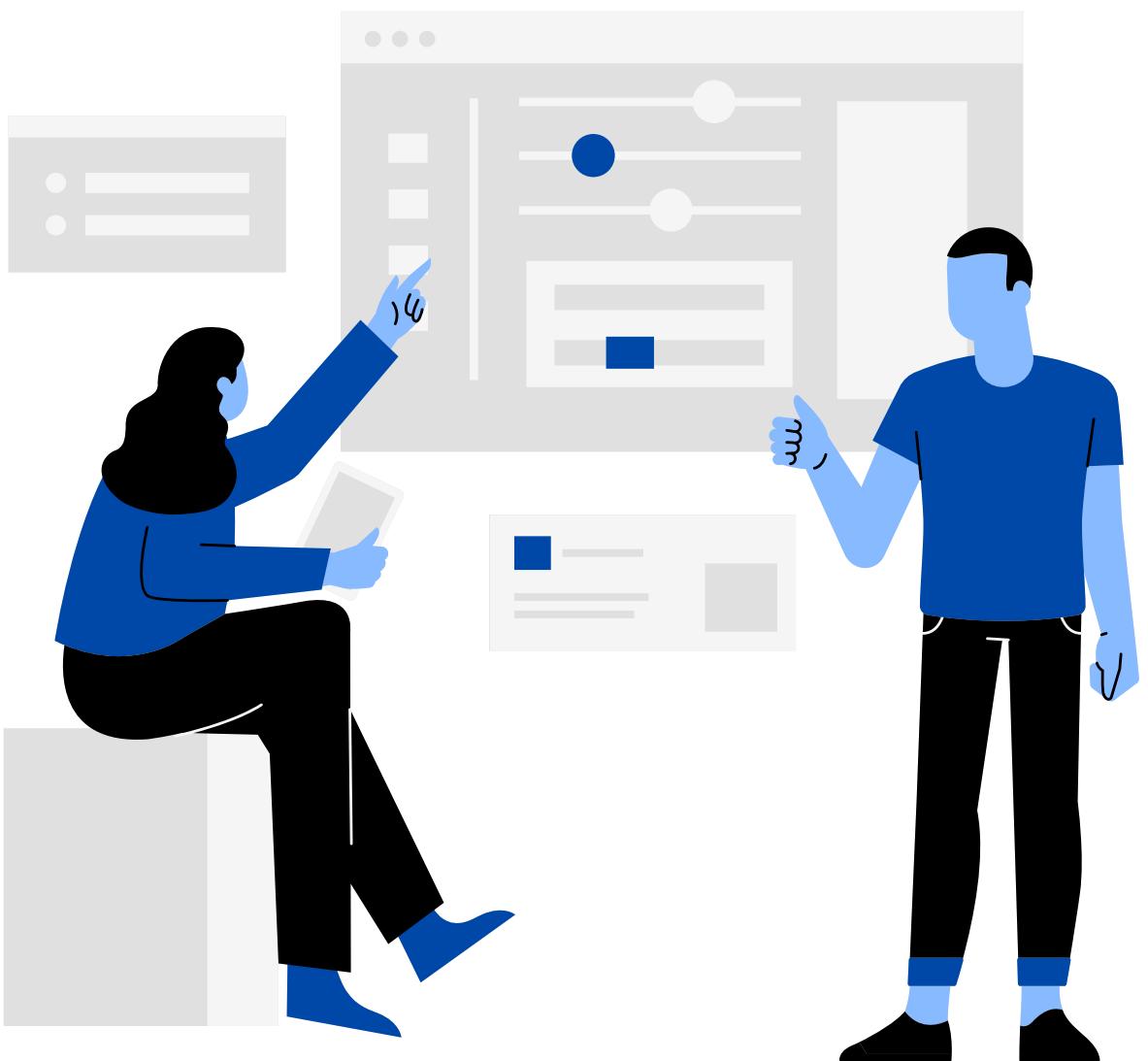


## IKEA's Chatbot AI Product Consultant: Your Personal Shopping Assistant

In the dynamic world of online shopping, navigating through an extensive range of products to find the perfect fit for your home can be overwhelming. That's why we're thrilled to introduce IKEA's Chatbot AI Product Consultant

# Problem statement

- Information Overload
- Lack of Personalization
- Limited Accessibility
- Inefficient Search Process
- Current Landscape



# Solution overview



**High-Level Overview**



**AI techniques**



**Innovation and Novelty**



# High-level overview



IKEA's Chatbot AI Product Consultant is an innovative solution designed to revolutionize the online shopping experience for our customers. This AI-powered assistant serves as a personalized guide, leveraging advanced natural language processing and deep learning techniques to understand individual preference and enhance overall customer satisfaction.

# AI techniques



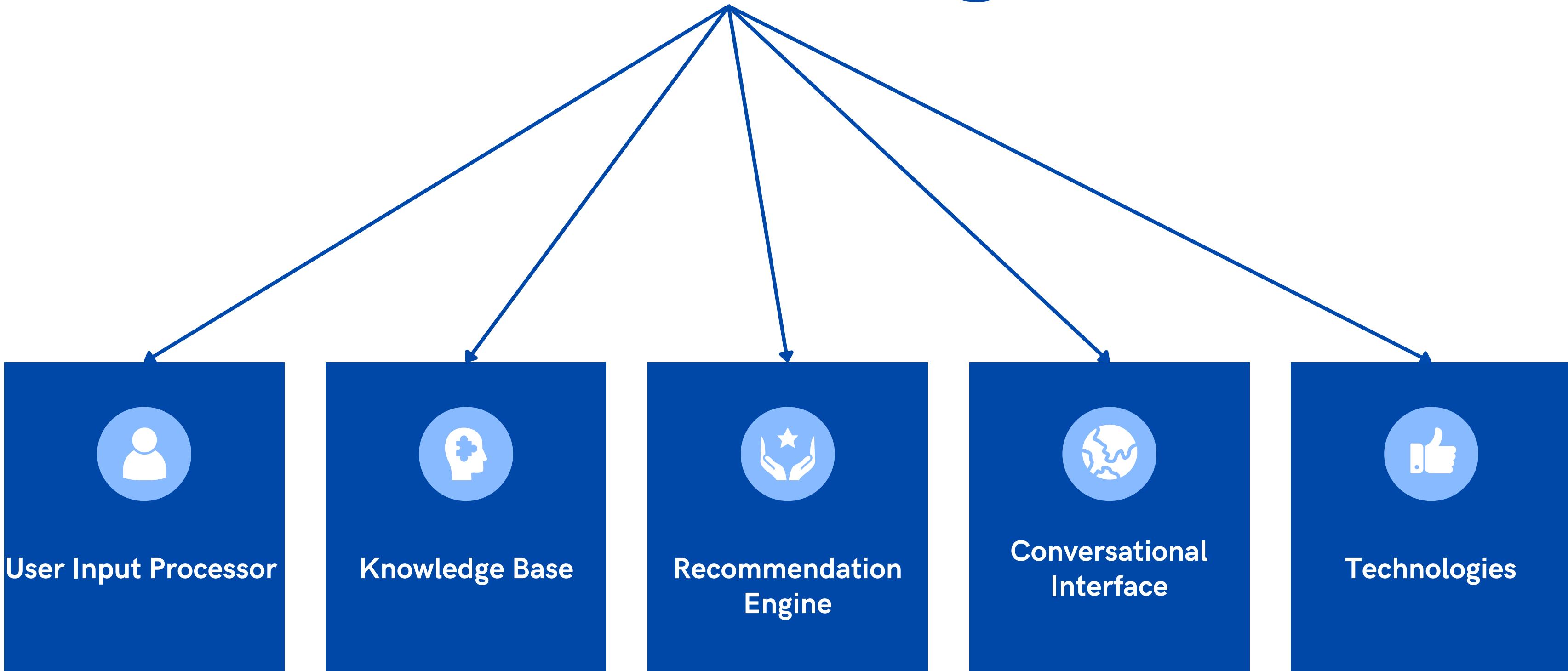
- Natural Language Processing (NLP):  
Employs NLP techniques: Tokenization, Text Normalization , Word Embedding (Word2Vec, TF-IDF)/ Bag of words to vectorize text data for training models..
- Deep Learning and Recommendation Algorithms:Our solution utilizes Deep Learning algorithms (LSTM/ Transformer model) to analyze customer behavior, preferences, and historical data, generate the responses with the context of the data, recommend relevant products when asked about specified items

# Innovation and Novelty



- Dynamic Learning Capability
- Seamless Integration with the Shopping Experience

# Methodologies



Personalized Product  
Recommendations



Natural Language  
Interaction



Product Information  
Retrieval



Style and Theme  
Matching



Guided Shopping  
Journey



# Core Functionality



Contextual  
Understanding



Integration with  
Customer Accounts



Continuous Learning  
and Improvement

# Performance Metrics

- 01** **Personalization accuracy:** measure how accurately the chatbot tailors recommendations based on user preferences. This can be evaluated through user feedback and the percentage of recommended products that base on satisfaction
- 02** **Response time:** Measure the speed of chatbot's responses. A fast time response help enhance user experience.
- 03** **User interaction:** Follow level of user with chatbot. Analyze the number of initiated conversations, user queries and interaction to understand how effectively the chatbot is being utilized.
- 04** **Customer satisfaction score:** Gather user feedback to evaluate overall satisfaction. User survey or post-interaction ratings to understand how well the chatbot is meeting user's expectation.
- 05** **Data accuracy:** ensure that the chatbot is equipped with up-to-date the accurate product information. Regularly check and update database to maintain the reliability of recommendations.



# Timeline of Development and Roadmap

## Phrase 1: Building and Training

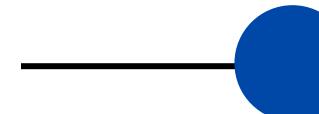
- Build the chatbot
- Launch on platform IKEA's Website
- Gather user feedback to update information

## Phrase 2: Personal Setting

- Implement DL algorithm to enhance personalization
- Roll out personalized product recommendations based on user history and preferences
- Monitor and analyze user interact and conversion rate

## Phrase 3: More Enhancement

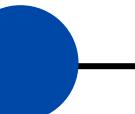
- Optimize the chatbot's infrastructure for 24/7
- Implement measure to enhance response time, ensuring quick and efficient interactions



**Building and training**  
(02/12-8/12)

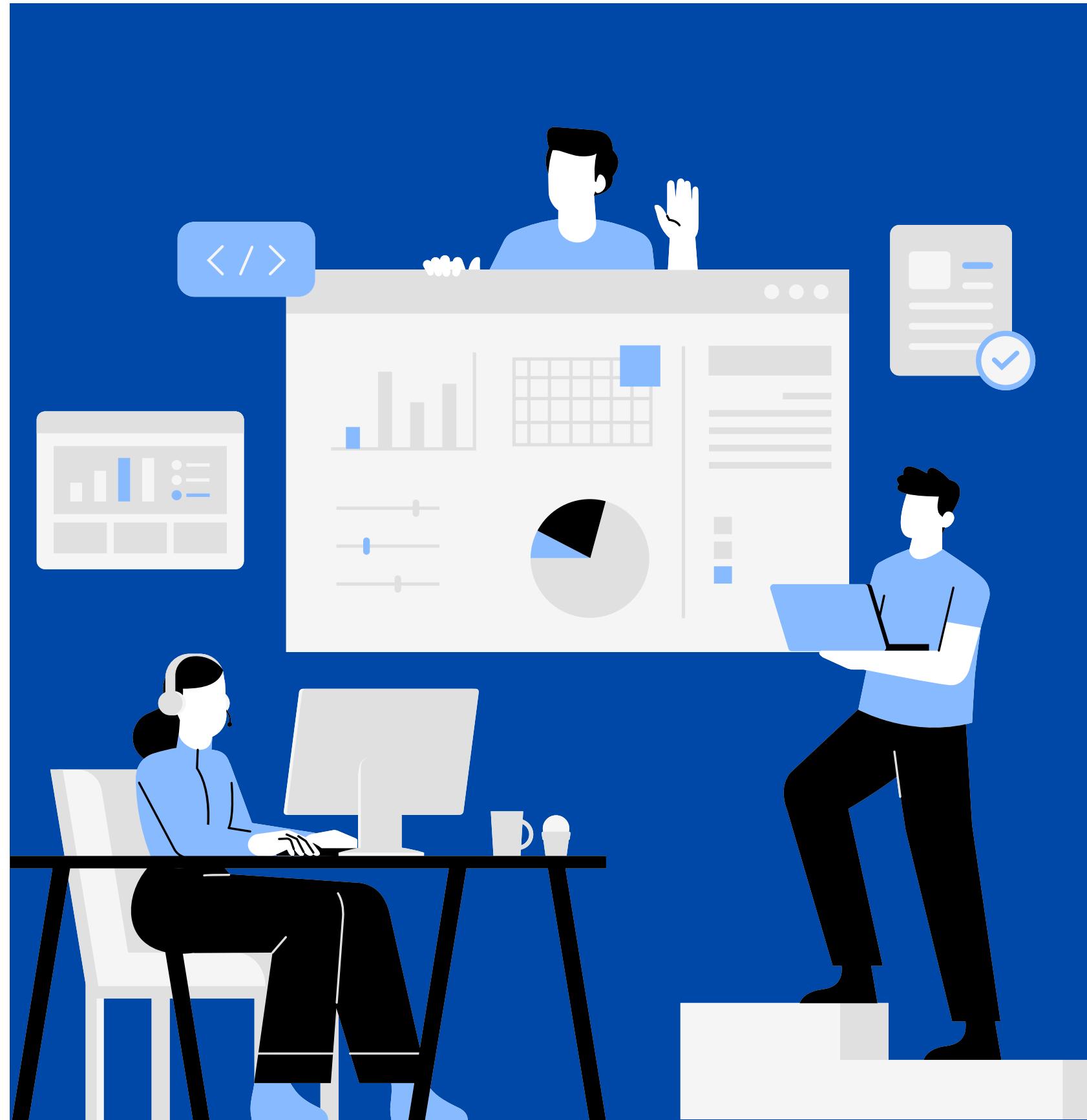


**Personal Setting**  
(08/12-13/12)



**More Enhancement**  
(13/12-15/12)

# User Interface and Interaction



01

Components: Conversational interface, message box, product cards, quick action buttons, system notifications.

02

AI-Powered Features: Conversation initiation, product queries, account integration, feedback and learning.



# Limitation and Future Enhancements

## Limitations

- Complex queries
- Limited product knowledge
- Language understanding
- Lack of data



# Limitation and Future Enhancements

## Future Enhancements

- Multimodal Interactions
- Advanced Personalization
- Enhanced Problem Resolution
- Expanded Product Knowledge Base
- Proactive Assistance

# Conclusion

- IKEA's Chatbot AI Product Consultant stands out with its user-friendly interaction, featuring a conversational interface that simplifies product inquiries and recommendations through natural language conversations.
- The key benefits include an enhanced user experience with 24/7 availability for unprecedented convenience, and improved product discovery through advanced recommendation capabilities.
- The emphasis on visual engagement, with virtual aids and settings, enhances the shopping experience, particularly for furniture and home decor, creating an immersive and enjoyable journey for users.



# Revenue Forecast



# Introduction

- Revenue forecast: predict revenue for the next month and factors affecting revenue
- The retail sector faces challenges in inventory management, resource allocation, and missed revenue opportunities due to inaccurate revenue forecasts.
- Monthly sales forecasts help predict future sales, support business, and guide supply and demand planning, guiding future planning goals and budgets. Sales forecasting brings significant advantages to retailers. It enables accurate forecasting, optimizes business strategies based on accurate forecasts.

# Problem Statement



**Our problem is predicting sales revenue and the factors that influence sales.**

**Currently, the main weakness lies in the lack of certainty and accuracy in revenue forecasts.**

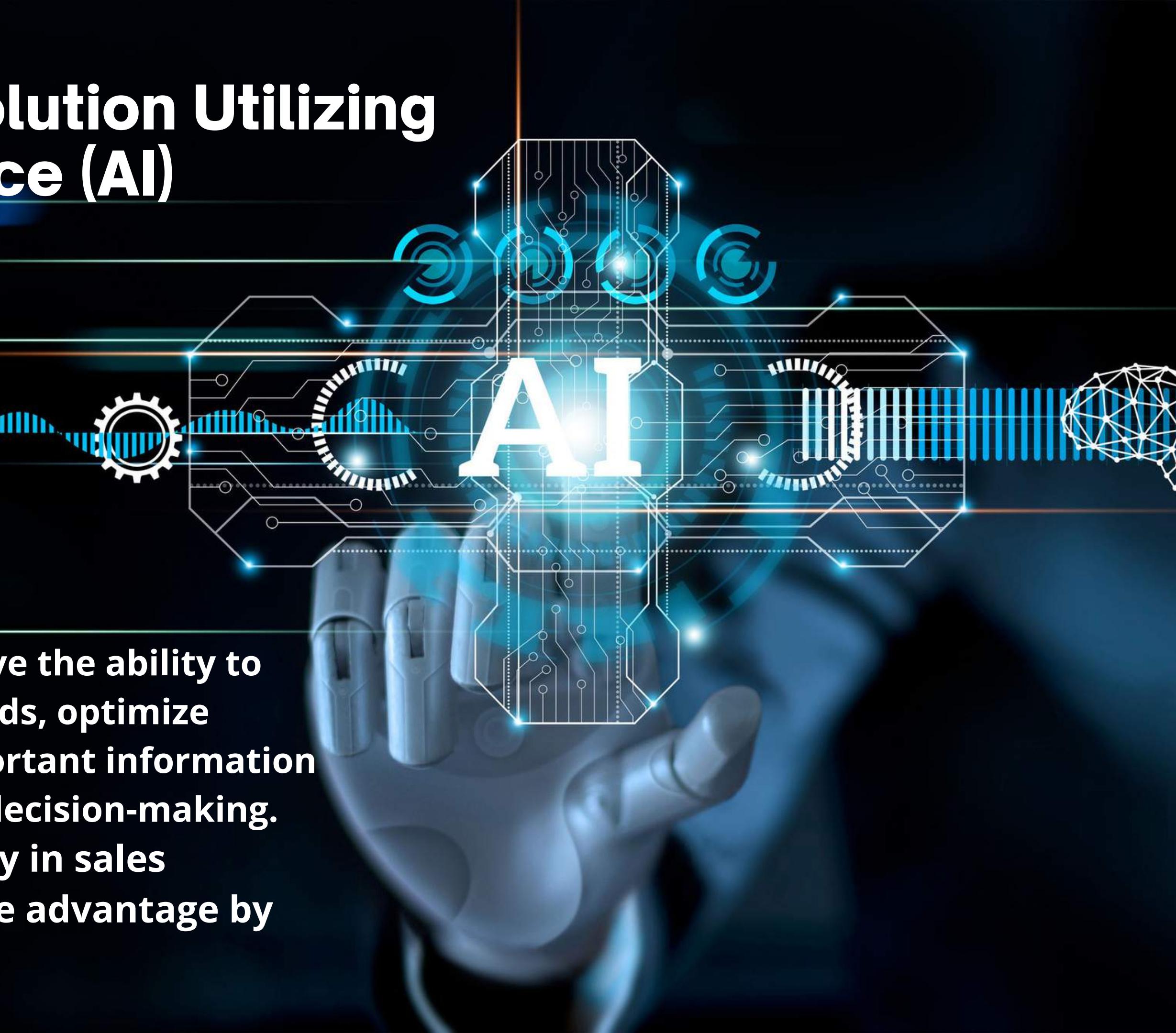
**Current methods have difficulty incorporating nuanced variables or adapting to sudden market changes, leading to unreliable forecasts**

# Overview of the Solution Utilizing Artificial Intelligence (AI)

Integrating Artificial Intelligence (AI) into sales forecasting solutions provides optimization in understanding and predicting business models.

Through the application of AI, we have the ability to analyze complex data to predict trends, optimize business strategies and provide important information for intelligent and flexible strategic decision-making.

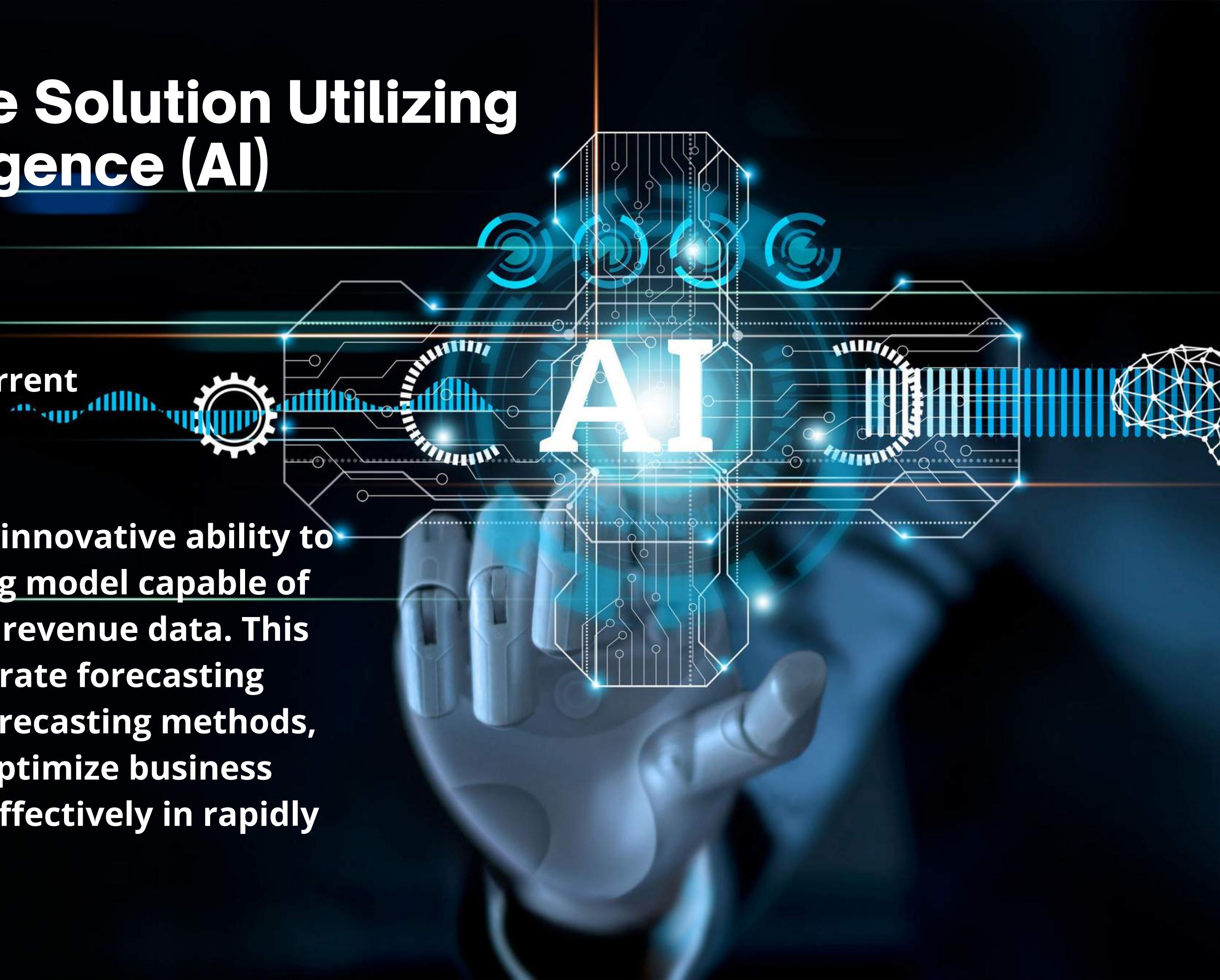
AI integration brings high efficiency in sales forecasting and creates competitive advantage by leveraging insights from data.



# Overview of the Solution Utilizing Artificial Intelligence (AI)

Innovation compared to the current solutions:

Our solution stands out for its innovative ability to integrate LSTM, a deep learning model capable of capturing complex patterns in revenue data. This creates more flexible and accurate forecasting capabilities than traditional forecasting methods, providing the opportunity to optimize business strategies and forecast more effectively in rapidly changing markets.



# AI Modeling Methodology

Our model is built on LSTM (Long Short-Term Memory) architecture, a type of deep learning neural network commonly used in time series prediction.

This architecture allows the model to learn and remember complex patterns in revenue data over time, improving prediction and performance compared to traditional forecasting methods.

# AI Modeling Methodology

In an LSTM-based revenue forecasting model, the key components include:

1. **LSTM Cells:** These form the basic units that retain and process past information.
2. **LSTM Layers:** Stacked layers of LSTM cells create a complex network for learning intricate patterns.
3. **Input/ Output Layers:** Regulate data input and extract learned information for predictions.

4. **Dropout Layers:** Prevent overfitting by randomly excluding neuron units during training.
5. **Activation and Loss Functions:** Make decisions and compute output values while evaluating prediction accuracy.

# Basic Functionality of Revenue Forecast

The proposed solution for sales prediction uses the Long Short-Term Memory (LSTM) model, which generates lagged characteristics by computing the variance between current and preceding months' sales.

These features are partitioned into distinct feature sets and labels within a scaled dataset.

Labels are derived from previous month's sales price differentials. The data is reshaped into a 3-dimensional structure, addressing multivariate problems with multiple time variables.

The methodology also includes techniques like linear regression, decision trees, and statistical approaches to prioritize influential features and construct a predictive model with exceptional precision and efficacy.

# Performance Indices

## - Key Performance Indicators (KPIs):

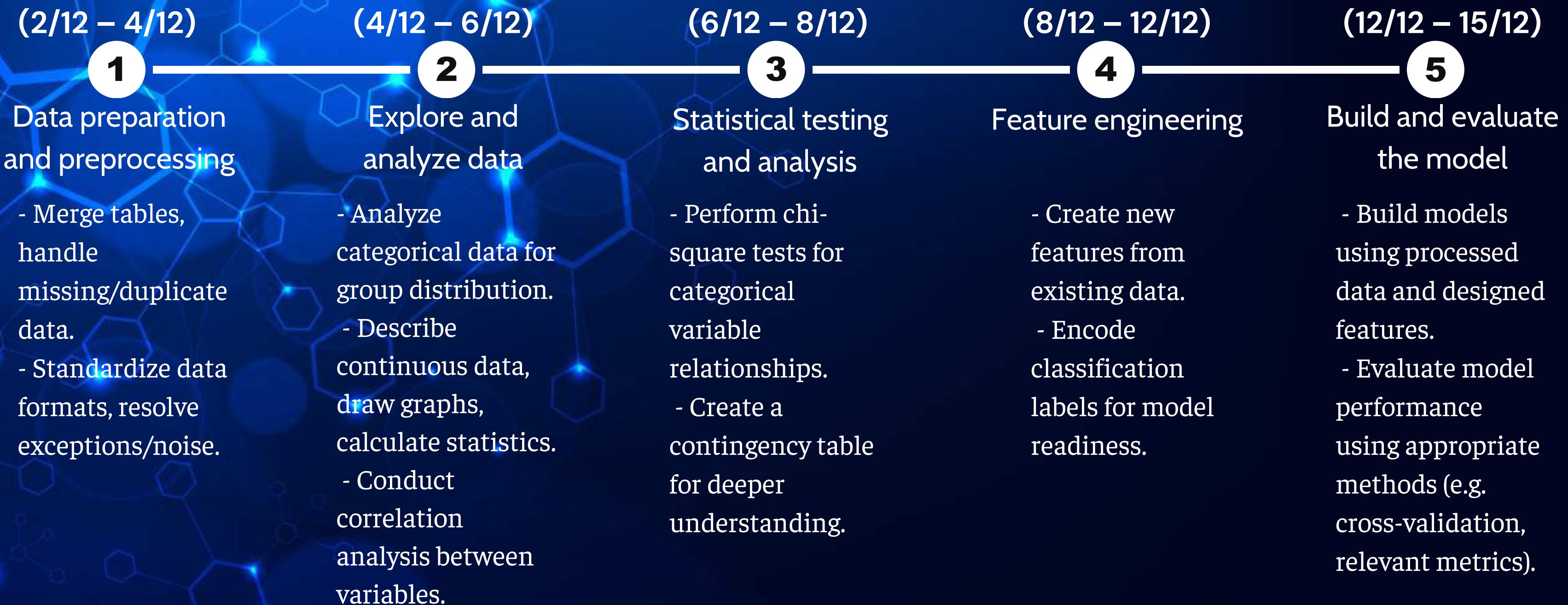
1. RMSE (Root Mean Squared Error): Assesses the difference between predicted and actual values.
2. MAE (Mean Absolute Error): Measures the average absolute difference between predicted and actual values.
3. R-squared: Determines the model's fit to the actual data.
4. Relative Error: Measures the percentage error compared to the actual value.
5. Precision and Recall Scores: Evaluates the model's ability to predict positive cases accurately and identify the actual values correctly.

## - Evaluation and Measurement of Performance:

There are two LSTM model to compare the performance. One is the LSTM model with an LSTM layer with 4-unit neurons and 1 Dense layer to output the predictive sales.

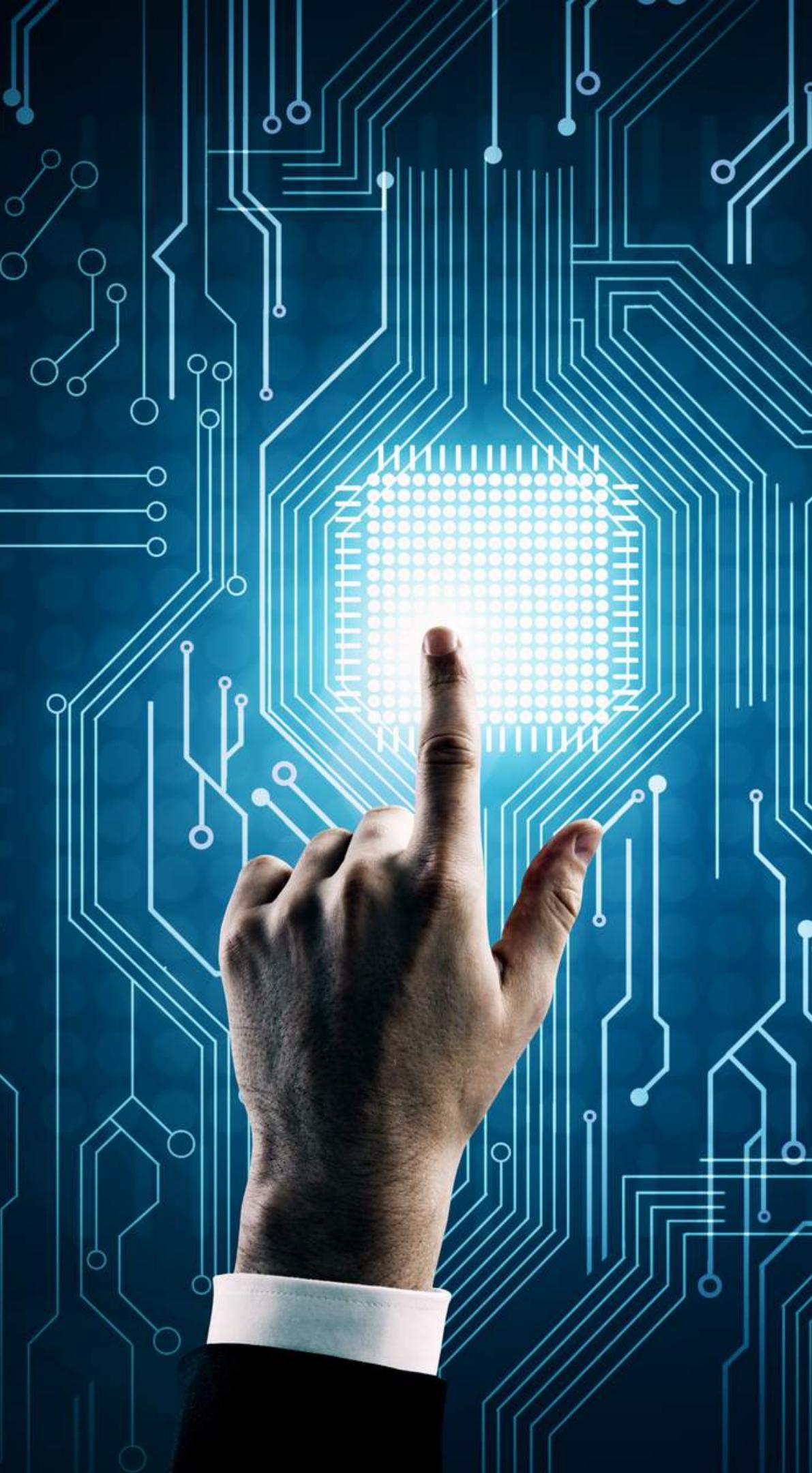


# Development Roadmap



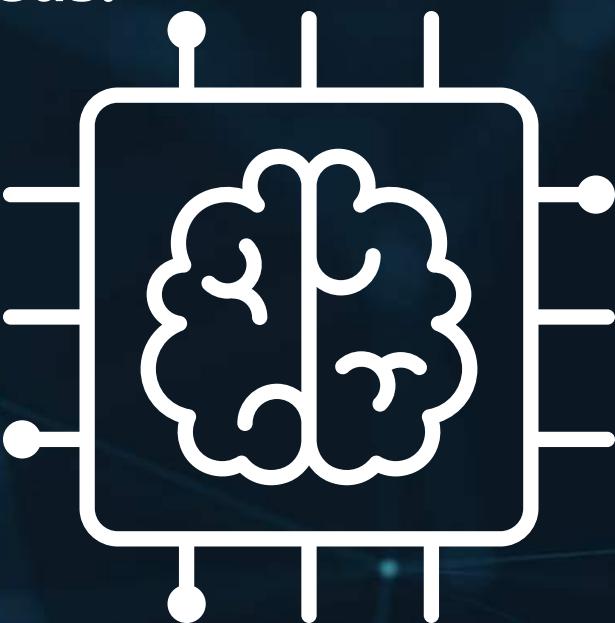
# Limitations

- **Accuracy and Reliability:** The current MVP may be challenged to provide accurate and reliable forecasts due to factors such as inaccuracy in forecasting sudden fluctuations in revenue.
- **Data and Volatility:** It can be difficult to deal with heterogeneous data or missing key data, making it difficult to predict revenue fluctuation patterns.
- **Scalability and Applicability:** The current MVP may not be flexible in expanding to new data sources or not easily integrating new enhancements into the model.
- **Performance and Stability:** There may be performance and stability issues in model implementations, leading to unreliability in real-world environments.



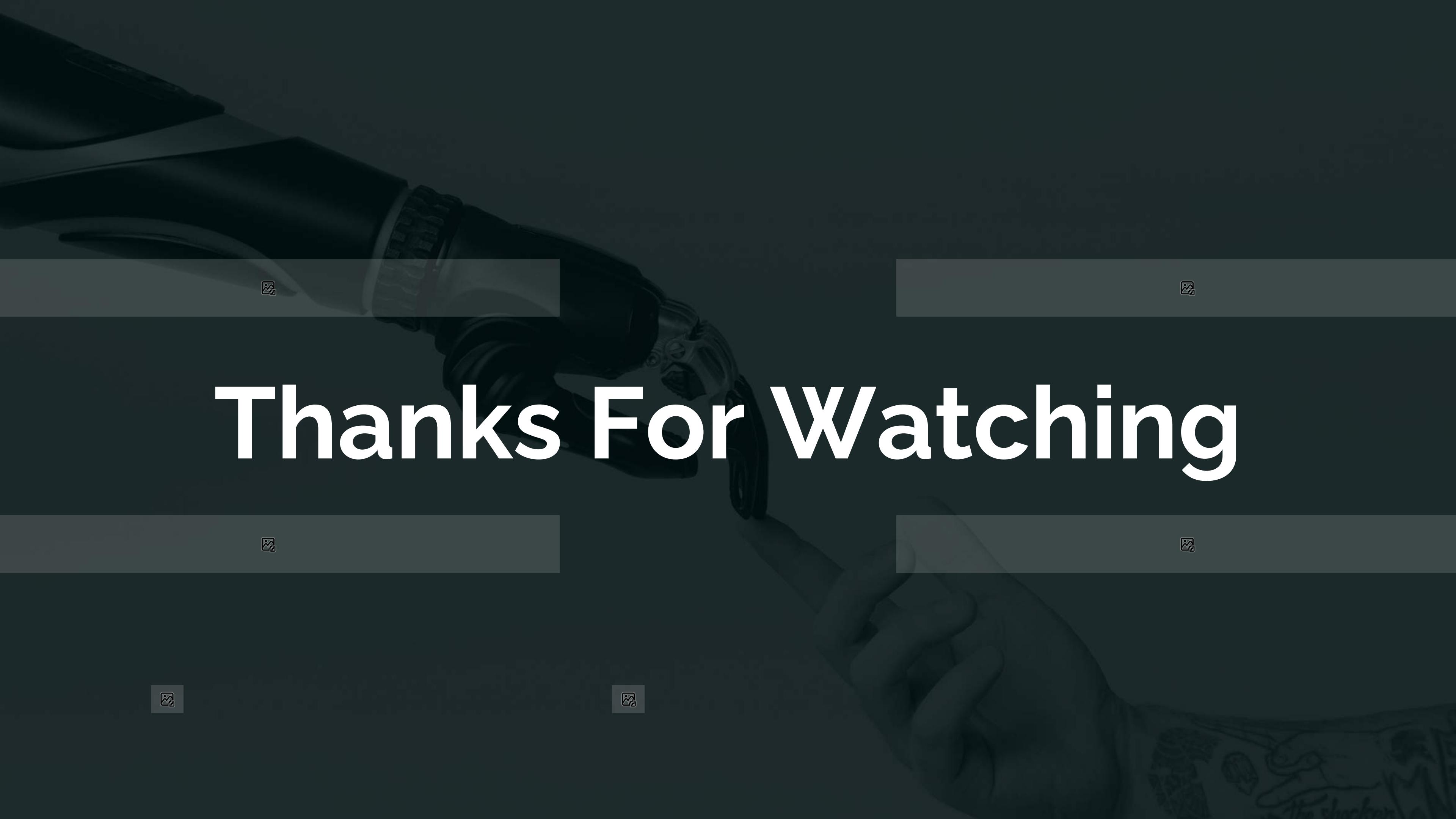
# Future Prospects

- Enhanced Prediction Accuracy: Improving revenue forecasting accuracy allows retail businesses to make informed decisions based on precise consumer trends.
- Optimized Business Strategies: Accurate predictions optimize production plans, inventory management, and marketing strategies, maximizing market opportunities.
- Improved Customer Experience: Precise predictions enable personalized shopping experiences, catering to individual customer needs.
- Agile Market Response: MVP's adaptability facilitates swift adjustments to market fluctuations, enabling flexible and responsive business strategies
- Competitive Edge: Utilizing the MVP for revenue prediction fosters a competitive advantage by attracting and retaining customers through unique offerings tailored to predicted needs.



# Conclusion

- Utilize the LSTM model to forecast sales to Predicting monthly sales is intended to help the firm by estimating future sales. We will create models and use various methods, such as decision trees and linear regression, based on historical sales data to identify new features that impact sales and increase the effectiveness of the model.
- Our MVP delivers value by generating accurate predictions, adapting flexibly to the market, and optimizing business decisions.
- We believe MVP will have a major impact on business performance, provide better customer experience and create competitive differentiation in the retail industry.



# Thanks For Watching