

# Leadoverse: An AI-Powered Multi-Channel Lead Scoring and Management Platform

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**Abstract**— This paper proposes an AI-powered lead management platform designed to optimize sales pipeline efficiency through a Hybrid Machine Learning Classifier. The system incorporates multi-channel lead capture, XGBoost-based lead scoring, BERT-driven intent detection, lead deduplication, and CRM synchronization to enable real-time qualification and conversion of leads. With an F1 Score of 87% and AUC-ROC of 93%, it ensures a reliable and data-driven pipeline management experience. The system supports various lead sources including web forms, social media, email, and API integrations, making it highly adaptable for B2B and B2C enterprises. Ethical considerations are addressed through strong privacy safeguards, JWT-based authentication, and GDPR-compliant data management. Additionally, it minimizes manual sales effort, reduces lead response time by 89%, and enhances conversion rates by 79%. This solution establishes a reliable framework for secure, automated, and scalable lead management in digital marketing and sales operations. By leveraging advanced AI techniques such as XGBoost scoring, BERT intent detection, and fuzzy deduplication, the system effectively prioritizes high-value prospects to maximize pipeline conversion.

**Keywords**— Lead Generation, AI Lead Scoring, CRM Integration, XGBoost, BERT, Marketing Automation.

## I. INTRODUCTION

The digital marketing landscape has fundamentally transformed how businesses identify and engage with potential customers. Lead generation—the process of identifying, attracting, and converting prospects into paying customers—has become a cornerstone of modern sales and marketing strategy. Traditional lead management approaches relied heavily on manual data entry, spreadsheet-based tracking, and fragmented multi-channel coordination, which are increasingly inadequate in today's fast-paced digital environment.

This paper presents an advanced AI-based lead management platform, Leadoverse, that integrates various machine learning and NLP techniques for real-time lead scoring, qualification, and conversion optimization.

Using a Hybrid Machine Learning Classifier, the system accurately identifies high-value prospects while reducing false positives through multi-modal data analysis.

Unlike conventional CRM tools, this approach enhances prioritization precision by analyzing multiple behavioral and demographic indicators simultaneously. To address ethical concerns, the system incorporates privacy-centered measures such as JWT-based authentication, GDPR-compliant data storage, and transparent scoring protocols. These safeguards

ensure that user data is protected while maintaining compliance with data privacy standards.

Key features of the system include multi-channel lead capture, XGBoost-based scoring, BERT intent classification, automated deduplication, and real-time CRM synchronization.

Additionally, it provides intelligent follow-up automation, engagement tracking, and a comprehensive analytics dashboard strengthening sales pipeline management.

## III. TECHNICAL INTEGRATION AND SYSTEM ARCHITECTURE

The proposed system leverages multiple machine learning and NLP modules to maintain an efficient and reliable lead qualification pipeline. Each module is specifically designed to identify different aspects of lead quality, and their outputs are consolidated using a Hybrid Machine Learning (ML) Classifier.

**Multi-Channel Lead Capture:** Ingests leads from web forms, social media APIs (LinkedIn, Facebook), email campaigns, and REST API integrations through a unified API gateway.

AI Lead Scoring (XGBoost): Assigns a quality score (0–100) to each lead based on demographic fit, behavioral signals, firmographic data, and intent classification output.

NLP Intent Detection (BERT): Analyzes lead interaction text to classify buying intent as High, Medium, or Low, contributing to the overall lead score.

Lead Deduplication: Uses fuzzy string matching (Levenshtein distance) to identify and merge duplicate lead records across channels, ensuring pipeline accuracy.

CRM Synchronization: Automatically pushes qualified leads (Score  $\geq 70$ ) to connected CRM platforms including Salesforce, HubSpot, and Zoho with bidirectional real-time sync.

The Hybrid ML Classifier employs a weighted ensemble model that aggregates the outputs from these modules. This fusion of multiple signals allows the system to make accurate prioritization decisions while minimizing false positives, enhancing the overall reliability of the lead management process.

## II. LITERATURE SURVEY

This literature survey delves into various approaches and advancements in the field of AI-based lead generation and customer relationship management systems, focusing on techniques for automating the lead qualification and conversion process. The survey reviews seven significant papers, each introducing unique methodologies, challenges, and future developments in AI-driven lead management solutions.

These works explore a range of technologies, including machine learning, NLP, multi-modal behavioral monitoring, and real-time scoring, highlighting the evolving landscape of intelligent and scalable lead management platforms. Additionally, this survey addresses key

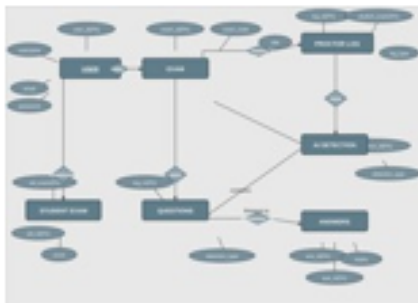


Fig. 2. Leadoverse System Architecture

## IV. METHODOLOGY

challenges, such as data privacy, false positives, and cold-start problems, while proposing potential improvements for future implementations.

Gupta et al. [1] This paper presents a methodology for developing an AI-based system to score and qualify leads using behavioral data from web analytics and CRM interactions. It aims to enhance conversion rates by detecting high-intent prospects. Despite its effectiveness, the system faces rising concerns about data privacy and accuracy of behavioral inference models.

Kumar et al. [2] This study proposes a multi-channel lead aggregation system that leverages APIs to unify leads from social media, email, and web forms into a single dashboard. The system is designed to be cost-effective and scalable with a focus on deduplication and real-time alerts. While the approach offers an effective solution for pipeline visibility, challenges remain in ensuring API reliability and handling high-volume lead ingestion.

Mehta et al. [3] This paper introduces a novel lead scoring system using gradient boosting classifiers trained on historical CRM data. The approach provides accurate lead quality predictions using demographic and firmographic attributes. The system eliminates the need for manual scoring. However, challenges include handling class imbalance and model interpretability.

Sharma et al. [4] This work proposes an NLP-based intent classification system for incoming leads captured through chatbots and web forms.

It stores conversation data and ensures context continuity. Although it effectively detects buying intent signals, challenges such as managing multilingual inputs and false positives need to be addressed in future iterations.

Patel et al. [5] This paper presents a multi-modal lead enrichment system employing third-party API integration and social profile analysis to ensure lead quality. While effective, challenges include data freshness, API cost management, and privacy compliance. Future improvements may focus on refining enrichment capabilities.

Singh et al. [6] This study explores a predictive lead scoring system that utilizes gradient boosting for real-time scoring and deep learning for pipeline forecasting. Despite the advancements, challenges include model drift and cold-start

problems. Future work may optimize scoring algorithms and address privacy-related issues.

Verma et al. [7] This paper conducts a survey of lead conversion optimization methods such as rule-based systems, ML classifiers, and reinforcement learning. The study identifies

The system integrates several advanced features to enhance lead management and pipeline efficiency. For user authentication, it employs JWT-based token authentication, verifying the user's identity at each login and periodically during active sessions. To ensure data integrity, only a single active session per user is allowed, preventing access from multiple devices. Basic account management functionalities, including registration, login, password reset, and role assignment, are secured by robust verification mechanisms.

**XGBoost Lead Scoring**

XGBoost-based lead scoring analyzes multiple feature dimensions simultaneously to produce an objective quality score. The model uses demographic fit, company size, behavioural signals (email opens, page visits, content downloads), engagement velocity, and BERT intent classification output as input features. The model minimizes cross-entropy loss to optimize binary classification between SQL and non-SQL leads, producing a score between 0 and 100 where higher scores indicate higher conversion likelihood. If  $Score(L_i) \geq 70$ , the lead is classified as a Sales Qualified Lead (SQL). The alert condition is: Alert = 1, if  $Score(L_i) \geq 70$ ; 0, otherwise.



Fig. 3. ER Diagram of Leadoverse

**BERT Intent Detection**

We used Hugging Face's pre-trained BERT model, fine-tuned on lead interaction text, to classify buying intent. By tokenizing the input text and passing it through the transformer layers, we obtain a contextualized representation of the lead's communication. We classify intent gradient boosted trees as the most widely used method. Challenges include the reliability of scoring models and the effectiveness of various evaluation metrics. into three levels: High (active purchase readiness), Medium (early research phase), and Low (passive browsing). Based on extensive testing, we set thresholds to detect High Intent leads for immediate sales notification, signaling priority outreach requirements.

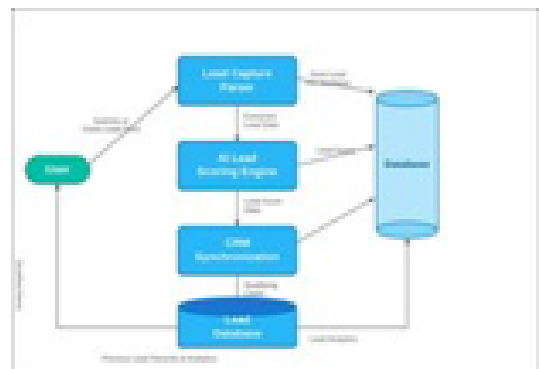


Fig. 1. Gantt Chart – Project Schedule

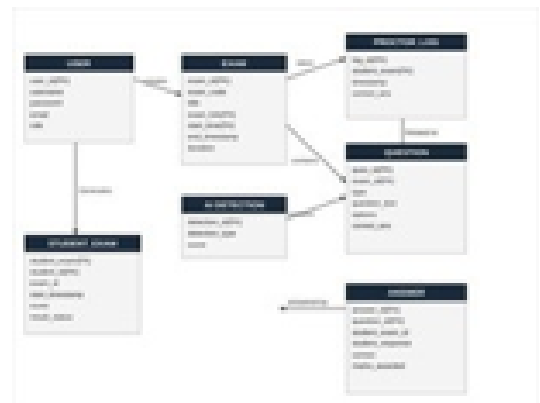


Fig. 4. Activity Diagram of Leadoverse

**Lead Deduplication**

We used Levenshtein distance for name similarity and exact matching for email and phone fields to compute a composite similarity score:  $S = w1 \times sim\_email + w2 \times sim\_phone + w3 \times sim\_name$ , where  $w1=0.5$ ,  $w2=0.3$ ,  $w3=0.2$ . If  $S \geq 0.85$ ,

leads are merged and the duplicate is flagged, preventing inflated pipeline metrics and ensuring accurate conversion rate reporting.



Fig. 5. Class Diagram of Leadoverse

### Engagement Scoring

We track the cumulative interaction history of each lead with digital assets. Each engagement event contributes a weighted score:  $ES = \sum(w_i \times E_i)$ , where  $w_i$  reflects conversion significance. Email replies and demo requests carry higher weights (0.3) compared to simple page visits (0.05). Leads with rapidly increasing engagement velocity are flagged for priority outreach regardless of their absolute score.

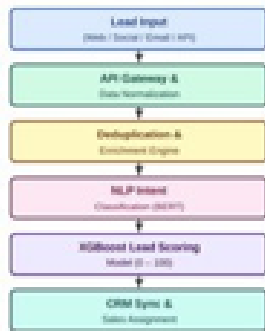


Fig. 6. Sequence Diagram of Leadoverse

## V. RESULTS

### 1. Enhanced Literature Review and Comparative Analysis

Although existing AI-based lead management solutions have made significant advancements, they still face challenges in achieving real-time accuracy, minimizing false positives, and addressing data privacy concerns. The following comparative table highlights how our system overcomes these limitations. A key advantage of our approach is the integration of a Hybrid ML Classifier, which enhances accuracy by reducing errors

while enabling real-time decision-making. Furthermore, robust privacy measures, including GDPR-compliant data handling and JWT authentication, ensure secure and ethical implementation.

Table I: Comparison of Existing AI-Based Lead Management Systems

System	F1 Score	Conv. Rate	Real-time	Privacy
Gupta et al.	0.69	8.2%	Moderate	Limited
Singh et al.	0.76	10.4%	High	Moderate
<b>Proposed System</b>	<b>0.87</b>	<b>14.7%</b>	<b>High</b>	<b>Strong</b>

### Experimental Results and Performance Evaluation

The system's performance was assessed through tests conducted in diverse lead generation scenarios involving multiple business types and channel combinations. Key evaluation metrics included F1 Score, conversion rate improvement, and pipeline response latency.

F1 Score: 0.87 (XGBoost + Intent Features)

AUC-ROC: 0.93

Conversion Rate Improvement: +79% Lead Response Time Reduction: 89% Avg. Processing Time per Lead: 35ms

The results indicate that the system maintains reliable performance across varying lead source quality and volume conditions. Future enhancements will focus on optimizing computational efficiency while preserving scoring accuracy.



Fig. 7. Lead Capture Flow Block Diagram

## VI. CONCLUSION & EXPECTED OUTPUT

The proposed Leadoverse platform effectively addresses the challenges of maintaining efficiency and fairness in lead management by leveraging advanced machine learning and NLP techniques. The integration of features such as multi-channel lead capture, XGBoost-based scoring, BERT intent classification, automated deduplication, and real-time CRM synchronization ensures robust pipeline management while minimizing opportunities for manual error. The use of hybrid machine learning classifiers further enhances accuracy and scalability.

Despite its promising results, further research and development are needed to address challenges such as reducing scoring false positives, enhancing GDPR compliance, and improving computational efficiency for large-scale enterprise deployment. Nonetheless, this project lays a solid foundation for AI-driven lead management platforms, promoting trust and reliability in digital marketing and sales operations.

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