

# “GEN AI IS THE FUTURE” ... BUT WHERE DO WE STAND NOW?

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Potential and limitations of the trendiest technology out there



# THE FUTURE OF DATA MODELING... IS HERE: THE JOURNEY SO FAR

Artificial Intelligence (AI) has come a long way since its early days, becoming widely accessible today. A key subset of AI, Natural Language Processing (NLP), has developed over decades to enable computer programs to understand and generate human language in a meaningful way. Here is how it all started:

## TRADITIONAL NLP (1950s–1990s)

1950s  
to  
1970s

### RULE-BASED SYSTEMS

Used predefined, handwritten rules to understand human language, responding only to specific prompts

1980s  
to  
1990s

### STATISTICAL LANGUAGE MODELS

Used machine learning to analyze data patterns and predict the probability of the next word based on preceding ones

2000s  
to  
Present

### NEURAL LANGUAGE MODELS

Use deep learning, large data sets, and neural networks inspired by the architecture of the human brain to learn language structures and predict word sequences. Different types include:

## ADVANCED NLP (2000s–Present)

### GATED RECURRENT UNITS – 2014

Evolved from Long Short-Term Memory (LSTM) to require lower computational power, while LSTM advanced previous Recurrent Neural Networks (RNNs)\* by overcoming their limitations in handling long-term sequences

1

### TRANSFORMER-BASED MODELS – 2017

Process input simultaneously by focusing on self-attention mechanisms

2

### LARGE LANGUAGE MODELS – 2018-Onwards

Have an immense size and perform diverse tasks with minimal fine-tuning (e.g., BERT/GPT series)

3

\*RNNs are foundational models that process sequences by using the output from the previous step as input for the current one.

# TRADITIONAL NLP: THE START OF A SMARTER EVERYDAY

Traditional Natural Language Processing (NLP) leverages rule-based systems and machine learning to provide key features we use daily. Aside from enabling **speech recognition** that converts spoken language into text, it **processes and analyzes text data** through the following:



Syntax analysis



Sentiment analysis



Topic segmentation and identification



Semantic analysis



Detection and classification of key elements (*e.g., individuals/locations*)



Detection of references to similar entities

**NLP is the translator**, interpreting and manipulating human language based on defined structures. Yet, it has **key limitations in:**



## CONTEXTUAL UNDERSTANDING:

Failing to maintain context throughout the conversation, resulting in incoherent interpretations



## HUMAN LANGUAGE UNDERSTANDING:

Struggling to grasp phrasing ambiguities, misspellings, and words/phrases with multiple meanings



## SCALABILITY AND ADAPTABILITY:

Executing only the specific tasks it was trained on, limiting its ability to tackle more diversified queries

## YOU MIGHT KNOW NLP FROM:

- Autocomplete and autocorrect
- Predictive texts
- Spell and grammar checks
- Text translation and summarization
- Transcription of image and speech-to-text
- Traditional chatbots
- Voice assistants (e.g., Amazon's Alexa/Apple's Siri)
- Online sentiment monitoring
- Detection of search spam and duplicate content

# LARGE LANGUAGE MODELS: A NEW MILESTONE, BUT NOT THE LAST

Large Language Models (LLMs) are a subset of Generative AI\* and advanced architectures used in NLP. They use deep learning to train on vast amounts of text data and use the learned patterns to generate text that is coherent and contextually relevant. Their key features include:



Human-like text generation



Enhanced dialogue simulation



Scalability to handle larger datasets



Semantic question answering



Interdisciplinary knowledge



Continuous and adaptive learning

LLM is the brain, predicting and generating language with human-like fluency and adaptability. It built on existing NLP features to address previous limitations:



## CONTEXTUAL UNDERSTANDING:

Maintains context over extended text spans, ensuring relevance throughout lengthy interactions



## HUMAN LANGUAGE UNDERSTANDING:

Grasps nuances in human language, allowing for a deeper understanding of intent and meaning



## SCALABILITY AND ADAPTABILITY:

Handles new and diverse tasks, demonstrating adaptability to varying queries

## YOU MIGHT KNOW LLM FROM:

- Text and code generation
- Context-aware text translation
- Voice translation
- Search recommendations
- AI chatbots
- Digital AI assistants

\*Generative AI (GenAI) refers to AI that can create original content. While LLMs generate text, other GenAI models work with audio, video, and images.

Curious about Digital AI Assistants?  
Download our e-book on “Smart Solutions for Consultants”

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BUSINESS SERVICES



# POWERFUL... BUT NOT PERFECT: LLMs TODAY

● NLP Challenges  
Unresolved by LLMs

● New Challenges  
Introduced by LLMs

Despite the significant advancements brought by LLMs, **many concerns remain unresolved while new ones continue to emerge.** Companies integrating LLM tools are bound to encounter multiple challenges, including:











Overcoming these limitations and fully harnessing the potential of LLMs requires a blend of technical and business expertise, capabilities that expert advisors like Infomineo are distinctively positioned to provide.

# INFOMINEO'S HYBRID INTELLIGENCE APPROACH: TAKING AI TO THE NEXT LEVEL

Artificial intelligence does not intend to replace human intelligence, but to serve it. While LLMs offer valuable applications, they also present significant challenges that can only be addressed with human expertise.

At Infomineo, our data experts combine LLM-powered tools with business proficiency to help organizations across sectors, deliver deeper insights, and optimize resource allocation. Here is how we do it:

KNOWLEDGE AND EXPERTISE		INTEGRITY AND EXCELLENCE	
TECHNICAL EXPERTISE	BUSINESS EXPERTISE	DATA PRIVACY	DATA QUALITY
<p><b>TOOL SELECTION</b></p> <p>Identify the best tools for each application and advise clients on their optimal uses</p> 	<p><b>BUSINESS ACUMEN</b></p> <p>Leverage a deep understanding of industry dynamics and client needs</p> 	<p><b>INTERNAL LLM MODEL</b></p> <p>Built our own internal and secure AI chatbot, using existing LLMs</p> 	<p><b>PROMPT ENGINEERING</b></p> <p>Developed an AI prompt library for employees to maximize the effectiveness of AI tools</p> 
<p><b>TECHNOLOGICAL INTEGRATION</b></p> <p>Combine LLM and NLP tools with other premium technologies</p> 	<p><b>CROSS-DEPARTMENTAL COLLABORATION</b></p> <p>Combine data analytics and research expertise to deliver comprehensive insights</p> 	<p><b>EXPERT TRAINING</b></p> <p>Train employees on best practices to protect and secure data when using AI tools</p> 	<p><b>HUMAN QUALITY ASSURANCE</b></p> <p>Identify AI hallucinations and evaluate outputs for accuracy, credibility, and timelines</p> 

# INFOMINEO'S INSIGHTS | ASSESSING HOTELS' SATISFACTION LEVELS ON SPECIFIC CRITERIA



## CLIENT CHALLENGE

Assess customer satisfaction levels of more than 2,500 hotels in Saudi Arabian neighborhoods and categorize them according to specific criteria (e.g., service, infrastructure, cleanliness, and pricing)



## OUR SOLUTION

Provided a detailed scoring grid for hotels in Saudi Arabia based on 12,000 online comments



## LEVERAGED TECHNOLOGIES

- **Google API** to analyze and retrieve online comments for all hotels
- **NLP** to categorize comments for enhanced sentiment analysis
- **GenAI** to extract relevant details from the reviews for each criteria



## ADDITIONAL APPLICATIONS

- Retail Stores
- Restaurants and Cafés
- Healthcare Facilities
- Educational Institutions
- Sports Facilities
- Entertainment Venues



**LENGTH OF ENGAGEMENT:**  
3 days - 1 Data Scientist

## Customer review and criteria identification



## Customer satisfaction scoring grid by criteria after sentiment analysis

Global Review	Luxury score	Service score	Infrastructure score	Cleanliness score	Convenience score	Amenities score	Overpriced score	Overall Sentiment Score
R1: The rooms are big, simple and functional. Clean and comfortable not to mention at affordable pricing in a central location in Riyadh. Truly a nice budget hotel to stay in. R2: Good R3: Best place for Relaxing in Riyadh near Riyadh Best Hospitals R4: Nice place enjoyed a lot R5: Nice and good place	0	1	1	1	1	0	1	0.71
R1: The restrooms are very bad, not cleaning and a lot of yellow spots from a long time ago. So, it was really bad experience R2: It is good, clean, but cooking oven and proper ventilation system is not there. R3: No basic items, staff is good, washrooms are not much clean. R4: Very conveniently situated on Olaya street in Riyadh R5: The only good thing is the location	0	1	1	-1	1	-1	0	0.14

# INFOMINEO'S INSIGHTS | STREAMLINING PRODUCT EXTRACTION AND HS CODE MAPPING

## CLIENT CHALLENGE



Analyze national consumption trends across 200,000 purchases and match products to their appropriate HS codes at the country classification level

## OUR SOLUTION



Classified products accurately and efficiently, significantly saving manual time and effort

## LEVERAGED TECHNOLOGIES



- **NLP** to transform product descriptions into concise product names
- **GenAI** to extract key information from product descriptions that allows mapping to HS Codes

## ADDITIONAL APPLICATIONS



Prompt engineering can be used to map descriptions to well established nomenclatures like HS codes, UNSPSC, NAICS, etc.

## LENGTH OF ENGAGEMENT:

6 weeks - 2 Data Scientists



## Reduction of the initial dataset size



- Supply and installation of 86-inch 4k **smart screens** in the ministry's branch building in hafar al-batin governorate
- 82-inch **smart screen** - college of science, male section
- Regarding the supply of an 82-inch **smart screen**
- Supply and installation of an 86-inch **smart screen** with nanocell technology
- Providing (3) 85-inch **smart screens** for the public prosecution headquarters
- 86-inch **smart tv screen** for the meeting room

"Smart Screen"



HS 4 : 8528

"Monitors and projectors"

HS 6 : 8528722

"Reception apparatus for television ... incorporating a colour video display or screen"



# ABOUT INFOMINEO

# WHO WE ARE

Infomineo is a global pioneer in "Brainshoring" that serves leading global strategy consulting firms and over 50 Fortune 500 companies. By handling complex tasks that require judgment and critical thinking, we allow our clients to focus on their core activities while entrusting us with intricate tasks. As an ISO 27001-certified company, Infomineo adheres to the highest data security and management standards.

## OUR SERVICE HUBS

Cairo, Egypt  
Casablanca, Morocco  
Mexico City, Mexico

## LANGUAGES

English  
Arabic  
Spanish  
French  
Italian  
German  
Portuguese  
Russian

## CLIENTS



# OUR SERVICES

From DATA TO IMPACT

ANALYSIS

## DATA

### BUSINESS RESEARCH

Getting the right insights to make better decisions

Desk Research  
Expert Calls  
Tech/ AI Enabled

### DATA ANALYTICS

Analyzing data to extract relevant Insights and identifying trends to answers business

Business Intelligence  
Data Science

COMMUNICATION

## INSIGHTS

### CONTENT SERVICES

Converting insights into written communication

Translation  
Reviewing  
Content Repurposing  
Business Writing

### GRAPHIC DESIGN

Presenting messages in a more compelling and impactful way

Slide Production  
Document Enhancement  
Creative Design

# GET IN TOUCH TODAY



 **5** OFFICES

 **+350** EMPLOYEES

 **25** NATIONALITIES

 **+80%** OF OUR BUSINESS ON A RETAINER BASIS



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