

Al Revolution 2.0

LLMs + GPT: History, Types, and Impact on the World Around Us

March 2024

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Discover the world of Generative Al

Just a year ago, AI technologies were mainly discussed within the expert community, with little interest from the public. However, the rapid development of Generative AI and the accessibility of new technologies for ordinary users have made AI popular and widely discussed.

As people evaluate the potential of AI services like ChatGPT, they are becoming more aware of the importance and impact of artificial intelligence on our everyday and professional lives. This is where the revolutionary moment lies.

The term "AI 2.0" emphasises the transition from narrow, specialised artificial intelligence systems to more general and universal models capable of solving complex tasks and adapting to new situations.

At Tovie AI, we believe the current technological wave will bring about many positive changes in business, organisations, and human activities. Large language models, LLMs, effectively help professionals in their duties, freeing up time for other tasks, allowing companies to restructure processes, and creating new value for companies, their employees, and customers.



Generative AI is already transforming entire industries. However, to take leadership positions in the markets five years from now, companies need a clear AI strategy focused on exploring, testing, and analysing new ways of applying Generative AI in business.

In our whitepaper, we will explain what Generative AI is, how it is trained, where it is used, how the main generative models are structured, and what industry use cases are. Let's explore it together!

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What is Generative AI?

Generative AI is a type of artificial intelligence that enables the creation of original content. Very often, it resembles content created by humans. To achieve this, generative models are trained on large datasets. To become "smart," neural networks must learn from millions, and sometimes billions, of images, texts, music compositions, or videos, depending on the domain.





2025



In Generative AI, there are several types of neural networks.

Generative adversarial network (GAN)



The term "adversarial" in the network's name is not without reason. Two neural networks compete in GAN - the generator and the discriminator. The generator attempts to create data that can deceive the discriminator, making it believe that the generated data is real. On the other hand, the discriminator tries to distinguish real data from fake data.

These two components learn from each other. Eventually, the generator starts producing content that is so realistic that the discriminator can no longer differentiate it from genuine data. This indicates that the GAN has been trained and is ready for use.



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Autoregressive model (AR)



The autoregressive model (AR) generates new data by predicting the next value based on previous values in a sequence. This can be applied to sequences of words or pixel values in an image. During training, the neural network compares the predicted and actual values. If the difference between them is minimised, the model can be used.



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Variational autoencoder (VAE)



VAE utilises a learning method based on compression algorithms. The model consists of two entities - the encoder and the decoder. They operate quite simply: the encoder takes in the input data and compresses and encodes it. The decoder uses this information to reconstruct the original data.





Transformer models





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Where is Generative Al used?

Today, Generative AI is one of the fastest-growing technologies. Neural networks optimise human activities, enhance productivity, and improve decision-making processes in various industries, from healthcare and finance to education and entertainment. Generative AI helps us experience a unique level of personalisation.



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Where is Generative Al used?

Image generation



Neural networks can create unique images based on given parameters. They can be used for product design and advertising, creating works of art, and generating realistic images, including 3D models.

In 2018, a painting called "Portrait of Edmond Belamy," created by AI, <u>was sold</u> at the famous Christie's auction for \$432,500.

Natural language processing (NLP)

Generative models are already being applied to generate text, for example, chatbots, speech synthesis for voice assistants, language translation, or creating content for social media and blogs.



Where is Generative Al used?

Creating music

Generative AI helps create new musical compositions based on given parameters or styles, such as background music in videos, soundtracks for games, or even standalone musical compositions.

Video generation

While this field is still in its early stages, it is expected that we will soon be able to create full-fledged videos based on given parameters or styles. For example, commercials or even entire films.

Game design

Generative models are already used to create game levels, characters, and other elements. This will potentially make games more personalised and engaging for the user.

Content personalisation

Neural networks can be applied even more widely: to create product and service recommendations, generate personalised news feeds, and adjust educational content based on the user's learning style.

Research and development

Al models accelerate scientific progress, including in essential areas such as synthesising new materials and developing medicines. Here, the principle of reverse engineering is used. When the desired properties of a drug or material are specified, the neural network helps create their formulas.

Generative AI already represents significant progress in AI and has the potential to revolutionise many industries. Experts agree that neural networks will not only be applied in practical purposes but also in fundamental sciences.

Trends in Generative AI

Since 2023, AI has become mainstream thanks to ChatGPT and other neural network breakthroughs. All industries - and people who were previously unfamiliar with Generative AI - have been able to experience this tool.

Neural networks have triggered a wave of creativity. Yes, neural networks cannot yet handle all tasks 100%. Still, even the current functionality has formed an army of active users around them. Just one ChatGPT, even in the public beta testing phase, gathered over 1 million people in less than a week.

The year 2023 became significant for the entire AI industry.

Here is a list of trends in Generative AI.



Increasing LLM profitability

Tech giants are actively implementing Generative AI models into their products. And while not everyone has options for paid subscriptions, the trend of expanding such services will definitely continue.

Increase in AI startup investments

Young players in the Generative AI market are actively and successfully attracting funding for their development. For example, the AI content creation company Jasper secured \$125 million in investments, Runway - an AI video editing startup, reported attracting \$50 million in funding, and Creative Fabrique, which operates in the design field and also uses AI, got \$61 million in investments. And there will be more venture investments like that.



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Trends in Generative Al



Development of small language models

If companies used to rely more on large models through APIs, this year, more have focused on creating their own. This trend will lead to the development of small but more efficient language models tailored to specific areas of knowledge.



Throughout the past year, the corporate sector has actively monitored the development of Generative AI. Now, the trend has shifted: companies are adopting AI technologies and adjusting their development strategy accordingly. We can expect more practical use cases of AI in the nearest future.

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Unsurprisingly, the use of AI has raised numerous ethical and legal issues. With the help of neural networks, one can write a thesis and create fake news or even malicious spam content. Another problem is bias and violation of confidentiality. The way LLMs are trained raises many questions. Often, content is used for this purpose without obtaining permission from the copyright holder. Companies are increasingly talking about the need for AI alignment.

goals, and values

Creating legal foundations for using AI is significant for the global community.

Creating a legal framework for Generative AI

Al alignment refers to aligning Al systems with human ethics,

Trends in Generative Al

Development of technologies for identifying AI-generated content

LLMs are trained on large datasets, but their perception of the real world is often limited. Therefore, users may receive answers based on incorrect, outdated, or contextually inconsistent information. Tools for identifying content generated by neural networks are already emerging.

Companies will seek tools that help them save time and money. It seems that Generative AI will play a significant role in this process. Machine learning models will be refined and focused on specific tasks.

When creating new models, we will likely face a shortage of computational resources, such as high-performance computers and graphics processors.

Another problem is ecology. Neural network training requires large datasets, which significantly increases energy consumption.

Training just one AI model can result in emissions of over 626,000 pounds of carbon dioxide equivalent, which is nearly 5 times the emissions of an average car over its entire lifespan (MIT Technology Review).

For example, training the GPT-3 model by OpenAI in 2021 required 1.287 GWh.

96%

agree that the convergence of the digital and physical worlds will change business in the next decade

90%

95%

75%

Among global business leaders





agree that digital identification of users and resources is now a strategic priority



believe that data transparency is now a competitive advantage



believe that Generative AI opens a new era for business



agree that AI can help address social challenges





Over the past few years, we have witnessed the emergence of dozens of transformer models. They have sparked a wave of creativity worldwide. The simplicity of use, accessibility, and impressive results demonstrated by these models have made them incredibly popular among users.

People have gained convenient tools for creative tasks and code generation. Generative Al is no longer just entertainment. Neural networks help increase users' efficiency. Companies are integrating Al into their business processes.

Today, neural networks come in both closed-source and open-source code. For example, Open AI provides limited access to all of its products. This means they can be used but not customised or embedded into one's application. Stability AI, on the other hand, follows an entirely different strategy. Their DALL-E 2 model is publicly available. agree that AI models will play an important role in their development strategy in the next 3-5 years



Source: Accenture



Variety of machine learning models

The first glimpses appeared in 2018, but the real boom happened at the end of 2022. Let's talk about the most important ones.



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GPT-3 (text generation)

Introduced: **05/2020**

Developed by: **Open Al**

Technology: **GPT** Architecture: **Decoder**

Application: initially designed for text generation, but over time, it has been used for a broader range of tasks, such as writing poetry and prose, news articles, blog posts, answering text-based questions, translation, solving math problems, composing music, and programming.

Key features: closed-source neural network; utilises over 175 billion parameters; GPT-3 was trained on 500 billion data points, including BookCorpus, Common Crawl, and Wikipedia.

Interesting fact: GPT-3 supports over 300 different applications.

Stable Diffusion (image generation)

Introduced: 12/2021 Developed by: Stability.ai

Application: generating images based on text descriptions.

learn how to generate its own based on user prompts.

Interesting fact: unlike other image generation neural networks (DALL·E 2 and Midjourney), it has an open-source code. Anyone can use it to create their own applications for specific tasks.

Technology: **Diffusion**

Architecture: Coder/Decoder

- Key features: the model utilises hidden diffusion technology. Stable
- Diffusion has "absorbed" over 5 billion images from the internet to

GPT-4 (general purpose)

Introduced: 03/2023

Developed by: **Open Al**

Technology: **GPT** Architecture: **Decoder**

Application: Unlike GPT-3, the model can analyse text, voice queries, and images.

Key features: closed-source neural network. This is the first neural network with multimodal capabilities. Unlike the previous version, it utilises several trillion parameters.

Interesting fact: GPT-4 scored 297 points on the bar exam. This is enough to be admitted to the legal practice in most US states.

Midjourney (image generation)

Introduced: **12/2021** Developed by: **Midjourney**

Application: generating images based on text descriptions.

Key features: a new generation neural network with closed-source code. It can create new images based on text descriptions, enhance existing ones, redraw them, and adapt or change their style.

Interesting fact: this is the first widely accessible and partially free network for image generation.

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Technology: Diffusion

Architecture: Coder/Decoder



BLOOM (general purpose)

Introduced: 07/2022	Technology: GPT
Developed by: BigScience/Huggingface	Architecture: Decoder

Application: same as GPT-3.

Key features: utilises over 176 billion parameters. Unlike GPT-3 and LaMDA, it has an open-source code. The ease of access to the model is its biggest advantage - anyone can download and freely work with BLOOM.

Interesting fact: more than a thousand volunteer researchers are working on improving BLOOM as part of the BigScience project funded by the French government.

LLaMA (general purpose)

Introduced: 02/2023 Developed by: Meta AI

Application: capable of engaging in dialogue, answering closed questions, understanding text, performing mathematical calculations, and generating code.

Key features: utilises up to 65 billion parameters. Developers can use LLaMA to create chatbots and other Al-based products.

Interesting fact: the company provides users with basic code for configuring the model and applying it in research free of charge.

Technology: GPT

Architecture: **Decoder**

PaLM (general purpose)

Introduced: **04/2022**

Developed by: Google

Technology: Transformer Architecture: **Decoder**

Application: PaLM was developed as a general-purpose model for solving hundreds of language tasks. These tasks range from deciphering complex data to deductive reasoning. One example of this skill in PaLM is its ability to explain a joke it has never heard before.

Key features: utilises 540 billion parameters, including complex concepts and relationships. PaLM became the first large-scale example of using Pathways.

Interesting fact: the model's code includes 24 programming languages.

some of their individual activities.

Current Generative AI and other technologies have the potential to automate work activities that absorb 60 to 70 percent of employees' time today.

Generative AI has the potential to change the anatomy of work, augmenting the capabilities of individual workers by automating

McKinsey & Company report



Claude (general purpose)

Introduced: 03/2023

Developed by: Anthropic

Technology: **Transformer** Architecture: **Anthropic-LM**

Application: Claude can generate text, write code, and perform AI assistant functions similar to ChatGPT.

Key features: Claude uses a transformer-based neural network architecture. This allows it to understand contextual information and engage in natural dialogue while avoiding harmful, unethical, or dangerous responses.

Interesting fact: former employees of OpenAI, the creators of GPT, worked on developing Claude.

Gen-1 (video generation)

Introduced: **02/2023** Developed by: **Runway**

Application: capable of transforming existing videos by changing the style and composition of frames. Gen-1 supports various modes of operation, such as stylisation, storytelling, masking, rendering, and customisation.

Key features: a closed-source neural network. It can generate new videos from existing ones by combining text prompts and images. Gen-1 can create entirely new videos from scratch.

Interesting fact: it was created by the same developers as Stable Diffusion, the free network for image generation.

Technology: Stable Diffusion

Architecture: Diffusion Model

The emergence of ChatGPT has significantly accelerated the adoption of AI technologies in companies. Neural networks are reshaping the anatomy of brands and employees' work. Even people without programming experience have gained simple tools to enhance their efficiency. With LLMs, ordinary text prompts can be used to create original posts, generate images or entire presentations, summarise meetings, and much more.



The implementation of AI will have the most significant impact on eight sectors:



in these 20 industries will be influenced by large language models (LLMs)

Source: <u>Accenture</u>

AI can take on up to 50% of current tasks in the banking sector.

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In which industries can AI do most of the work?

Share of working hours in specific industries in the US that can be automated or enhanced with AI:



Tasks with high automation potential can be implemented with minimal human involvement. Those with a high potential for enhancement require more human involvement.

2022

<2%

Companies in various industries are already launching AI copilots for their staff - assistant tools (or guides) for performing routine or creative work. However, these are currently isolated initiatives. The rapid development of AI will require businesses to rethink and restructure many processes. Training and clear motivation will be necessary to ensure the successful adoption of new tools without resistance from employees.

by 2025

30%

outbound marketing messages from large companies will be generated by AI

Source: Gartner

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How will neural networks help companies?



- Increase personal employee efficiency
- Take on some of the routine processes
- Completely replace employees in specific business processes

Can we say that implementing AI technologies will lead to mass layoffs? For example, in the banking sector alone, AI could replace 50,000 employees in the next 5 years. Experts believe it will not be about layoffs but increasing productivity.

On the one hand, companies are intrigued by the possibilities of AI. Still, on the other hand, they are concerned about the risks it brings. Integrating AI technologies into their business processes is not enough. It is important to ensure security, confidentiality, and legal legitimacy. Even the latest generation neural networks in content generation can make mistakes, show bias, and fail to follow the company's tone of voice.



are already using AI tools

According to the survey by GitHub and Wakefield Research





According to the <u>McKinsey Global Institute</u>, a well-thought-out AI strategy in any company should include creating a cross-functional team. This team should include data processing specialists, legal experts, and executives. Together, they will need to address important questions:

- **?** Where can AI technologies help our business?
- What AI policy do we adhere to? (Are we waiting for the development of specific technology, investing in pilot projects, or attempting to build a new business? Should our position be consistent across different business areas?)
- How do we build an effective ecosystem of partners, communities, and platforms in AI?
- Considering the limitations of models, what are our criteria for selecting use cases?
- **?** What legal and social standards should these models comply with?

We are already familiar with ChatGPT and its counterparts generating texts, images, music, and even videos. Companies can use this content to create new products and attract customers. Essentially, brands gain a creative assistant ready to endlessly share new ideas.

However, the involvement of transformer models is not limited to this. Al can improve the quality of creative tasks, reduce the amount of routine work, help find new product value for customers, and even reshape entire processes within a company.

They can process vast amounts of data, uncover hidden connections and patterns, and provide CEOs with valuable information for making strategic decisions.

In practice

	s consider some use cases that are already relevant today in this section mple 1. Customer reviews management	-	grating bring
prod	ay, the success of many companies heavily relies on the tone of reviews about their lucts and services. Negative reviews can push a product card down in search results on ketplaces. In contrast, positive reviews can elevate it to the top. In the banking sector,	1 2	Auto and Add
work	king with reviews helps improve financial products or services for customers.		clas neu ⁻
can	n, companies focus only on handling negative reviews, but working with positive reviews also yield results. Responding to a customer who gave a high rating for a product makes n more loyal to the brand. This gentle touch reminds the customer that the company values	3	Auto clas
	opinion. Neural networks can be invaluable assistants in this area, as they can:	4	Auto key reco
	Respond diversely and individually to positive reviews	5	Eval
•	Generate relevant responses to typical user queries		and
	Analyse the sentiment of reviews and identify patterns Form recommendations based on reviews for product, service, or process improvements	6	Ens style

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ting neural networks into review management ng even more possibilities:

- utomatic parsing of websites with comments nd reviews
- dding industry context, automatic lassification, and auto-responses for positive, eutral, and non-critical reviews
- utomatic identification of common topics and lassification of reviews based on them
- utomatic daily/weekly summaries of ey issues and advantages, generating ecommendations
- valuating the quality of employee responses nd providing improvement suggestions
- nsuring a consistent brand communication tyle when working with reviews

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Example 2. Analysis of customer conversations in a contact centre

Employees in a typical contact centre have varying levels of experience and knowledge. The involvement of LLM models in their work could enhance the speed and quality of their responses. How AI can be used in a contact centre:

- Evaluating the quality of operators' responses
- Al assistant for employees
- Analysis of customer sentiment
- Onboarding and adaptation of new hires

Example 3. Generation of responses based on documents, websites, or other resources

Companies often use their own knowledge base for chatbots and voice assistants. However, updating and maintaining this knowledge base can be lengthy and challenging. Companies can update information on public resources such as websites, messengers, and social media much faster. ChatGPT and its counterparts would enable guicker and more accurate responses to customer gueries, considering the updated data. A chatbot can analyse information on a website and provide relevant answers without waiting for the knowledge base to be updated.

In another scenario, the chatbot can become the knowledge base itself for customers and employees. It can be further trained on company materials to serve as a comprehensive source of information.

Neural networks can serve as an additional support tool for operators and, in some cases, even replace them. The combined use of AI and human operators can improve the performance of the contact centre in customer interactions.

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Tovie Data Agent platform for quick access to business data

🔶 data agent	🗀 My agents / Agent 🗸			@tovie.ai \vee
My agents Channels				< 1 > 10/page <
 Teams 	Search		Q Update date: new	at the top \vee + Create an agent
Chat WidgetAPI	Sales training ····	Agent test ····	Customer support ····	
Al Model Provider				
Google	Last updated: 2 days ago	Last updated: 5 days ago	Last updated: 8 days ago	
Anthropic	\$	\$	\$	
Tovie Al				
	Website search ····	Employee onboarding	нк …	
	Last updated: 9 days ago	Last updated: 9 days ago	Last updated: 9 days ago	
	\$	\$	\$	
	Complex documentation agent	Tovie Data Agent	Meeting summary ····	
	Last updated: 12 days ago	Last updated: 12 days ago	Last updated: 12 days ago	
	\$	\$	\$	

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Example 4. Analysis of candidate CVs for job vacancies

Candidates often format their resumes in different styles. When there are many resumes to review, HR managers must spend a significant amount of time reading and analysing them. AI models can be informed about the list of requirements for the vacancy: key skills, education, experience, and other factors. Based on the input data, the neural network will check new resumes for compliance with these requirements.

HR can even use an evaluation scale or other criteria to conveniently shortlist candidates for interviews. In mass hiring scenarios, using neural networks can make it easier to quickly evaluate whether resumes are a good fit, saving the HR department time on routine tasks.

Example 5. Writing job descriptions

ChatGPT can conduct a brief survey to gather more information about the job requirements. Based on the collected data, the neural network will draft a job description outlining the candidate's requirements, responsibilities, necessary experience, and other details. Notably, AI can consider the company's tone of voice when preparing the description. A human reviewer can quickly make any necessary adjustments to the draft and proceed with its publication.

The next step may involve creating a shortlist of candidates. The neural network can conduct preliminary interviews with them directly in the chat without relying on scripts and considering the context of respondents' answers.

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Example 6. Follow-up and meeting minutes



Almost every day, office employees engage in offline or online meetings. An important aspect of conducting these meetings is documenting the outcomes and agreements. In this case, neural networks can be effectively utilised. Al can transcribe such meetings and prepare a comprehensive protocol highlighting key moments. Moreover, such a follow-up can include ideas, recommendations, or suggestions for the participants.

There are even more possibilities for neural networks in this use case:

- 1 Working with semantic breakdowns of text blocks and intermediate conclusions while preserving key facts when dealing with large amounts of data
- 2 Fine-tuning Automatic Speech Recognition (ASR) on company-specific terms or correcting deficiencies in the final transcriptions
- 3 Converting video into an audio stream, separating speakers using video conferencing tools (e.g., Zoom)
- Adding standard meeting protocol templates with automatic formatting of the resulting document 4
- 5 Identifying and clarifying questions that may not be explicitly evident from the transcription
- 6 Integration with the company's communication systems
- 7 In the longer term, extracting speakers' voices directly from the audio stream

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Example 7. Creating a reference illustration for an advertising campaign

The model can be informed about the concept of the advertising campaign, target audience, illustration requirements, and desired mood. The output can be an image that aligns with the company's visual style, conveys the advertising message, and considers the product's unique features. Working with neural networks is beneficial because even without a clear idea of the desired outcome, one can experiment by allowing AI to generate ideas.

For example, ideas for a logo that should include a bull and have a connection to cryptocurrency



Or a credit card design in the style of impressionism





Neural networks allow quickly exploring options, experimenting with styles, and choosing a basis for a future project.

Brands are already using Generative AI in their operations for various reasons. Neural networks help create unique content and products while automating business processes. Generative AI has become integral to modern business, opening new possibilities for companies. There are already many areas where AI has proven its effectiveness and can be applied right now.

More use cases to come soon as the technology is evolving rapidly.







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What's the most popular GenAl use case today?

A Generative AI chatbot built on your data

All my knowledge and work settings are stored	
model that I use to think and style of my talking	GPT 4.0 Suitable for most cases
I have processed the documents and am ready 10:52	to answer your questions. ChatGPT All languages
Always happy to help!	Tone of voice
правьте сообщение	

Tovie Data Agent is a powerful GenAI tool that integrates diverse data sources. It generates contextually accurate responses across your company's data and knowledge bases.

It works with multiple data sources like Google Drive, Dropbox, SharePoint, CRMs, and MP3 audio files. Data Agent provides deep and contextually correct responses to queries in a chat format. Are you looking for your use case in the field of Generative AI? Contact us, and we will help you.

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How to define your AI use case?

Tovie AI consulting services leverage Generative AI expertise to identify your business optimisation potential.

Our experts will collaborate with you to unlock the full potential of LLMs and determine where the disruptive technology can bring the most value.

We establish and guide the process of Al-2.0 tools adoption across your organisation: learning how to orchestrate the technology, make the most of it and work in a brand-new, most effective way.

As a result, you get powerful tools for your business performance improvement within your team.

Contact us

Generative AI consulting services

Al application discovery and prioritisation

We map out possible AI use cases in your business and, through viability studies, determine their potential impact, offering you the insight needed for informed decision-making.

Pilot project implementation in the cloud

We initiate our AI application process by gathering and formatting use case data, calibrating Large Language Models, deploying and enhancing user experience, followed by quality assurance and thorough testing.

Pilot run and business case production

We initialise by deploying the pilot using cloud infrastructure and running it for three months. After the pilot phase, we present a comprehensive business case to support future production deployment.

Generative AI implementation

Our team ensures easy deployment of generative AI applications into your existing infrastructure, minimising disruptions while maximising benefits for a hassle-free utilisation of AI capabilities.

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Tovie Al GenAl offering

About Tovie Al

Tovie AI accelerates business growth and efficiency by utilising Generative and Conversational AI technologies. We focus on automation and improving customer experiences, viewing language-based AI as the key to unlocking enterprise potential.

Our robust tools for Natural Language Processing, speech synthesis, and dialogue management help businesses personalise their brand and connect more deeply with customers. Our end-to-end solutions, including a precise NLP engine and tailored analytical reports, ensure effective market navigation and investment maximisation.

As a central part of our offering, we provide comprehensive Generative AI consulting services. We create and integrate custom ML models into client workflows, promoting quick innovation, efficient problem-solving, and collaboration.

Our AI solutions are cutting-edge, aligning with ethical and responsible AI practices.

Contact us today to schedule a free consultation and explore the potential of LLMs for your business.

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Conclusion

Neural networks have emerged as a powerful tool in various domains, including personal productivity, sales, customer support, scientific research, corporate strategy, market analysis, creativity, and programming.

In the business setting, generative language models have already proven highly effective. Some examples include:

- personalised training for employee onboarding
- automation of routine tasks for improved performance
- chatbot-style recruitment interviews for efficient hiring
- sentiment data analysis for better decision-making
- simplified data retrieval through data querying
- website search for enhanced customer engagement

New technologies like AI have changed the way we live and work. Generative AI is growing quickly and has the potential to make a significant impact, creating trillions of dollars in value and transforming the way we do our jobs.

But with this progress comes new challenges. It's important for everyone involved to understand and manage the power and risks of this technology. We are all on a journey to explore and learn about generative AI and its capabilities.



