ISBN: 978-623-89040-6-8

CHAPTER X

Assessment Of Arranged Man-Made Intelligence (AI) Apparatuses, Their Utilitarian Design Processor And Its Market Size

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ABSTRACT

This paper provides an in-depth assessment of arranged artificial intelligence (AI) apparatuses, focusing on their utilitarian design processes and the expansive market size of AI technologies. AI systems, encompassing machine learning, natural language processing, computer vision, and robotics, have become pivotal in transforming industries such as healthcare, finance, automotive, and retail. The utilitarian design process of AI involves problem definition, data collection, algorithm selection, model training, deployment, and continuous feedback, ensuring that these systems solve real-world problems efficiently and effectively. As AI technologies evolve, the market for AI is experiencing rapid growth, with projections indicating that the global AI market will exceed $1 trillion by 2030. Advancements in deep learning, AI-as-a-service models, and the increasing integration of AI across business processes fuel this growth. However, challenges such as data privacy concerns, regulatory frameworks, and a shortage of skilled talent must be addressed to realize AI's potential fully. This assessment underscores the transformative impact of AI on global industries, as well as the ongoing need for strategic innovation and ethical considerations in its deployment.

Key Words: AI-Tools, Chat-GPT, Humanizer AI, Deep Seek, Applications of AI Tools.

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INTRODUCTION

Artificial Intelligence (AI) tools [I] have emerged as transformative technologies, revolutionizing industries by automating tasks, enhancing decision-making, and enabling innovative solutions. These tools are designed to mimic human intelligence, performing tasks such as recognizing patterns, understanding language, making predictions, and solving complex problems. From virtual assistants like Siri and Alexa to advanced systems like self-driving cars and medical diagnostic tools, AI is reshaping how we live and work.

At the core of AI tools lies a structured working process that enables them to learn from data and perform specific tasks.

This process typically involves several key stages [II]:

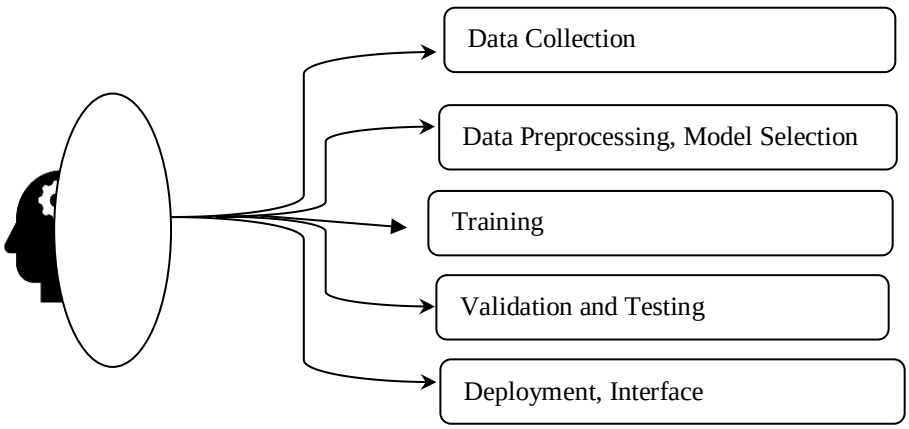

Fig 1- Key Stages in AI – Tools Process

1. **Data Collection:** AI tools rely on vast data to learn and make decisions. This data can come from various sources, such as text, images, audio, or sensor inputs.
2. **Data Preprocessing:** Raw data is cleaned, formatted, and transformed into a usable format. This step ensures that the data is consistent and error-free.
3. **Model Selection:** Depending on the task, an appropriate AI model is chosen. Standard models include machine learning

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algorithms (e.g., decision trees, support vector machines) and deep learning architectures (e.g., neural networks).

4. **Training:** The selected model is trained using the prepared data. During training, the model adjusts its internal parameters to learn patterns and relationships in the data.
5. **Validation and Testing:** The trained model is tested on unseen data to evaluate its performance and ensure it can be generalized to new inputs.
6. **Deployment:** Once validated, the model is deployed into real-world applications, performing tasks like image recognition, language translation, or predictive analytics.
7. **Inference and Feedback:** In the deployment phase, the model makes predictions or decisions based on new data. User feedback and new data can be used to refine and improve the model further over time.

AI tools are powered by advanced technologies such as machine learning, deep learning, natural language processing (NLP), and computer vision.

For example:

Machine Learning enables systems to learn from data and make predictions.

Deep Learning uses neural networks to model complex patterns, making it ideal for image and speech recognition tasks.

NLP allows machines to understand and generate human language, enabling applications like chatbots and translation.

Computer Vision allows machines to interpret visual data by identifying objects in images or videos.

Despite their immense potential, AI tools face challenges such as bias in data, lack of transparency, high computational costs, and ethical concerns like privacy and job displacement. Addressing these challenges is critical to ensuring responsible development and deployment of AI technologies.

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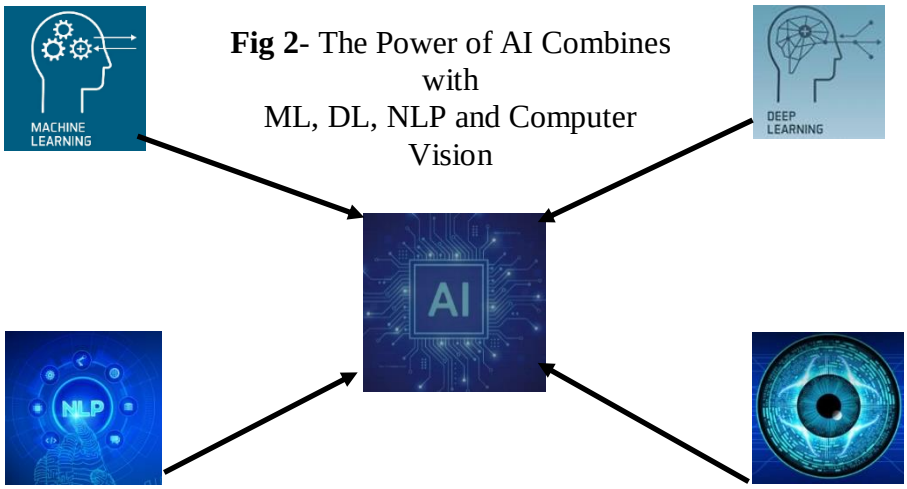

Fig 2- The Power of AI Combines with ML, DL, NLP and Computer Vision

AI tools leverage algorithms, data, and computational power to perform tasks requiring human intelligence. Here is a breakdown of how they function:

1. Data Collection [III]

AI tools rely on large amounts of data to learn and make decisions. In other words, data collection is an approach to collections of methods. There are two types: 1. Primary data collection methods [IV] (Ex: Opinion Polls), 2. Secondary data collection methods [IV] (Ex: Organization Annual Report). This data can come from various sources, such as:

Text (e.g., books, articles, social media posts)
Images (e.g., photos, medical scans)
Audio (e.g., voice recordings, music)
Sensor data (e.g., from IoT devices, autonomous vehicles)

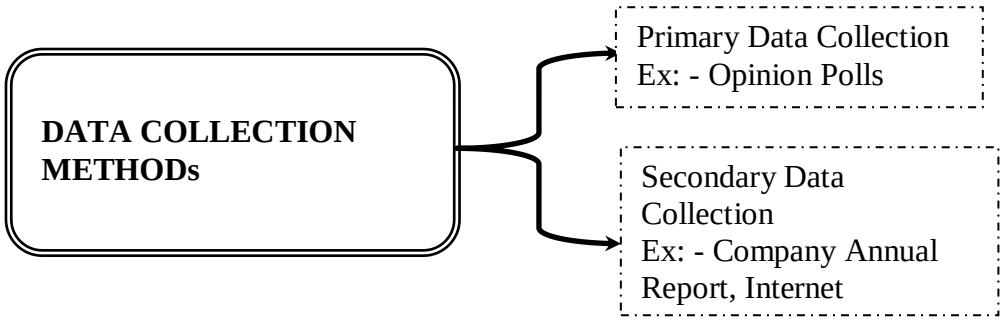

Fig 3- Data collection methods

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2. Data Preprocessing

Data Processing [V] is a process/analysis of Raw data; often, we cannot understand the raw data, so we use this technique to analyze it. It must be cleaned and formatted before being fed into an AI model. This is the collection of data from different resources and using different mechanisms to process acquired data. To process the collected data, this may include and followed by

A. data cleaning (Fixing/removing uncorrected data),
B. data transformation (converting the data from one format to another),
C. data integration (combine the data from different resources) and
D. data reduction (limits the amount of data to store).

3. Model Selection [VI]

Depending on the task, an appropriate AI model is chosen. Common types of models include:

Machine Learning (ML) Models: For classification, regression, or clustering tasks.

Deep Learning Models: For complex tasks like image recognition, natural language processing (NLP), or speech recognition.

Reinforcement Learning Models: For decision-making tasks like game playing or robotics.

4. Training the Model

The AI model is trained using the prepared data. During training:

The model learns patterns and relationships in the data.

It adjusts its internal parameters to minimize errors (e.g., using techniques like gradient descent).

Training can take hours, days, or weeks, depending on the model's complexity and the dataset's size.

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5. Validation and Testing

After training, the model is tested on unseen data to evaluate its performance. This step ensures that the model generalizes well to new inputs and does not just memorize the training data (a problem called overfitting).

Metrics like accuracy, precision, recall, or F1 score are used to measure performance.

6. Deployment

Once the model performs well, it is deployed into a real-world environment. This could involve:

Integrating the model into an application (e.g., a chatbot, recommendation system, or autonomous vehicle).

Setting up infrastructure to handle real-time predictions (e.g., cloud servers, edge devices).

7. Inference

The trained model makes predictions or decisions based on new input data during inference. For example:

A facial recognition system identifies a person in a photo.

A language model generates text based on a user's prompt.

8. Feedback and Improvement

AI tools often improve over time through feedback loops. For example:

User interactions (e.g., clicks, corrections) can be used to retrain the model.

New data can be collected to keep the model up-to-date.

1. AI TOOLS AND WORKING PROCESS

AI is nothing but artificial thinking machines; as the above discussion approach, the tools of AI were working. In the present situation, many AI tools are working. Among them are CHAT-GPT, Humanizer-AI, Deep-Seek, etc. These AI tools make working conditions easier for Humans. Now, we will see the working process of the AI tools mentioned, which will help us understand AI tools.

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1.1. CHAT-GPT [VII]

Chat-GPT is an easy-to-use AI tool. Its work through its Generative Pre-Trained

Transformer (GPT) uses specialized algorithms to find patterns within data sequences. It is used to generate like text to humanize text process above above-mentioned key things like Data Collection, Data Process, etc., and also using Machine Language, Deppe learning, NLP and computer Vision, etc concepts. This work is based on the Large Language Model (LLM), Large Multimodal Model (LMM), and other AI Models.

There are three significant steps behind the smooth working

of the Chat-GPT: a. Collect demonstration data and train a supervised policy.

a. Collect comparison data and train a reward model,
b. Optimize a policy against the reward model using the Proximal Policy Optimization (PPO) reinforcement learning algorithm.

Open AI made some exhibit information that showed the brain network how it ought to answer in ordinary circumstances. From that, they made a prize model with examination information (where artificial intelligence mentors positioned at least two model reactions) so the artificial intelligence could realize the best response in some random circumstance. While not unadulterated directed learning, Reinforcement Learning from Human Feedback (RLHF) permits networks like GPT to be calibrated successfully.

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The following diagram explains the working processor of Chat-GPT.

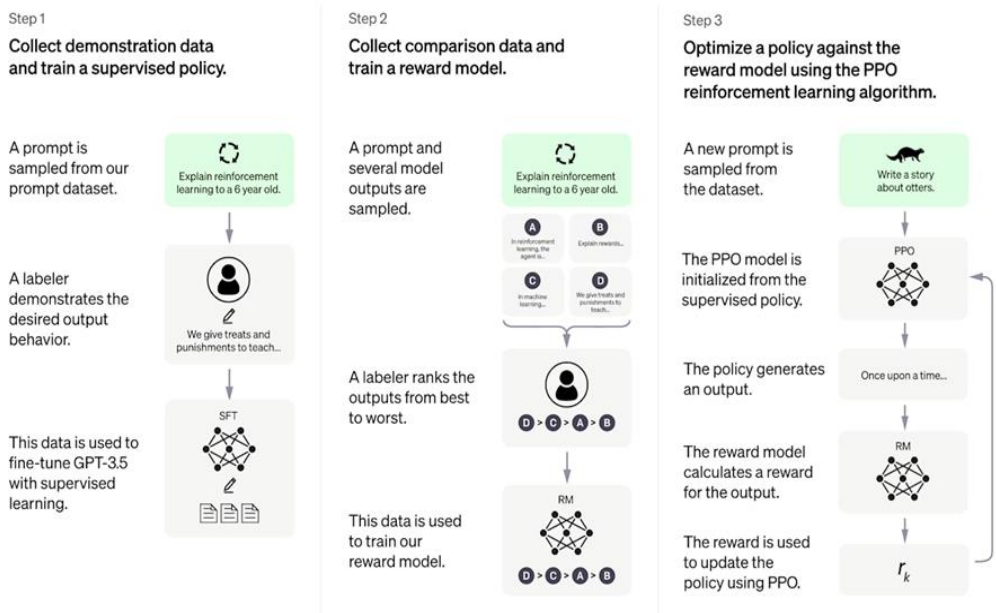

Fig 4- The AI Tool Chat-GPT working Structure.

Humanizer-AI

The Humanizer-AI [VIII] is an AI-Tool systems that work by using algorithms and data,

which is analyzing much human-composed text to learn examples of language, syntax, and tone, then, at that point, applying that information to change artificial intelligence-created text, making it sound more normal and human-like by adding unpretentious subtleties, conversational components, and profound signs, successfully Humanizing the result. The key aspects of this mechanism are Data Training, Pattern Recognition, Modifications and refinement, and contextual understanding.

Using the processor of the Humanizer AI

Input: the AI-generated text is passed into the humanizer tool by pasting it.

Customization Options: The tool may allow you to change parameters such as the degree of

formality, the tone (formal or informal), or the desired emotional sentiment.

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Output: The text will look more like what a human wrote after being revised by the humanizer.

Fig 5- Humanizer-AI

1.2. Deep Seek

It is another powerful AI tool which is developed recently by China; it is the first product of

a strong open-source AI tool using a Mixture-of-Experts (MoE) language model that stands out for its economical training, efficient inference, top-tier performance across various benchmarks, and Large Language Model (LLM). It is more efficient and cost-effective than the Chat-GPT AI Tool.

Table 1- Hardware Requirements for Deep-Seek [IX]

Component	**Requirement**
GPU	Multi-GPU setup with at least 32 GB VRAM per GPU (e.g., NVIDIA A100 80GB x16)
RAM	Minimum 64 GB system memory
CPU	High-performance multi-core processor (e.g., **AMD EPYC or Intel Xeon**)

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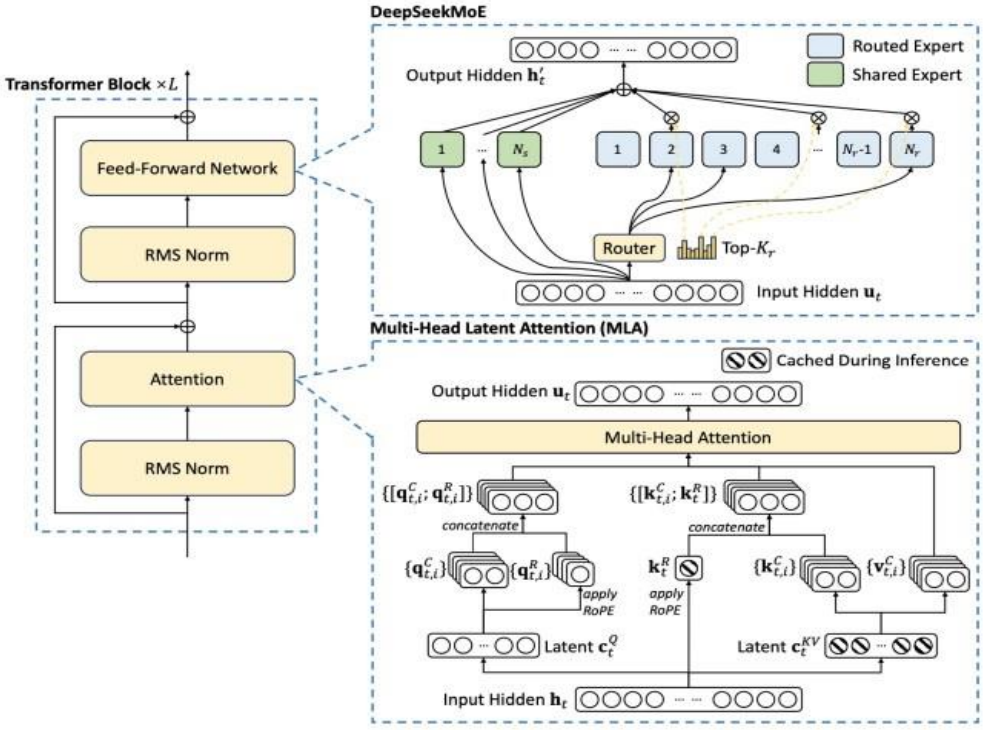

Fig 5- Deep-Seek Architecture

When we compare it (deep-seek) with other AI tools, it reduces training costs, reduces KV

cache size is almost 90 % and increases maximum generation throughput by 4-6 times.

2. APPLICATIONS, BENEFITS AND DRAWBACKS OF AI TOOLS

2.1. Applications of AI Tools

We cannot imagine any department/ sector/ Organization without these AI Tools.

Utilization [X], i.e., a broad range of development is done in every sector, such as education, health, builders, transportation, human resources, energy, agriculture, etc.

AI tools are transforming industries by enhancing productivity, reducing costs, and offering innovative solutions to complex

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problems. The applications are continuously expanding as technology advances.

2.2. Benefits and drawbacks of AI Tools [XI]

As mentioned above, we could not image any sector without an AI Tool, which means we

We regularly face many merits/demerits in our daily lives while using AI tools.

Merits are:

a) **Automation and Efficiency**:

AI can automate repetitive tasks, improving efficiency and reducing human errors.

It can quickly handle large amounts of data, providing results in a fraction of the time it would take humans.

b) **Data Analysis**:

AI is excellent at processing and analyzing vast datasets, uncovering patterns and trends that would be hard for humans to detect.

This ability helps in decision-making, improving predictions, and optimizing processes.

c) **24/7 Availability**:

AI tools do not require rest and can work round the clock, which is especially useful in customer support, healthcare monitoring, and many other fields.

d) **Cost-Effective in the Long Run**:

Though there may be upfront costs, AI can reduce long-term labor costs, making businesses more cost-effective.

It can also help reduce operational inefficiencies.

e) **Personalization**:

AI systems can tailor experiences based on user behavior, preferences, and needs, as seen in applications like entertainment, shopping, and learning recommendation systems.

f) **Accuracy in Certain Tasks**:

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AI can excel in areas where precision and accuracy are crucial, such as medical diagnostics, financial forecasting, or quality control in manufacturing.

g) **Enhanced Creativity**:

AI tools are now being used for creative tasks such as art generation, music composition, and writing, offering new possibilities for creative expression

Demerits are:

a) **Job Displacement**:

As AI automates tasks, job loss is risky, especially in the manufacturing, retail, and customer service sectors.

This could contribute to economic disparities and require shifts in workforce skills.

b) **Dependence on Data**:

AI tools are heavily reliant on data. The AI's output can also be flawed if the data is biased, incomplete, or inaccurate.

Poor data quality can perpetuate biases in decision-making processes, such as hiring, lending, or policing.

c) **Lack of Emotional Intelligence**:

Even with advancements, AI tools cannot truly understand or replicate human emotions, a drawback in areas like customer service or therapy.

Human empathy and nuanced judgment are still beyond AI's reach.

d) **Security and Privacy Concerns**:

AI systems often handle vast amounts of sensitive data, which makes them attractive targets for cyberattacks.

Privacy concerns exist, especially with facial recognition and personal data in AI-driven systems.

e) **High Initial Costs**:

The development, training, and maintenance of AI systems can be expensive barriers to entry for smaller organizations.

f) **Ethical Issues**:

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There are ethical concerns around AI decision-making, especially in military use, surveillance, and algorithmic bias.

Who is responsible when an AI makes a mistake or causes harm?

g) **Over-reliance and Lack of Control**:

A heavy reliance on AI tools could lead to complacency, where humans fail to assess AI decisions critically, potentially leading to mistakes.

The complexity of some AI systems may make it difficult for humans to understand how decisions are made (the black-box problem).

h) **Potential for Misuse**:

AI can be used maliciously in deepfakes, cyberattacks, or creating manipulative content.

3. AI TOOLS UTILIZATION ANALYSIS

AI tools are used to generate human text, which helps to learn and analyze different fields of information because these AI tools work based on machine learning, deep learning, NLP computer vision, etc. So, these AI tools provide processed data that prefers human-generated text differently. This article provides information on data from a few years in various fields. This information can help society analyze and improve any particular field more broadly. AI tools were used many years ago, but since 2021, they have been widely used. The market size of AI tools has grown exponentially in recent years. Payload table information is based on some online sources that predict the data collection in billions of USA currency.

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Table 2- AI Tools Market Size in Different Years (in USD Billions)

No	AI Tool	2021	2022	2023	2024	2025	2026	2027	2028	2029
1	Automotive	2.5	3.1	3.22	3.88	4.67	5.91	7.12	9.7	11.8
2	Pharmaceuticals and biotechnology	12.1	15.3	19.1	19.7	22.8	27.9	32.8	39.8	44.8
3	Education	2.3	2.6	3.5	4.9	6.3	7.8	12.4	15.3	18.9
4	Fashion	0.9	1.1	1.2	1.26	1.77	2.5	4.2	5.4	6.69
5	Health	12.4	16.3	26.8	51.4	75.8	92.9	119	151	173.5
6	Private equity and principal investment	2	2.5	4	5.6	7.8	9.1	12.8	13.5	16.9
7	Legal businesses	1.76	2.1	3.5	4.8	6.1	7.9	8.26	8.91	9.63
8	Information technology	202.6	128.8	135.9	184.12	243.7	320.1	416.12	530.4	667.9
9	Construction / Real-Estate	1.7	2.6	3.9	4.1	4.96	6.12	7.5	9.87	13.78
10	Agriculture	1.9	2.1	3.01	3.8	4.71	5.89	7.81	9.12	11.7

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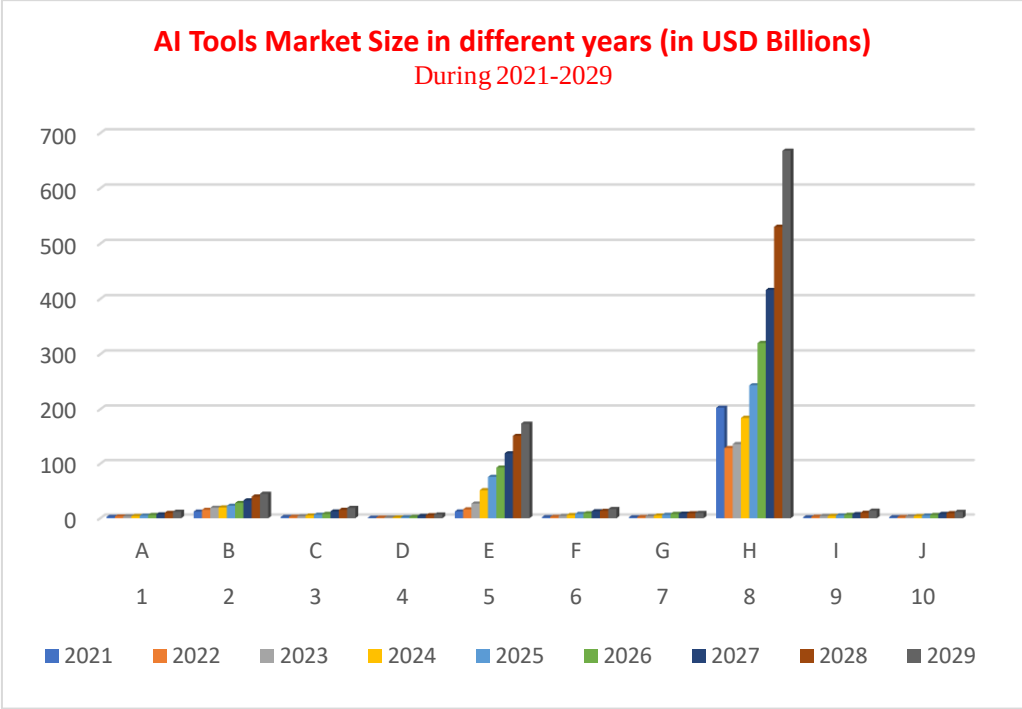

Graph-1 AI Tools Market Size in different years (in USD Billions)

Note: In the above graph, the alphabets mentioned are the AI Tools, respectively, as per S. No.

CONCLUSION

The assessment of arranged artificial intelligence (AI) apparatuses, their utilitarian design process, and market size reveal a rapidly evolving landscape with profound implications for various sectors. AI systems have become integral tools, driving efficiency, innovation, and automation across healthcare, finance, automotive, and retail industries. The utilitarian design process of AI—centered around data collection, algorithm selection, training, and deployment—ensures that these systems are tailored to address specific real-world challenges with increasing accuracy and adaptability.

The market for AI continues to expand, with projections indicating substantial growth over the next decade. This growth is propelled by advancements in deep learning, natural language processing, and

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machine learning algorithms, as well as the widespread availability of cloud-based AI services that make these technologies accessible to a broader range of businesses. However, increasing AI adoption brings challenges related to data privacy, ethical considerations, regulatory frameworks, and the scarcity of skilled talent.

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