AI Industry Analytics

DEEP KNOWLEDGE GROUP

AI Industry Rankings and Benchmarks Analytical Methodology

5th Industrial Revolution Institute

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DEEP KNOWLEDGE ANALYTICS

Introduction & General Methodology

Artificial Intelligence (AI) is about to revolutionize global industry over the next decade. Almost no sector, from finance to governance, can afford to ignore it any longer. With its ability to analyze massive amounts of data, identify patterns, and make accurate predictions, AI empowers businesses to optimize their operations, enhance productivity, and drive innovation. AI-powered technologies like machine learning, natural language processing, and computer vision are transforming sectors such as **healthcare**, **finance**, and **technology**, among others. Furthermore, AI has the potential to address pressing global challenges, including healthcare access, manage resources, enable data-driven decision-making, reshape industries, create new job opportunities, and foster economic growth, ultimately changing the world as we know it.

This makes AI a prime example of a "metatechnology": a technology that serves to create, improve, or modify other technologies. The ultimate metatechnology, logically, would be a sector that improves itself as well as others, with optimal multiplicative effects of the rate of progress. "Recursive self improvement" in AI would be a prime candidate for the ultimate technology. But whereas recursive self-improvement is normally imagined as AI-driven AI coding, the current most realistic method for AI to self-improve is through AI-driven AI industry analysis. This is the current weak link. AI applications are now becoming characterized by such high levels of technological intersectionality, impacting so much global industry and incorporating so many disparate tech sectors, that AI industry development *itself* now defies analysis, benchmarking or forecasting by human beings. And yet deep analytics of AI-powered companies *could* significantly contribute to their development by providing valuable insights and driving data-driven decision-making in all sectors from finance to policy making.

It is to meet this need that AI Industry Analytics has developed an analytical system for the industry based on an identification of its constituent corporate entities, investors, hubs & platforms and other core components. The sector framework for this system is the subject of our sister document titled AI Industry Framework.

One of the key outputs of this system is a variety of benchmarks and rankings. This consists of 8 ranking groups, and 8 benchmarks groups which between them consist of 450 benchmarks. The main sets of ranking are: Countries, Cities, Institutions, Governments, AI related Jobs, AI Leaders, AI Technologies, and AI Policies. Benchmark groups include: Companies by Regions, Companies by Industry, Companies by Technology, Startups, Corporations, Investment Funds, Angels, Institutional Investors. Data for creating benchmarks and rankings include 50,999 **AI Companies** across 86 sub-industries, 10,000 **Governmental Organizations**, 3,393 **Educational Institutions** and 3,238 **AI Leaders** from various spheres of social activity.

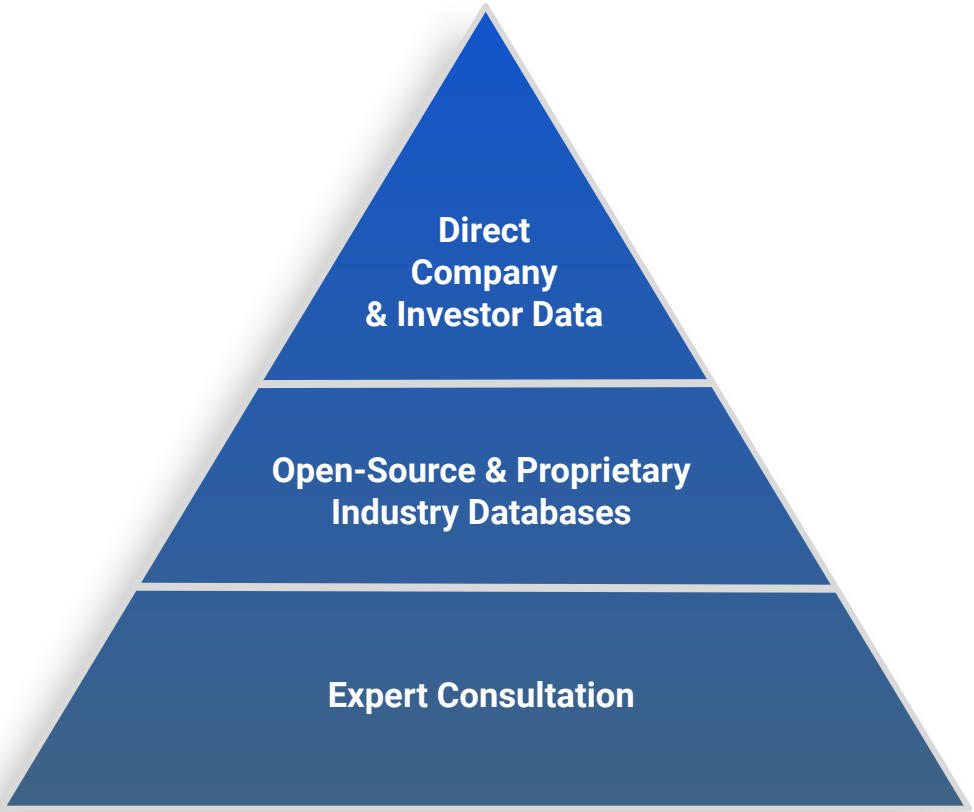
Data Accuracy Review

The **AI Industry Rankings and Benchmarks** utilizes a combination of publicly available databases as well as manually-curated and researched quantitative and qualitative data obtained by manual searches using search engines, media, industry and company reports, and the use of expert opinions and consultations.

In utilizing three qualitatively distinct sources of data, AI Industry analysts have attempted to overcome barriers in conducting a comprehensive, yet reliable and methodologically-rigorous analysis by utilizing the largest and most reputable databases where possible, by consulting sector-specific resources in cases when open-source broad industry databases are not possible.

Where possible, equivalent data is obtained from multiple sources, and averaged when the values offered by each source differ significantly.

By utilizing this approach, the present analysis attempts to find an optimal balance between using maximally transparent and reliable sources of data, and including data which are only obtainable from expert consultation.



Principal Component Analysis

Principal components analysis (PCA) is a data science technique used to quantitatively define the way that metric (parameter, ratio or velocity) weights are assigned in order to create a “composite index” (a ranking based on a weighted sum of specific metric categories). PCA allows us to remove redundant information that are shared among two or more metrics or metric categories by creating a weighting that accounts for the greatest amount of variance in the data.

The PCA weights that have been used to create AI Industry Rankings and Benchmarks are based on the subjective evaluations of each parameter significance by the domain experts. They should be considered as complementary tools, and not as supplemental weights to override the default weights assigned to metric categories or individual metrics, or as a direct means of understanding the benchmarking index scores themselves, because they do not take into account the “impact factor” or significance-based weights used in the model.

PCA weights each component of the index taking into account covariance between indicators, and the degree with which a particular component (parameter, indicator or category) maximizes the variation among scores in the index. In essence, it is a method used to minimize redundancy between variables and maximize variation as it pertains to the actual final index scores.

In simplified terms, it minimizes the importance or impact of redundant factors shared among variables and maximizes the importance of impact of non-redundant factors that contribute significantly to the final output of the index (the company or investor scores).

Each PCA weight is calculated by taking the principal component (known as the eigenvector) associated with the highest explained variance (known as the eigenvalue), which constitutes a method of decomposing data into independent components ordered by informational content.

Principal Component Analysis

Valid PCA makes several important assumptions. These include (1) the assumption that variance is meaningful and not the result of significant measurement errors in the data itself, and (2) the assumption that the dynamic in question is along the direction with the largest variance.

Single-stage PCA analysis solves for the weights maximize variance across all variables, irrespective of which top-level category they belong to. The following steps are followed:

- Perform PCA analysis on all indicators, ignoring the category they belong to.
- Use the principal component associated with the highest eigenvalue.
- Set negative components to zero.
- Normalize metric category weights (such that the sum of weights is equal to 1).
- Use the sum of the non-normalized metric weights and assign this as the metric category weight for that category.
- Renormalize top-level metric category weights across metric so that those also sum to 1.

Variation within indicator weights is a sign that redundancy is occurring in the elements or that some elements are not as relevant in explaining the variation in the overall index once all the other variables are considered.

Finding equal weights across indicators is a sign of very little redundancy across subgroups and similar relevance in explaining variation in the Index, which suggests that the Index has been divided into subgroups appropriately.

Data Sources

The majority of sources used are publically available and open source. Data is collected from many sources including news articles and press releases, websites of the entities, academic papers, patents fillings, experts opinions, public reports, marketplaces statistics, professional networks etc. Giving higher importance to the independent data from sources unrelated to the entity, we carefully perform cross-validation of each data point from as many sources as possible, filtering low quality and questionable data to keep the overall database as accurate and updated as possible.

Periodic manual checks of randomly selected samples of data points allow us to track the quality and accuracy of the database, see strong and weak areas of the methodology and obtain the real time feedback for the algorithms' improvements. Automatic QA is also utilised by the QA and Accuracy Measurement system. The data validator gives permanent evaluation and feedback to the system and allows it to constantly improve and keep the database clean and updated.

- Countries' Legislations Databases
- Media Articles
- Peer Reviewed Papers
- Industry Reports
- Experts Articles
- Open Source Databases (e.g. WikiData)
- Web of Science / Scopus Data
- Commercial Datasets
- Patents Databases
- Social Media

Analytical Approach Behind the 4-Tiered Ranking System

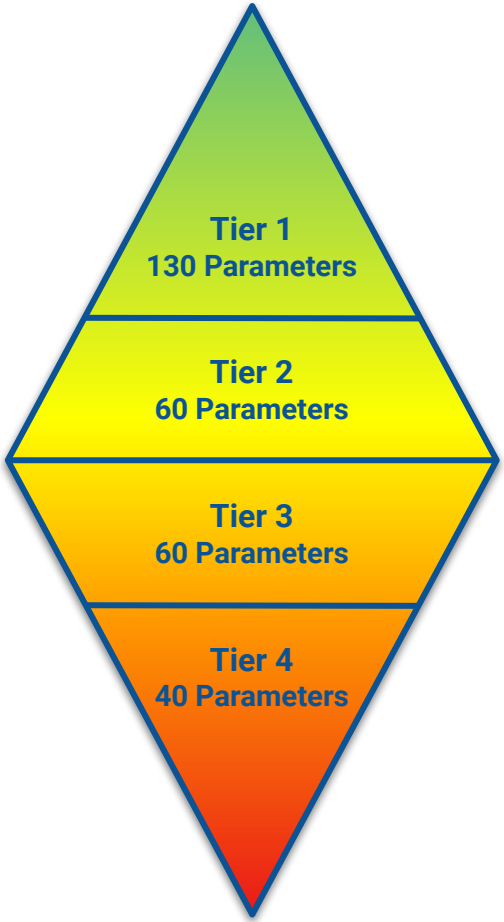
Tier 1 consists of the 20 regions with exceptionally high levels of adaptiveness to the changing technological landscape and the AI revolution, as determined by the full application of all 130 parameters across all Index Categories.

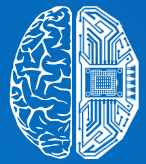
Tier 2 consists of the 20 regions that scored comparatively well in terms of adaptiveness to changing the technological landscape and AI revolution, according to the phase-1 analysis using 20 parameters, but not as well as those in Tier 1. After being located in Tier 2, they were ranked among each other using a subset of 60 parameters.

Tier 3 consists of the 60 regions that scored much less favourably during the first-phase analysis.

Tier 4 consists of the 100 regions that scored least favourably during the first-phase analysis, and which suffer from high levels of data unavailability or unreliability. After being placed in Tier 4, they were ranked among each other using a subset of 40 parameters (due to data availability issues which prevented a more comprehensive analysis).

The aim of this approach is to conduct as comprehensive an analysis as possible considering each region's unique levels of data availability and reliability.





Commercial Benchmarks:

List of Rankings & Metrics Categories

Commercial Benchmarks

Companies by Regions

Number and headquarters locations of companies in the AI Industry, spotlighting the strengths and areas of expertise in specific geographic regions.

Companies by Industry

AI-related companies operating within specific sectors and industries with their unique challenges, opportunities.

Companies by Technology

The range of AI-related companies based on the specific technologies they specialize in or utilize.

AI Companies

Number and size of companies that leverage AI to create innovative solutions and products that can perform intelligent tasks, learn from data, and make decisions or predictions.

AI Corporations

Corporations which have substantial resources, dedicated teams of AI experts, and extensive infrastructure to support their AI initiatives.

AI Investors

Venture capital firms, private equity firms, and other entities that provide financial support and resources to AI companies.

Institutional Investors

Large financial institutions, such as pension funds, insurance companies, and asset management firms, that invest in artificial intelligence companies or funds specializing in AI.

Derivatives

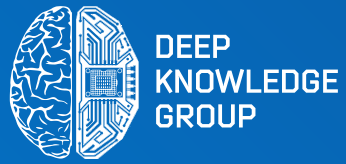
Financial instruments or contracts that derive their value from artificial intelligence technologies or AI-related assets.

Commercial Benchmarks Metrics Categories

Metric Category Title	Metric Category Description
Companies by Regions	This metric category tracks the number of AI companies in each region, the volume of AI investments made by large venture capital firms, the average number of years between early-stage AI investments and subsequent funding rounds, and the year of the first AI-focused investments in specific regions. These metrics provide insights into the historical trends and patterns of AI investments in different regions, highlighting the strategic foresight of investors in recognizing the potential and profitability of the AI industry early on. They also gauge the validation and credibility of early AI investments by examining subsequent funding rounds by reputable investment funds.
Companies by Industry	This metric category analyzes the number of AI companies operating in each industry, the volume of investments made by large venture capital firms in AI companies within different sectors, the average duration between early-stage AI investments and subsequent funding rounds within specific industries, and the year of the first AI-focused investments in each sector. These metrics provide valuable insights into the penetration and impact of AI technologies within various industries, showcasing the level of adoption, investment activity, and strategic foresight of investors.
Companies by Technology	This metric category quantifies and tracks the presence and distribution of companies that excel in various AI technologies such as natural language processing, computer vision, machine learning, robotics, and deep learning. It analyzes the number of companies operating within each technology domain, the volume of investments made in companies specializing in specific AI technologies, the average duration between early-stage investments and subsequent funding rounds within each technology field, and the year of the first investments in each technology domain. These metrics provide valuable insights into the advancements and adoption of AI technologies, highlighting the areas of expertise, investment trends, and the transformative potential of each technology within the AI industry.
AI Companies	This metric category focuses on quantifying and tracking various aspects related to artificial intelligence companies. This category includes metrics such as the number of AI companies, the volume of investments in AI companies, the average funding rounds and durations, and the year of a company's establishment or entry into the AI industry.

Commercial Benchmarks Metrics Categories

Metric Category Title	Metric Category Description
AI Corporations	This metric category quantifies, benchmarks and tracks the aggregate score of all Longevity based companies in the portfolio, the total number of Longevity related investments, the total number of Longevity related exits the average pre-exit portfolio company profitability and Granular TRL specific metrics which provide a Longevity based financial foundation making multi layered evaluations of portfolio level holdings of companies through a Longevity focused lens.
AI Investors	This metric category quantifies, benchmarks and tracks larger public companies through a granular 3-tier system featuring metrics such as cost of revenue, operating expenses, gross profits and interest expenses, which cumulatively serve as a gauge of companies' raw financial performance, with specific regard to their bare balance sheet. These metrics serve as an important baseline for measuring investors' capacity to enter new markets and adapt existing investment strategy and business models to neutralize Longevity-related risks and capitalize on Longevity-related investment opportunities.
Institutional Investors	This metric category quantifies, benchmarks and tracks deep stock based metrics through a 3-tier evaluation system that compares and contrasts various baseline financial performance metrics, in order to identify subtle performance advantages and high-risk disproportions and sources of financial risk, vulnerability and unsustainability.
Derivatives	This metric category quantifies, benchmarks and tracks intricate ratios and complex formulated metrics such as Beta ratings, Alpha ratings, Treynor ratios, Piotroski F-scores and Sloan ratios. These factors provide individual holistic evaluations of different facets of investment performance. By using non-normally distributed evaluative parameters, this metric category provides unique insights that other simpler measures of investment performance and risk-adjusted return cannot.



Standard Benchmarks:

List of Rankings & Metrics Categories

Commercial Benchmarks

Rankings of Countries

These rankings provide insights into a country's AI readiness, investment, innovation, talent pool, and overall competitiveness in the field of AI.

Rankings of Cities

Commercial rankings for cities in the AI Industry provide insights into the competitiveness, innovation, and AI ecosystem of specific cities.

Rankings of Governments

These rankings provide insights into government policies, regulations, investments, and overall support for AI development and adoption.

Rankings of AI-related Jobs

These rankings highlight the demand, skills, and market trends associated with AI-related roles.

Ranking of AI Technologies

There are various reports, indexes and tests that evaluate specific AI technologies or aspects of the AI Industry. These assessments often focus on areas such as AI adoption, innovation, research, and market trends.

Rankings of AI Tools

There are various reports, analyzes, and industry ratings that rank specific AI tools and platforms based on their capabilities, performance, features, and user feedback.

Rankings of Hubs and Organizations

These rankings often evaluate factors such as research output, innovation, talent, ecosystem support, and overall contributions to the AI Industry.

Rankings of Educational Institutions

These are the rankings of educational institutions in the AI Industry. These rankings take into account factors such as research output, faculty experience, industry collaborations, funding, and alumni outcomes.

Rankings of AI Ethics Organizations

Rankings of organizations and initiatives focused on AI ethics that play a crucial role in shaping the responsible development and deployment of AI technologies.

Rankings of AI Leaders

These rankings consider various factors such as financial performance, market presence, technological advancements, research output, and overall influence.

Rankings of AI Apps

These ratings are used to help evaluate the performance, features, and market presence of AI applications.

Rankings of AI Policies/GovTech

These rankings can help evaluate the regulatory environment, ethical considerations, and policy frameworks surrounding AI. Also, government services, digital transformation, and public sector innovation.

Standard Benchmarks Metrics Categories

Metric Category Title	Metric Category Description
Rankings of Countries	The rankings for various categories in the AI industry use a composite score methodology based on indicators that measure specific aspects of each country's performance. These indicators are derived from publicly available data sources and expert assessments, encompassing factors such as government policies, investment, research and development capabilities, commercial adoption, education, data governance, intellectual property protection, startup ecosystems, job opportunities, ethical regulations, partnerships, and innovation promotion.
Rankings of Cities	The methodology for ranking cities in various AI-related categories involves assessing the city's environment and factors related to AI development and talent. It considers a range of factors such as infrastructure, policies, talent pool, innovation ecosystem, entrepreneurship support, societal impact, quality, quantity, and diversity of AI talent. Data is collected from diverse sources and parameters are selected based on their relevance to the specific category
Rankings of Institutions	The methodology for ranking educational institutions in the field of artificial intelligence (AI) involves assessing factors such as program quality, faculty expertise, research output, resources, reputation, and impact. Data is collected from various sources, including university websites, publications, and surveys. Parameters are selected based on their relevance to AI education and research.
Rankings of Governments	This methodology for determining the top governments with the most powerful AI systems aims to identify and rank the governments that have made significant strides in developing and implementing advanced artificial intelligence (AI) systems. The methodology considers various factors to assess the capabilities, achievements, and impact of AI systems deployed by governments.

Standard Benchmarks Metrics Categories

Metric Category Title	Metric Category Description
Rankings of Hubs	The methodology for creating a ranking of AI hubs involves assessing various parameters to evaluate the strength and potential of AI hubs, including research and development, industry and start-up ecosystem, talent pool, infrastructure, government support, funding and investments, community and networking, and public adoption. By considering these parameters, the ranking methodology aims to identify and rank AI hubs based on their overall strength, potential for innovation, and ability to attract and nurture AI-related activities and talent.
Rankings of AI Ethics Organizations	The methodology for ranking AI ethics organizations involves assessing their commitment to ethical AI principles, including fairness, accountability, transparency, and explainability. The evaluation considers the organization's efforts in promoting and implementing these principles in AI development and deployment. By considering these factors, the ranking methodology identifies organizations dedicated to fostering ethical practices in AI and ensuring responsible innovation.
Rankings of AI Apps	The methodology for ranking AI apps involves evaluating their performance, functionality, and impact in the field of artificial intelligence (AI). Multiple parameters are considered, such as accuracy, efficiency, user experience, scalability, compatibility, integration capabilities, and real-world success. By assessing these parameters, the ranking methodology aims to identify and rank AI apps based on their quality, usability, and contribution to solving real-world problems and advancing AI capabilities
Rankings of AI Tools	The methodology for ranking AI tools involves evaluating their effectiveness, functionality, and impact in the field of artificial intelligence (AI). This assessment considers parameters such as accuracy, versatility, user-friendliness, scalability, integration capabilities, support, compatibility, and real-world implementation success. By considering these factors, the ranking methodology aims to identify and rank AI tools based on their quality, usability, and contribution to advancing AI capabilities and applications.

Standard Benchmarks Metrics Categories

Metric Category Title	Metric Category Description
Rankings of AI related Jobs	The methodology for ranking job roles and professions in the context of artificial intelligence (AI) involves evaluating factors related to automation vulnerability, enhancement through AI tools, and significance in the AI field. Data is gathered from various sources to assess the level of vulnerability, the transformative impact of AI tools, and the demand for AI professionals. Parameters are selected based on their relevance to each benchmark, and weightage is assigned accordingly.
Rankings of AI Leaders	The methodology for ranking AI leaders involves identifying individuals who have made notable contributions to the field of artificial intelligence (AI) in various roles. Data from diverse sources, such as publications and expert assessments, is gathered. Factors assessed differ depending on the role, including quality and impact of reporting for journalists, impact and success of ventures for entrepreneurs, research and academic achievements for academics, and expertise in shaping AI governance for policymakers.
Rankings of AI Technologies	The Ranking of Technologies category utilizes a comprehensive methodology to identify and rank promising and revolutionary technologies in the field of AI.Factors considered include the potential of each technology to transform industries, foster innovation, and shape the future of AI. This assessment takes into account technological advancements, scalability, adaptability, disruptive impact, and feasibility of implementation. The rankings aim to highlight technologies that show exceptional promise, pushing the boundaries of AI capabilities and creating new possibilities for exploration and application.
Rankings of AI Policies	The Ranking of AI Policies category uses a comprehensive methodology to identify and rank impactful and robust policies in the field of AI. Factors evaluated include the quality, effectiveness, and potential impact of AI policies. This assessment considers dimensions such as policy scope, alignment with emerging AI technologies, regulatory clarity, ethical considerations, and safeguards. The rankings aim to highlight policies with strategic vision, forward-thinking approaches, and the ability to shape the future of AI governance.

Parameters Example (academics)

Parameter	Description
i10-index	Number of publications with at least 10 citations
Innovation and Creativity	Number of patents filed or granted
Field-Weighted Citation Impact (FWCI)	Measure the citation impact of a scientist's publications compared to the average of their field
Collaboration and Leadership	Number of research projects led
Teaching and Mentoring	Success rate of students (measured by their subsequent job placements, their own publication records, etc.)
External Recognition	Number of keynote speeches or invited talks at prestigious conferences
Application of Research	Number of spin-off companies or products resulting from their research
Ethics and Responsibility	Publications or presentations on the ethical aspects of AI
Communication Skills	Engagement on social media platforms or scientific blogs (followers, likes, shares, comments)
Interdisciplinary Approach	Number of collaborations with scientists from other disciplines

Parameters Example (hubs, accelerators, incubators)

Parameter	Description
Number of Startups Supported	The number of startups or projects supported by the hub. This includes those currently in residence and those that have 'graduated'
Funding Raised by Supported Startups	The total amount of funding raised by startups while they were or after they have been part of the hub
Success Rate of Startups	The percentage of startups from the hub that have succeeded (e.g., achieved profitability, IPO, successful exit through acquisition)
Patents and Intellectual Property	The number of patents filed and granted to startups affiliated with the hub
Research Output	The number of research papers published by members of the hub in peer-reviewed journals or conferences
Collaboration and Partnerships	The number of partnerships with universities, corporations, or other research institutions
Community Engagement	Attendance at events hosted by the hub, or online engagement metrics if events are virtual (e.g., views, likes, shares, comments)
Diversity	Diversity metrics among supported startups and within the hub's leadership (gender, ethnicity, age, etc.)
Technological Impact	Number of AI systems, tools, or technologies developed within the hub and their adoption rate in the market
Industry Recognition	Number of awards or recognitions received by the hub or its startups

Parameters Example (jurisdictions and policies)

Parameter	Description
Number of AI Policies/Legislations	The total count of laws and regulations that explicitly address AI in a country
Protection Level of Intellectual Property	Using a scale, such as the International IP Index, that rates countries based on their IP laws
R&D Tax Incentives	A quantifiable value like percentage tax reduction or credit for R&D expenditure
Patents and Intellectual Property	The number of patents filed and granted to startups affiliated with the hub
Regulations Affecting AI Implementation	Number of regulations that a business must comply with to deploy AI in the country
Ethics-related AI Incidents	The number of reported incidents involving ethical issues related to AI, such as bias or privacy breaches. This may reflect how well ethical considerations are being implemented in practice
AI Governance and Accountability Guidelines	Presence (1) or absence (0) of clear guidelines that outline responsibilities and liabilities associated with the use of AI
AI Policy Stability	Number of significant changes to AI-related laws and regulations in the past few years
Ease of Hiring Foreign AI Talent	Rating based on immigration policies, such as the ease of obtaining a work visa for AI specialists
Data Protection and Privacy Laws	The presence of comprehensive and fair data protection laws is critical for businesses handling large amounts of data

Parameters Example (countries)

Parameter	Description
Data Availability	The availability of high-quality, diverse datasets for training AI, taking into account the country's data protection and privacy laws
AI Research Output	The number of AI-related papers published in reputable journals or conferences originating from the country
AI Education	The number of universities or institutions offering AI-related courses or degrees, and the number of graduates in AI-related fields
AI Investments	The amount of public and private investment in AI technology, startups, and research
AI Technology Adoption	The rate of AI adoption in different sectors such as healthcare, transportation, finance, etc
Internet Speed and Accessibility	Availability and quality of digital infrastructure supporting AI development and deployment
International AI Collaborations	The number of international collaborations in AI research and development
AI Ethics Guidelines	The number of official guidelines or policies addressing ethical considerations in AI
AI Policy and Regulation	The number of AI-specific policies or regulations, with considerations for their comprehensiveness and clarity
AI Talent Pool	The number of AI professionals and researchers residing in the country

Conclusion

The emergence of AI has opened up a plethora of possibilities and the potential to have a transformative effect on global industries. The analytical prowess of AI algorithms are able to extract vital insights from extensive datasets and automate complicated and labor-intensive tasks, creating immense operational efficiencies for businesses. As the accessibility and adoption of AI become widespread, the technology will continue to be a disruptive force in the digital economy and drastically alter the face of many industries.

As the AI industry continues its rapid growth, its driving organizations need the necessary tools and insights to be able to make informed decisions and capitalize on the opportunities it presents. This analytical framework has been designed to provide AI pioneers with the data they need to navigate this burgeoning market. By allowing them to access analytics, trends, projections and strategic advice, the framework can assist investors, policymakers, and business leaders in developing an AI-driven future. The research derived from the framework will create a platform for strategic decision making that can help drive industry growth and economic prosperity.

In conclusion, AI, as the ultimate 'meta-technology' capable of accelerating practical developments in other sectors, technologies and domains, presents a nearly unlimited array of opportunities that have the potential to revolutionize the way industries operate.

And this analytical framework presents leaders in public and private sectors, from policy to finance, with the analytics and insights they need to capitalize on these opportunities and set the standard for the new era of AI-driven industries. With the data-driven decisions that this platform can provide, organizations have the potential to develop a new wave of technological innovation and economic growth. However, we believe this framework represents the industries fairly and provides insights into their current landscape.

From this moment on, AI pioneers, from investors to policymakers and business leaders, will have the indispensable data, analytics, trends, projections, and strategic advice necessary to navigate this burgeoning market. Leaders in both the public and private sectors can seize the unlimited array of opportunities presented by AI, set new industry standards, foster a new wave of technological innovation, and fuel unparalleled economic growth through the vast potential of an AI-driven future.

The current framework, based on our expertise, is the first iteration, and will continue to be developed and further improved over the coming months.

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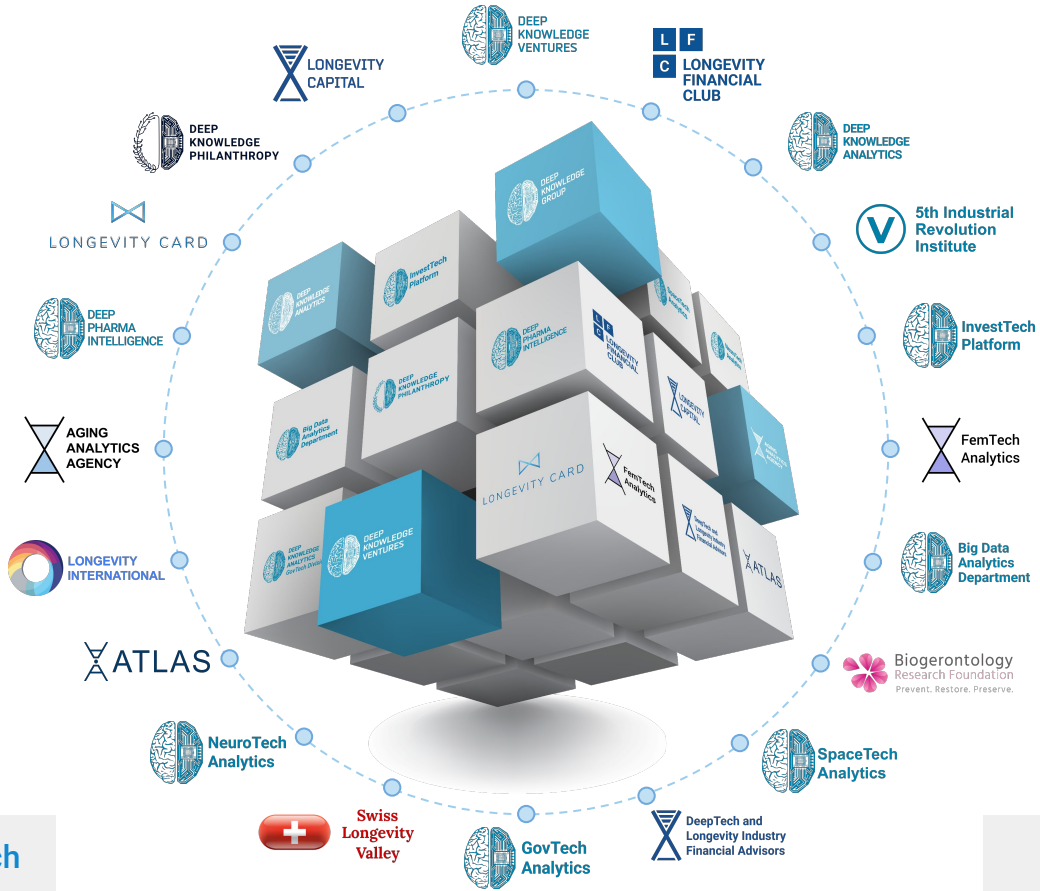

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