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AI-Enabled Scientific Knowledge Networks: Accelerating Collaboration, Discovery and Interdisciplinary Research

Eric von Hippel

Professor MIT Sloan School of Management

Abstract

The rapid growth of scientific literature, research datasets, digital repositories, computational tools, and interdisciplinary research has created both unprecedented opportunities and significant challenges for knowledge discovery. Conventional scholarly workflows often struggle to identify relationships across disciplines, integrate fragmented evidence, discover emerging research themes, and connect researchers with complementary expertise. Artificial intelligence (AI), knowledge graphs, natural language processing, large language models, semantic search, graph analytics, and intelligent recommendation systems are creating new possibilities for developing AI-enabled scientific knowledge networks. These networks can connect researchers, publications, datasets, methods, institutions, technologies, concepts, and research questions within dynamically evolving knowledge environments. This paper examines the role of AI-enabled knowledge networks in accelerating scientific collaboration, discovery, and interdisciplinary research. It explores AI-assisted literature discovery, semantic knowledge representation, citation-network analysis, researcher expertise mapping, hypothesis generation, research-gap identification, dataset discovery, and intelligent collaboration recommendations. An AI-Enabled Scientific Knowledge Network Framework is proposed, consisting of six interconnected layers: scientific data acquisition, semantic representation, knowledge-graph construction, AI-driven inference, collaboration intelligence, and human-centred research decision-making. The paper also examines challenges related to data quality, hallucination, algorithmic bias, intellectual-property rights, research integrity, privacy, interoperability, explainability, and overdependence on automated systems. The study argues that AI should not replace scientific judgement but should augment researchers by reducing information-search costs, exposing hidden connections, and enabling more systematic exploration of interdisciplinary knowledge. The future scientific ecosystem is likely to evolve from static repositories of publications toward dynamic, machine-readable knowledge networks capable of continuously connecting evidence, expertise, methods, and emerging discoveries. Such transformation could significantly

accelerate interdisciplinary research while requiring robust governance, transparent AI systems, and strong human oversight.

Keywords: Artificial Intelligence, Scientific Knowledge Networks, Knowledge Graphs, Scientific Discovery, Interdisciplinary Research, Research Collaboration, Natural Language Processing, Large Language Models, Semantic Search, Research Intelligence, Knowledge Discovery.

1. Introduction

Scientific knowledge has expanded at an extraordinary rate.
Every year, researchers produce:

- Journal articles.
- Conference papers.
- Datasets.
- Patents.
- Software.
- Research protocols.
- Preprints.
- Technical reports.

This expansion creates a paradox.
Researchers have access to more knowledge than ever before, yet identifying the right knowledge, relevant researchers, hidden connections, and emerging research opportunities is becoming increasingly difficult.
Traditional literature-search systems primarily help researchers find documents.
AI-enabled scientific knowledge networks aim to go further.
They seek to connect:
Researchers + Publications + Concepts + Methods + Datasets + Institutions + Technologies + Problems
into a dynamic knowledge environment.

2. From Scientific Databases to Knowledge Networks

Traditional scholarly databases generally organise information around documents.
A knowledge network instead represents relationships.
For example:

Researcher → authored → Paper
Paper → investigates → Concept
Concept → related to → Method
Method → applied to → Dataset
Dataset → generated by → Research Institution

This relational structure allows AI systems to discover connections that may not be obvious through keyword-based searching.

3. Scientific Knowledge Networks

A scientific knowledge network can be defined as a computationally supported environment that represents and connects scientific entities and relationships.

Important entities include:

- Researchers.
- Publications.
- Research questions.
- Concepts.
- Methods.
- Datasets.
- Institutions.
- Technologies.
- Patents.
- Funding programmes.

The network can continuously evolve as new scientific knowledge becomes available.

4. Artificial Intelligence as a Knowledge Connector

AI can perform several functions within scientific knowledge networks:

1. Information extraction.
2. Semantic classification.
3. Entity recognition.
4. Relationship discovery.
5. Knowledge-graph construction.
6. Literature recommendation.
7. Researcher matching.
8. Trend detection.
9. Hypothesis generation.
10. Research-gap identification.

5. Natural Language Processing

Scientific literature contains complex terminology.

Natural language processing can extract:

- Concepts.
- Entities.
- Methods.
- Findings.
- Relationships.

- Research questions.

For example, an AI system can recognise that papers discussing carbon capture, industrial decarbonisation, and advanced catalysts may represent related research domains even when they use different terminology.

6. Semantic Search

Traditional search often relies heavily on matching keywords.
Semantic search attempts to understand meaning.
For example, searching for:

"AI for early disease prediction"
could retrieve research involving:

- Machine learning.
- Clinical prediction models.
- Medical diagnostics.
- Predictive biomarkers.

even when the exact phrase does not appear in the document.

7. Scientific Knowledge Graphs

Knowledge graphs provide an important technological foundation.
A simplified structure is:

Entity A → Relationship → Entity B
For example:
Artificial Intelligence → applied to → Drug Discovery
Drug Discovery → uses → Molecular Simulation
Molecular Simulation → requires → Computational Chemistry

This structure enables machine-assisted reasoning over scientific information.

8. Automated Knowledge-Graph Construction

AI can extract information from:

- Research papers.
- Abstracts.
- Patents.
- Datasets.
- Research websites.
- Technical documents.

The extracted information can then be transformed into structured relationships.
This reduces the need for entirely manual knowledge-base construction.

9. Researcher Expertise Mapping

AI can analyse researchers' publications, methods and research topics to construct expertise profiles.

A researcher profile might contain:

- Research topics.
- Methods.
- Publications.
- Collaborators.
- Datasets.
- Research domains.

This can enable more intelligent collaboration discovery.

10. Intelligent Researcher Matching

A scientific knowledge network can identify researchers whose expertise complements a particular project.

For example:

Clinical Researcher + AI Scientist + Biomedical Engineer + Statistician

may form a stronger interdisciplinary team than researchers selected solely according to institutional affiliation.

11. Interdisciplinary Collaboration

Many contemporary scientific problems cross disciplinary boundaries.

Examples include:

- AI + neuroscience.
- Climate science + economics.
- Materials science + computational modelling.
- Biotechnology + engineering.
- Medicine + data science.
- Environmental science + remote sensing.

AI can help identify conceptual bridges between these fields.

12. Hidden Connections Across Disciplines

One major advantage of knowledge networks is the identification of unexpected relationships.

A network may reveal:

Materials Science → Advanced Catalysts → Hydrogen Production → Industrial Decarbonisation

This creates opportunities for researchers who might otherwise work in separate academic communities.

13. Research-Gap Identification

AI can compare:

- Existing studies.
- Research questions.
- Methodologies.
- Findings.
- Geographic coverage.
- Population samples.

This can help identify areas that appear underexplored.

However, AI-generated research gaps should be treated as candidate gaps requiring human verification, rather than definitive conclusions.

14. Emerging Research Trend Detection

AI can analyse changes in scientific literature over time.

Indicators may include:

- Rapidly increasing publication frequency.
- New terminology.
- New citation clusters.
- Emerging research communities.
- Increasing cross-disciplinary connections.

This can help identify emerging research areas earlier.

15. Citation Network Analysis

Citation relationships can reveal:

- Influential studies.
- Research communities.
- Intellectual foundations.
- Emerging schools of thought.

AI can analyse citation networks at large scale.

16. Beyond Citation Counts

Citation counts provide only one measure of influence.

Knowledge networks can additionally examine:

- Conceptual influence.
- Methodological reuse.

- Dataset reuse.
- Cross-disciplinary adoption.
- Technological translation.

This creates a richer representation of scientific impact.

17. Research Method Discovery

Researchers often spend substantial time identifying appropriate methodologies.
AI-enabled networks can connect research questions with:

- Statistical methods.
- Experimental techniques.
- Simulation approaches.
- Datasets.
- Software tools.

For example:

Research Question → Recommended Method → Relevant Dataset → Related Studies

18. Dataset Discovery

Scientific datasets are frequently distributed across institutional repositories and specialised databases.
AI can help researchers locate datasets based on:

- Topic.
- Variables.
- Geographic coverage.
- Population.
- Time period.
- Data format.

19. Connecting Papers and Datasets

A knowledge network can establish relationships between:

Paper → Uses → Dataset

and:

Dataset → Supports → Research Findings

This improves reproducibility and knowledge reuse.

20. Connecting Publications and Research Software

Modern scientific research increasingly depends on software.
AI knowledge networks can connect:

Paper → Method → Software → Dataset → Result
This can make computational research easier to reproduce and extend.

21. Hypothesis Generation
AI can analyse relationships across scientific literature to generate candidate hypotheses.
A conceptual workflow is:
Existing Knowledge → Identify Missing Connection → Generate Candidate Hypothesis → Human Evaluation → Experimental Testing
AI-generated hypotheses should remain subject to scientific validation.

22. Literature-Based Discovery
AI systems can potentially identify relationships between scientific concepts that are distributed across different bodies of literature.
For example:

Concept A
↓
Intermediate Concept B
↓
Concept C

Such approaches may reveal possible research directions that are difficult to identify through conventional searches.

23. Large Language Models in Scientific Research
Large language models can assist researchers with:
- Literature summarisation.
- Question answering.
- Concept explanation.
- Research navigation.
- Classification.
- Information extraction.

However, LLM outputs can contain unsupported or incorrect claims.
Scientific workflows therefore require verification mechanisms.

24. Retrieval-Augmented Scientific Intelligence
Retrieval-augmented systems can connect language models to verified scientific sources.
A conceptual architecture is:

Research Question
↓
Scientific Knowledge Retrieval

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↓

Relevant Evidence

↓

AI Reasoning

↓

Researcher Response

This can reduce dependence on model-generated knowledge alone.

25. AI-Assisted Systematic Reviews

AI can support systematic-review workflows by assisting with:

- Literature discovery.
- Screening.
- Classification.
- Duplicate detection.
- Information extraction.

Human researchers should retain responsibility for methodological decisions and final inclusion criteria.

26. Research Collaboration Networks

Collaboration networks can be represented as graphs.

For example:

Researcher A ↔ Researcher B ↔ Researcher C

where connections may represent:

- Co-authorship.
- Shared projects.
- Shared datasets.
- Methodological relationships.

AI can identify potential collaboration opportunities.

27. Institutional Knowledge Networks

Scientific knowledge networks can also connect institutions.

Entities may include:

- Universities.
- Research centres.
- Laboratories.
- Companies.
- Government agencies.

This can support institutional collaboration and research partnerships.

28. Global Scientific Collaboration

AI-enabled networks can reduce geographical barriers by helping researchers discover relevant expertise worldwide.

Potential applications include:

- International research teams.
- Multicentre studies.
- Shared datasets.
- Joint funding applications.
- Cross-border research programmes.

29. Funding Intelligence

AI can connect research topics with funding opportunities.

For example:

Research Topic → Funding Theme → Funding Agency → Eligibility → Relevant Collaborators

This can reduce the time required to identify appropriate funding programmes.

30. Patent and Scientific Knowledge Integration

Scientific innovation often crosses the boundary between academic research and industrial development.

Connecting:

Research Papers + Patents + Technologies + Companies

can provide insights into technology-transfer pathways.

31. Translational Research Networks

Knowledge networks can connect basic research with applications.

A pathway may be:

Basic Discovery → Experimental Validation → Prototype → Clinical/Industrial Application

AI can help identify research that has potential for translation.

32. Research Impact Mapping

AI can examine how scientific discoveries propagate across:

- Academic disciplines.
- Industry.
- Public policy.
- Healthcare.
- Technology development.

This can provide a broader understanding of research impact.

33. Real-Time Scientific Intelligence

Traditional literature reviews are often static.
AI-enabled networks can continuously monitor new information.
Potential sources include:

- New publications.
- Preprints.
- Datasets.
- Patents.
- Clinical studies.
- Conference outputs.

This creates a continuously evolving research environment.

34. Scientific Early-Warning Systems

Knowledge networks can identify rapidly emerging scientific developments.
For example:

Rapid Publication Growth + New Methods + New Collaborations + Increasing Citations may indicate an emerging research field.

35. Multimodal Scientific Knowledge

Scientific information is not limited to text.
Future knowledge networks can integrate:

- Text.
- Tables.
- Figures.
- Images.
- Experimental data.
- Code.
- Video.
- Sensor data.

This can create richer scientific representations.

36. AI for Experimental Planning

AI can potentially assist researchers in designing experiments by considering:

- Previous findings.
- Available materials.
- Experimental constraints.
- Statistical requirements.

The researcher remains responsible for validating experimental design.

37. Autonomous Research Systems

A future research workflow could involve:

Question → Literature Search → Hypothesis → Experiment → Data Analysis → Interpretation

with AI supporting each stage.

However, fully autonomous scientific research raises significant questions concerning:

- Reliability.
- Reproducibility.
- Safety.
- Accountability.

38. Human-in-the-Loop Scientific Intelligence

The most appropriate model is likely:

AI Assistance + Human Scientific Judgement

rather than complete automation.

Researchers should be able to:

- Inspect evidence.
- Challenge AI conclusions.
- Modify assumptions.
- Verify sources.
- Reject recommendations.

39. Scientific Knowledge Network Architecture

The proposed architecture contains six layers.

Layer 1 — Scientific Data

Papers, datasets, patents, code and research outputs.

Layer 2 — Semantic Processing

NLP, entity extraction and scientific terminology mapping.

Layer 3 — Knowledge Graph

Concepts and relationships represented as interconnected entities.

Layer 4 — AI Intelligence

Prediction, inference, recommendation and trend detection.

Layer 5 — Collaboration Intelligence
Researcher matching, institution discovery and interdisciplinary connections.

Layer 6 — Human Research Interface
Researchers interact with the network to explore, verify and develop new ideas.

40. Conceptual Framework

Scientific Data
↓
Semantic AI
↓
Knowledge Graph
↓
AI-Based Inference
↓
Researcher & Research-Opportunity Discovery
↓
Interdisciplinary Collaboration
↓
Scientific Discovery
↓
New Knowledge
↓
Updated Knowledge Network

The final stage creates a continuously learning scientific ecosystem.

41. Scientific Knowledge Network Maturity Model

Level	Capability
Level 1	Digital publication repositories
Level 2	Semantic literature search
Level 3	Integrated scientific knowledge graphs
Level 4	AI-assisted discovery and collaboration
Level 5	Continuously learning scientific knowledge networks

42. Key Performance Indicators

Indicator	Purpose
Search relevance	Quality of information retrieval
Knowledge-graph coverage	Breadth of scientific representation
Entity-linking accuracy	Data quality
Recommendation accuracy	Collaboration quality
Cross-disciplinary connections	Interdisciplinary capability
Research-gap precision	Discovery quality
Citation discovery	Knowledge navigation
Dataset reuse	Research efficiency
Collaboration formation	Network effectiveness
Human verification rate	Reliability

43. Researcher Workflow

A future researcher could interact with a knowledge network as follows:

Step 1
Enter a research question.

Step 2
AI identifies relevant concepts.

Step 3
The network retrieves related papers, datasets and methods.

Step 4
AI maps knowledge gaps.

Step 5
The system identifies relevant researchers.

Step 6
Potential interdisciplinary connections are presented.

Step 7
The researcher evaluates and develops a research strategy.

44. Benefits for Researchers

AI-enabled scientific knowledge networks can reduce:

- Literature-search time.
- Information overload.
- Discovery barriers.
- Collaboration-search costs.

They can increase:

- Knowledge accessibility.
- Interdisciplinary connections.
- Research efficiency.
- Discovery opportunities.

45. Benefits for Universities

Universities could use knowledge networks to identify:

- Institutional expertise.
- Collaboration opportunities.
- Emerging research fields.
- Funding opportunities.
- Research strengths.

This can support strategic research planning.

46. Benefits for Research Organisations

Research organisations can use AI-enabled networks to:

- Map research capabilities.
- Identify emerging technologies.
- Find collaborators.
- Monitor competitors.
- Identify technology-transfer opportunities.

47. Challenges of Scientific AI

Despite significant potential, major challenges remain.
These include:

1. Hallucination.
2. Data-quality problems.
3. Incomplete literature coverage.
4. Algorithmic bias.
5. Source reliability.

6. Intellectual-property concerns.
7. Privacy.
8. Reproducibility.
9. Explainability.
10. Research-integrity risks.

48. AI Hallucination

AI systems may generate plausible but unsupported scientific information.

This is particularly dangerous when users assume that fluent language indicates factual accuracy.

Scientific knowledge networks should therefore prioritise:

- Source grounding.
- Evidence traceability.
- Citation verification.
- Confidence indicators.

49. Research Integrity

AI should not facilitate:

- Fabricated references.
- Invented experimental results.
- Misrepresentation of evidence.
- Automated plagiarism.

Responsible AI use must preserve scientific integrity.

50. Intellectual Property

Scientific knowledge networks may contain information subject to:

- Copyright.
- Patents.
- Licensing restrictions.
- Confidentiality.

AI systems therefore require appropriate access-control and data-governance mechanisms.

51. Bias in Knowledge Networks

Scientific databases may reflect historical inequalities.

Certain:

- Countries.
- Institutions.
- Languages.
- Disciplines.

may be overrepresented.

AI systems can unintentionally reinforce these patterns.

52. Explainability

Researchers should be able to understand why an AI system recommends:

- A paper.
- A researcher.
- A method.
- A dataset.
- A research direction.

Transparent recommendation systems can improve trust.

53. Interoperability

Scientific knowledge exists in diverse formats.

A successful network should connect:

- Bibliographic databases.
- Institutional repositories.
- Data repositories.
- Research software.
- Patent databases.

Standardised metadata and interoperable architectures are essential.

54. Data Provenance

Every important scientific claim should ideally be traceable to its source.

A knowledge network should maintain:

Claim → Evidence → Source → Context

This improves scientific reliability.

55. Privacy

Researcher networks can contain information about:

- Collaboration patterns.
- Research interests.
- Institutional relationships.

Appropriate privacy controls are therefore necessary.

56. Cybersecurity

Scientific infrastructure increasingly depends on digital systems.

Potential threats include:

- Data manipulation.
- Model poisoning.

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- Unauthorised access.
- Intellectual-property theft.

Security must be integrated into the architecture.

57. Open Science

AI-enabled knowledge networks can support open science by improving discovery and linking research outputs.

Potentially useful connections include:

Publication ↔ Dataset ↔ Code ↔ Method ↔ Researcher

This can improve transparency and reproducibility.

58. Reproducible Science

A knowledge network can connect research findings to:

- Original datasets.
- Analytical code.
- Experimental methods.
- Software environments.

This can make scientific results easier to reproduce.

59. Future Research Directions

Important research opportunities include:

1. Multimodal scientific knowledge graphs.
2. AI-based hypothesis generation.
3. Automated research-gap detection.
4. Intelligent researcher matching.
5. AI-assisted systematic reviews.
6. Scientific digital twins.
7. Autonomous experiment planning.
8. Cross-language scientific discovery.
9. AI-based research impact analysis.
10. Real-time scientific trend detection.
11. Knowledge-graph-enhanced large language models.
12. Privacy-preserving scientific collaboration networks.

60. Implementation Roadmap

Phase 1 — Data Integration

Connect publications, datasets and research outputs.

Phase 2 — Semantic Processing
Develop scientific entity and relationship extraction.

Phase 3 — Knowledge Graph
Build interconnected scientific knowledge representations.

Phase 4 — AI Intelligence
Deploy semantic search, recommendations and trend analysis.

Phase 5 — Collaboration
Connect researchers and institutions based on complementary expertise.

Phase 6 — Continuous Learning
Update the network as new scientific knowledge emerges.

61. Future Scientific Ecosystem

The scientific ecosystem of the future may increasingly resemble a dynamic knowledge network:

Researcher
↕
Research Question
↕
Scientific Concepts
↕
Papers
↕
Methods
↕
Datasets
↕
Software
↕
Experiments
↕
New Discoveries

Each new discovery can update the network and create new research pathways.

62. Discussion

The greatest potential of AI-enabled scientific knowledge networks lies not simply in making literature searches faster.

Their more important function is to change how scientific knowledge is connected.

Traditional scientific workflows often divide knowledge into journals, disciplines, institutions and databases.

Knowledge networks can break down some of these boundaries by representing science as an interconnected system.

For example, a research question concerning climate-resilient agriculture could simultaneously connect:

Climate Science + Remote Sensing + AI + Soil Science + Economics + Agricultural Engineering

This creates an environment where interdisciplinary relationships can be discovered systematically rather than relying entirely on individual researchers already knowing which fields to explore.

63. Strategic Recommendations

Research organisations should:

1. Develop interoperable scientific-data infrastructures.
2. Build domain-specific knowledge graphs.
3. Integrate AI-based semantic search.
4. Establish source-verification mechanisms.
5. Develop intelligent researcher-matching systems.
6. Connect publications with datasets and software.
7. Use AI for research-gap and trend discovery.
8. Maintain human oversight over scientific decisions.
9. Establish strong AI-governance policies.
10. Promote transparent and reproducible research workflows.

64. Conclusion

AI-enabled scientific knowledge networks represent an emerging transformation in how scientific information is organised, discovered and connected.

The conventional model of:

Search → Read → Cite

is increasingly being complemented by:

Connect → Analyse → Discover → Collaborate → Innovate

Artificial intelligence can connect researchers with relevant literature, methods, datasets, technologies and collaborators. Knowledge graphs can provide the structural foundation for representing scientific relationships, while large language models and semantic AI can provide natural-language interfaces to increasingly complex knowledge environments.

The greatest opportunity lies in enabling researchers to discover relationships that may remain invisible within traditional disciplinary boundaries.

The future scientific knowledge ecosystem can therefore be represented as:

AI + Knowledge Graphs + Scientific Data + Researcher Networks + Human Expertise

↓

Accelerated Knowledge Discovery

↓

Interdisciplinary Collaboration

↓

New Scientific Insights

However, technological capability must be matched by scientific responsibility. Source verification, reproducibility, explainability, privacy, intellectual-property protection, algorithmic fairness and human oversight will be essential.

AI should therefore be viewed not as a replacement for scientists but as an intelligent infrastructure for augmenting scientific reasoning, collaboration and discovery.

The long-term vision is a continuously evolving scientific knowledge network in which every new paper, dataset, method, experiment and discovery contributes to a richer map of human knowledge—making it easier for researchers to identify connections, form interdisciplinary collaborations and pursue previously unexplored scientific opportunities.

References

1. Börner, K. (2010). Atlas of Science: Visualizing What We Know. MIT Press.
2. Chen, C. (2006). CiteSpace II: Detecting and visualizing emerging trends and transient patterns in scientific literature. Journal of the American Society for Information Science and Technology, 57(3), 359–377.
3. Fortunato, S., Bergstrom, C. T., Börner, K., et al. (2018). Science of science. Science, 359(6379), eaao0185.
4. Van Noorden, R. (2014). Global scientific collaboration. Nature, 525, 306–307.
5. Börner, K., Theriault, T. N., & Boyack, K. W. (2018). Mapping science and technology. Annual Review of Information Science and Technology, 37, 159–197.
6. National Academies of Sciences, Engineering, and Medicine. (2018). Open Science by Design: Realizing a Vision for 21st Century Research. National Academies Press.
7. Van Eck, N. J., & Waltman, L. (2010). Software survey: VOSviewer, a computer program for bibliometric mapping. Scientometrics, 84, 523–538.
8. Waltman, L., Van Eck, N. J., & Noyons, E. C. M. (2010). A unified approach to mapping and clustering of bibliometric networks. Journal of Informetrics, 4(4), 629–635.

9. Liao, Y., Wang, Y., & Li, H. (2021). Knowledge graphs in science and technology: A systematic review. Scientometrics.
10. Hogan, A., Blomqvist, E., Cochez, M., et al. (2021). Knowledge graphs. ACM Computing Surveys, 54(4), 1–37.
11. Ji, S., Pan, S., Cambria, E., Marttinen, P., & Yu, P. S. (2022). A survey on knowledge graphs: Representation, acquisition, and applications. IEEE Transactions on Neural Networks and Learning Systems, 33(2), 494–514.
12. Bommasani, R., Hudson, D. A., Adeli, E., et al. (2021). On the opportunities and risks of foundation models. arXiv preprint arXiv:2108.07258.
13. Lewis, P., Perez, E., Piktus, A., et al. (2020). Retrieval-augmented generation for knowledge-intensive NLP tasks. Advances in Neural Information Processing Systems, 33, 9459–9474.
14. Nature Editorial. (2023). Tools such as ChatGPT threaten transparent science; here are our ground rules for their use. Nature, 613, 612.
15. UNESCO. (2021). Recommendation on the Ethics of Artificial Intelligence. UNESCO.