MEDICAL SCIENCES IN AI ERA: CHALLENGES AND OPPURTUNITIES FOR IRAN

DR SOMAIEH SOLTANI

Iran's Key AI Initiatives in AI-based Healthcare

✓ **2005-2021: Development of eHealth Policies**

✓ **2021: National AI Strategy Formulated**

✓ **June 2023: Launch of Technology-Based**

  Primary Health Services Center in Tabriz

✓ **July 2024: Inauguration of the National AI**

  Organization

2005-2021: Development of eHealth Policies

Over 16 years, Iran developed and implemented policies focused on **eHealth solutions** to support universal health coverage.

- These policies emphasized integrating **digital health technologies** into healthcare delivery systems, enhancing accessibility and efficiency in healthcare.

- The initiative paved the way for the use of AI and digital tools to improve the quality and accessibility of medical services nationwide.

2021: National AI Strategy Formula[tion]

Iran announced a **national AI strategy** aimed at positioning the country among the **top 10 nations in AI** by 2032.

- This strategy focuses on:
  - Building AI capabilities across sectors, including healthcare.
  - Encouraging research and innovation in AI applications.
  - Developing policies to address ethical, legal, and technological challenges related to AI.

- The healthcare sector was prioritized for the application of AI to enhance medical diagnosis, treatment planning, and health system management.

June 2023: Launch of Technology-Based Primary Health Services Center in Tabriz

- The **Health Deputy of Tabriz** inaugurated the first center focused on **technology-based primary health services**.

- **Key Features:**
  - Offers **non-presential services**, enabling self-care through advanced digital tools.
  - Creates **health records electronically**, eliminating the need for direct interaction with doctors or caregivers.
  - Systematically records patient information in **electronic health files**, with feedback provided to patients via the system.

- **Impact:**
  - Increases accessibility for underserved populations.
  - Aligns with the **Ministry of Health's policies** to integrate technology into public health services.

July 2024: Inauguration of the National AI Organization

- Iran launched the **National AI Organization** to coordinate and oversee AI development across multiple sectors, including healthcare.

- **Goals:**
  - Foster collaboration between research institutions, government agencies, and private organizations.
  - Ensure a unified approach to AI development and deployment.
  - Promote the integration of AI technologies in healthcare for improving diagnostics, treatment efficiency, and resource management.

- The organization serves as a central body to support Iran's ambition of becoming a global leader in AI technology by 2032.

Health minister actions

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Challenges and Opportunities in Iran's AI-Driven Healthcare

Challenges:

- **Policy Weaknesses:** Lack of robust AI-focused healthcare policies.
- **Inadequate Infrastructure:** Insufficient technological and digital health infrastructure.
- **Legal Gaps:** Limited regulations for ethical AI implementation.

Opportunities:

- Aligning with **WHO's ethical guidelines** to address challenges.
- Leveraging AI to **enhance healthcare delivery** and improve patient outcomes.
- Ensuring **ethical and equitable AI adoption** for long-term benefits.

Opportunities, Challenges, and Barriers to AI Adoption in Iran's Health System

System	Component	Strengths	Weaknesses	AI Potential	Barriers to AI Development
Healthcare	Health Information Systems (**HIS**)	**Multiple systems available**	**Lack of integration between systems**	**AI can integrate data across systems for unified records and better decisions**	**Fragmented systems with inconsistent standards hinder data integration**
	Electronic Health Records (EHR)	Existing in some areas	Limited patient access, lack of integration	AI can enhance EHR accessibility and interoperability for better care	Privacy concerns, lack of nationwide infrastructure
	IT Infrastructure	Existing in urban centers	Limited in rural areas	AI-powered telemedicine and remote monitoring can reach underserved areas	Low digital literacy, outdated hardware, insufficient rural ICT infrastructure
Medical	Hospital Information System (HIS)	Used for inpatient care	Different systems with no integration	AI can unify data to improve patient care and resource management	Diverse HIS platforms create difficulties in system unification
	Outpatient Government Systems	Available in some regions	Lack of connection to medical records	AI can link outpatient and inpatient data for continuity	Poor interoperability between systems
	Private Outpatient Systems	Diverse, tailored to needs	Lack of integration with central databases	AI can standardize private healthcare systems for better data sharing	Siloed data, lack of national standards

Opportunities, Challenges, and Barriers to AI Adoption in Iran's Health System

system	Component	Strengths	Weaknesses	AI Potential	Barriers to AI Development
Educational	Medical Education Systems	Existing infrastructure	Outdated curriculum, limited AI exposure	AI can offer personalized learning and up-to-date education content	Resistance to change in traditional systems
	Future-Oriented Studies	Research on future trends available	Curricula outdated, not aligned with trends	AI can update curricula with emerging healthcare advancements	Insufficient AI-specific education programs
Research	Research Infrastructure	Existing systems for research	Lack of integration across departments	AI can consolidate research data and streamline collaboration	Fragmented databases, lack of cross-disciplinary integration
Infrastructure	Digital Equipment	Available in some regions	Underutilized, lack of advanced tools	AI can optimize equipment usage and enhance diagnostics	Insufficient training on advanced tools
Administrative	Administrative Systems	Existing in various sectors	Lack of integration with healthcare	AI can automate tasks and improve cross-sector communication	Bureaucratic inefficiency and lack of digital integration
Insurance	Insurance Coverage	Coverage available for many populations	Diverse policies, limited AI usage	AI can standardize processes and optimize patient coverage	Fragmentation due to multiple systems
	Insurance Systems (74)	Established, functioning systems	Inconsistent coverage and policies	AI can unify systems for efficiency and equity	Inconsistent architecture complicates integration

KEY BARRIERS TO IRAN'S AI-BASED HEALTHCARE

❖ **Data Fragmentation**

❖ **Limited Interoperability**

❖ **Infrastructural Gaps**

❖ **Privacy and Security Concerns**

❖ **Resistance to Change**

❖ **Lack of AI Expertise**

❖ **Financial Constraints**

❖ **Regulatory and Policy Gaps**

Data Fragmentation

The lack of standardization and integration between different healthcare systems (e.g., HIS, EHR, insurance systems) complicates the development of AI models that require unified, high-quality data.

Limited Interoperability

Healthcare systems in both public and private sectors often do not share data effectively, which makes it difficult for AI models to access and process the information necessary to deliver comprehensive insights.

Infrastructural Gaps

The lack of robust IT infrastructure in rural areas and underserved regions limits the application of AI technologies, such as telemedicine, remote monitoring, and AI-powered diagnostics.

Privacy and Security Concerns

The healthcare sector is highly regulated, and patient data privacy is a primary concern. AI solutions require secure, anonymized access to patient data, which can be difficult to implement given the current legal and ethical frameworks.

Resistance to Change

Healthcare professionals and educators may be reluctant to adopt AI-driven tools due to unfamiliarity with the technology or concerns about its effectiveness and impact on traditional practices.

Lack of AI Expertise

There is a shortage of professionals with expertise in both healthcare and AI. The integration of AI into medical research, education, and practice requires specialized knowledge that is often lacking.

Financial Constraints

Developing AI models, investing in necessary infrastructure, and training professionals all require significant funding, which may not be readily available, especially in resource-constrained environments.

Regulatory and Policy Gaps

There is a lack of clear national policies to guide the integration of AI into healthcare systems, leading to uncertainty about standards, regulations, and data governance.

AI in Healthcare – A Regional Perspective

Middle East AI Advancements:

- **Saudi Arabia:**
  - National AI Strategy 2031 focused on healthcare transformation.
  - Local providers adopting advanced AI tools and technologies.

- **UAE:**
  - Appointed the **world's first AI minister**.
  - Successfully integrated AI into various healthcare services.

AI Healthcare Structures and Governance (Iran, UAE, Saudi Arabia)

country/Region	Structure Overview	Key AI Healthcare Bodies/Institutions	Governance and Oversight	Collaboration and Partnerships
United Arab Emirates (UAE)	- AI & Digital Health Strategy by - MOHAP and Smart Dubai initiative. - Dubai Health Authority (DHA): Implements AI in healthcare.	MOHAP, DHA, UAE Artificial Intelligence Office, Dubai Health Authority. - **AI minister (2017)**	- Ministry of Health implements strategy. - Oversight by UAE AI Office.	Strong collaboration with private sector, global tech companies, and WHO.
Saudi Arabia	- AI in Healthcare Strategy: Supported by Saudi Vision 2030. - AI Research & Innovation Hub: Focus on healthcare applications.	- Ministry of Health (MOH). - King Abdulaziz City for Science and Technology (KACST). - Saudi Data and AI Authority (SDAIA).	- SDAIA governs AI projects. - Ministry of Health leads healthcare AI initiatives.	Partnerships with global tech firms (e.g., Microsoft, Google) and universities.

AI Healthcare Structures and Governance (China, Singapore)

country/Region	Structure Overview	Key AI Healthcare Bodies/Institutions	Governance and Oversight	Collaboration and Partnerships
China	- AI in Healthcare Strategy: Focus on AI-powered imaging and diagnostic tools.	- Ministry of Science and Technology (MOST), National Health Commission, Peking Union Medical College.	- MOST and National Health Commission govern AI.	Strong partnerships with private companies (e.g., Baidu, Tencent) and universities (e.g., Tsinghua).
Singapore	- AI in Healthcare Strategy: Integrated into National Healthcare Group (NHG).	- NHG, IMDA, National AI Office, Singapore Health Services (SingHealth).	- IMDA and National AI Office oversee strategy. - Ministry of Health leads.	Collaborates with global AI research hubs and universities (e.g., Harvard, Stanford).

AI Healthcare Structures and Governance (United States, United Kingdom)

Country/Region	Structure Overview	Key AI Healthcare Bodies/Institutions	Governance and Oversight	Collaboration and Partnerships
United States	- National AI Initiative Act: Overseen by HHS. - NIH AI Program: Focuses on advancing AI in healthcare.	- HHS, NIH, FDA (for AI regulatory approval).	- FDA regulates AI technologies. - NIH leads research funding.	Partnerships with private sector (e.g., IBM Watson, Google Health) and academic institutions.
United Kingdom	- NHS AI Lab: Central body for AI adoption under NHS Digital. - Focus on AI in diagnostics and robotics.	- NHS Digital, NHS AI Lab, Health Data Research UK.	- NHS Digital and AI Lab oversee strategy. - Department of Health leads.	Collaborations with academic institutions (e.g., Oxford, Cambridge) and private companies (e.g., DeepMind).

AI Healthcare Structures and Governance of Iran (suggested)

country/Region	Structure Overview	Key AI Healthcare Bodies/Institutions	Governance and Oversight	Collaboration and Partnerships
Iran (Suggested)	- AI Steering Committee: Overall AI strategy. - AI Health Technology Division: AI tech deployment. - AI Research Hub: Collaborates with universities. - AI Ethics and Compliance Unit: Ensures AI governance. - AI Education and Training Division: AI-related education.	- Ministry of Health (AI Health Division). - Medical Universities (AI R&D Hubs).	- Ministry of Health leads AI adoption. - AI Steering Committee oversees governance. - AI national organization	Collaboration with WHO, universities, tech companies (national and international), and public-private partnerships.

Advancements in AI and Health: A Path Forward

- **Global and Regional Progress**: AI is revolutionizing healthcare globally, with organizations like WHO leading ethical and sustainable AI initiatives.

- **Iran's Potential**: Iran has made significant strides, such as launching the National AI Organization and establishing eHealth policies. Continued focus on infrastructure and collaboration will solidify its position as a leader.

- **Challenges and Opportunities**: Overcoming barriers such as data fragmentation, privacy concerns, and lack of AI expertise is essential to leverage AI's full potential.

- **Collaborative Vision**: Partnership among government, academia, and the private sector is crucial for advancing AI in health.

- **A Shared Responsibility**: Ensuring ethical, equitable, and inclusive adoption of AI for the betterment of healthcare worldwide.

Global AI Index

The Global AI Index aims to make sense of this complex landscape in 83 countries that have chosen to invest in AI.

Now in its fifth iteration, it is the first ranking of countries based on AI:

1. implementation
2. innovation
3. investment.

Ranking Table

Country	Rank
Romania	50
Colombia	51
Egypt	52
Bulgaria	53
Qatar	54
Ukraine	55
Uruguay	56
Serbia	57
Vietnam	58
Mauritius	59
Iran	60
Peru	61
Bahrain	62
Jordan	63
Oman	64
Armenia	65
Slovakia	66
Philippines	67
Rwanda	68
South Africa	69
Latvia	70

Countries are ranked by their AI capacity at the international level. This is the fifth iteration of the Global AI Index, published on 19 September 2024.

SCORES

	Serbia	7
	Vietnam	7
	Mauritius	7
	Iran	7
	Peru	7
	Bahrain	7
	Jordan	7
	Oman	6
	Armenia	6
	Slovakia	6
	Philippines	6
	Rwanda	6

The pillars

The Global AI Index is underpinned by 122 indicators, collected from 24 different public and private data sources, and 83 governments. These are split across three pillars and seven sub-pillars.

Implementation

Talent focuses on the availability of skilled practitioners in artificial intelligence solutions.

Infrastructure assesses the reliability and scale of access infrastructure, from electricity and internet to supercomputing capabilities.

Operating Environment focuses on the regulatory context and public opinion on artificial intelligence.

Innovation

The pillars

Research looks at the extent of specialist research and researchers, including numbers of publications and citations in credible academic journals.

Development focuses on the development of fundamental platforms and algorithms upon which innovative artificial intelligence projects rely.

 Investment

Government Strategy gauges the depth of commitment from national governments to artificial intelligence; investigating spending commitments and national strategies.

Commercial focuses on the level of startup activity, investment and business initiatives based on artificial intelligence.
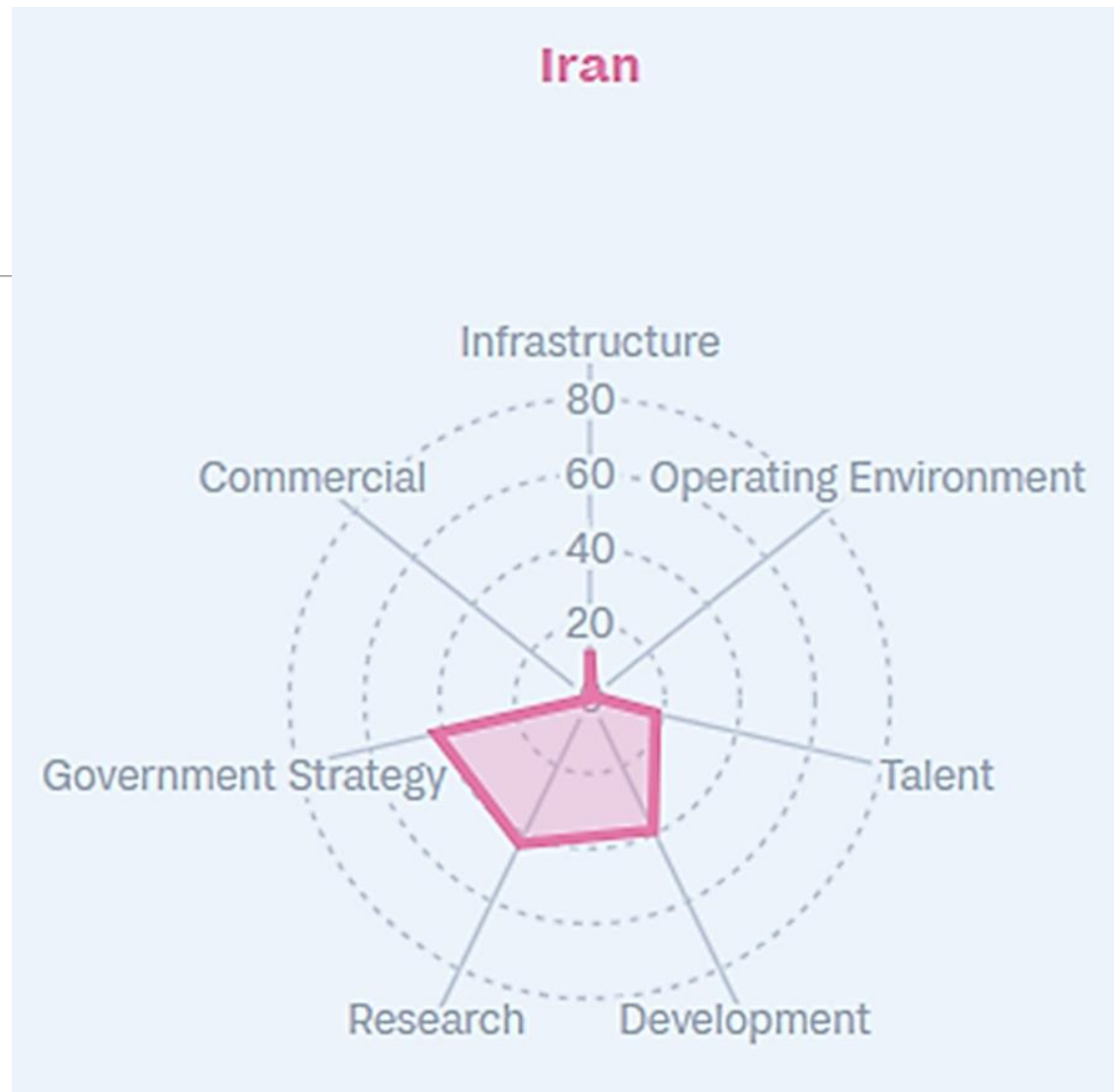
Iran

Iran
Talent Rank: 65
Infrastructure Rank: 70
Operating Environment Rank: 82
Research Rank: 40
Development Rank: 44
Government Strategy Rank: 41
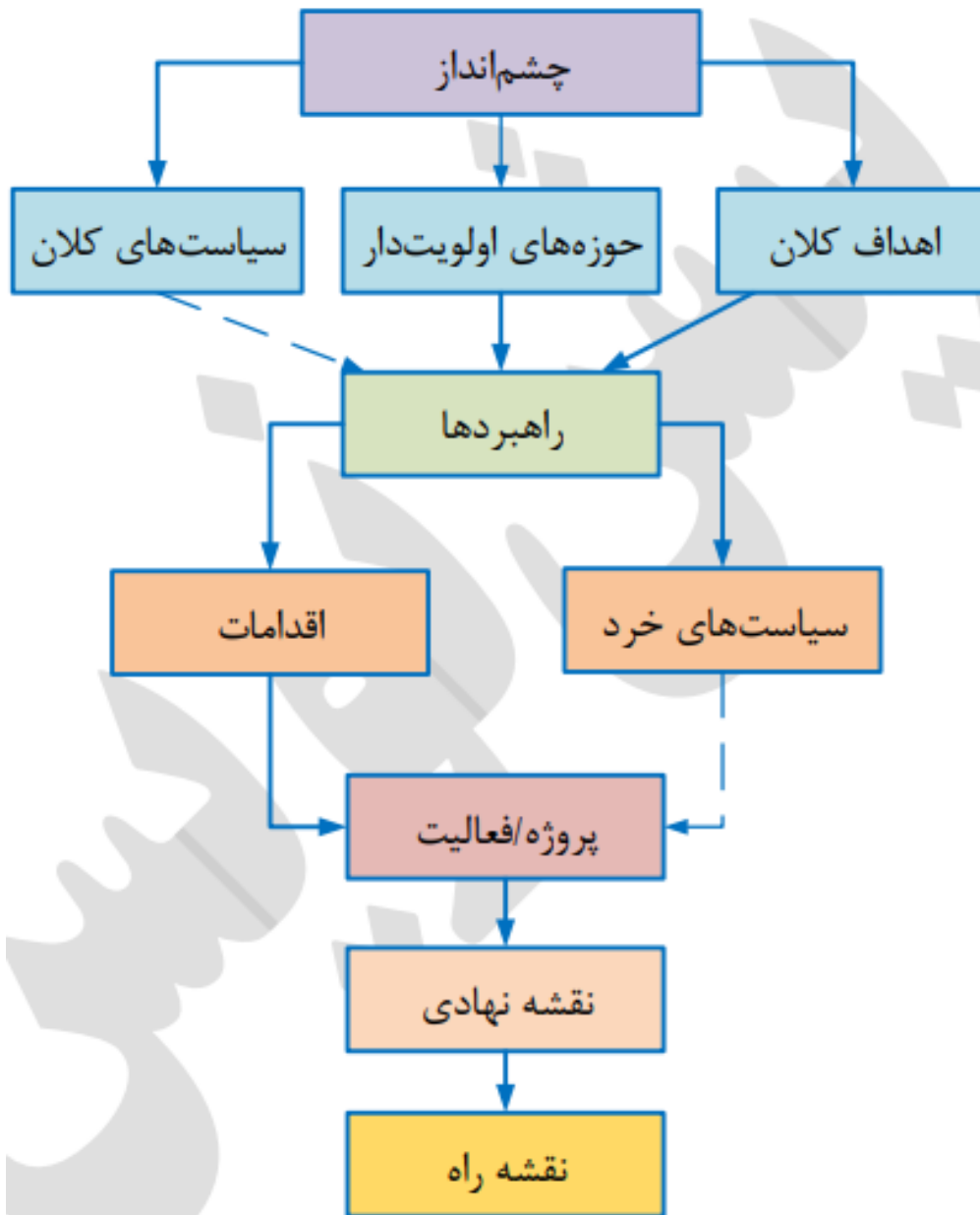
سند برنامه توسعه ملی هوش مصنوعی
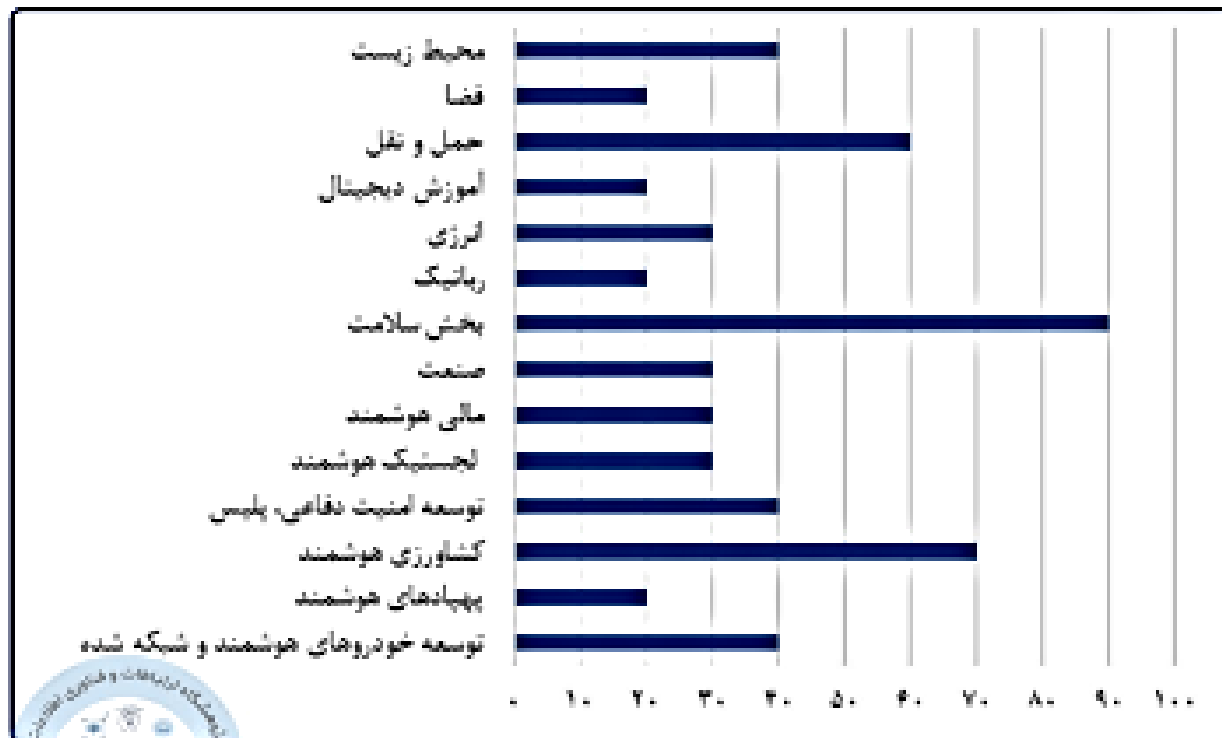
شکل ۱: درصد فروانی حوزه تمرکز براساس کشورهای مورد بررسی

جدول ۱: حوزه‌های قابل تمرکز توسط ایران برای به‌کارگیری هوش‌مصنوعی

اولویت‌ها	حوزه کاربرد
اولویت ۱	اقتصاد و خدمات مالی
اولویت ۲	مسائل زیست‌محیطی
اولویت ۳	مسائل اجتماعی
اولویت ۴	کشاورزی
اولویت ۵	سلامت
اولویت ۶	حمل‌ونقل و مدیریت شهری
اولویت ۷	آموزش
اولویت ۸	انرژی
اولویت ۹	صنعت، معدن، تجارت
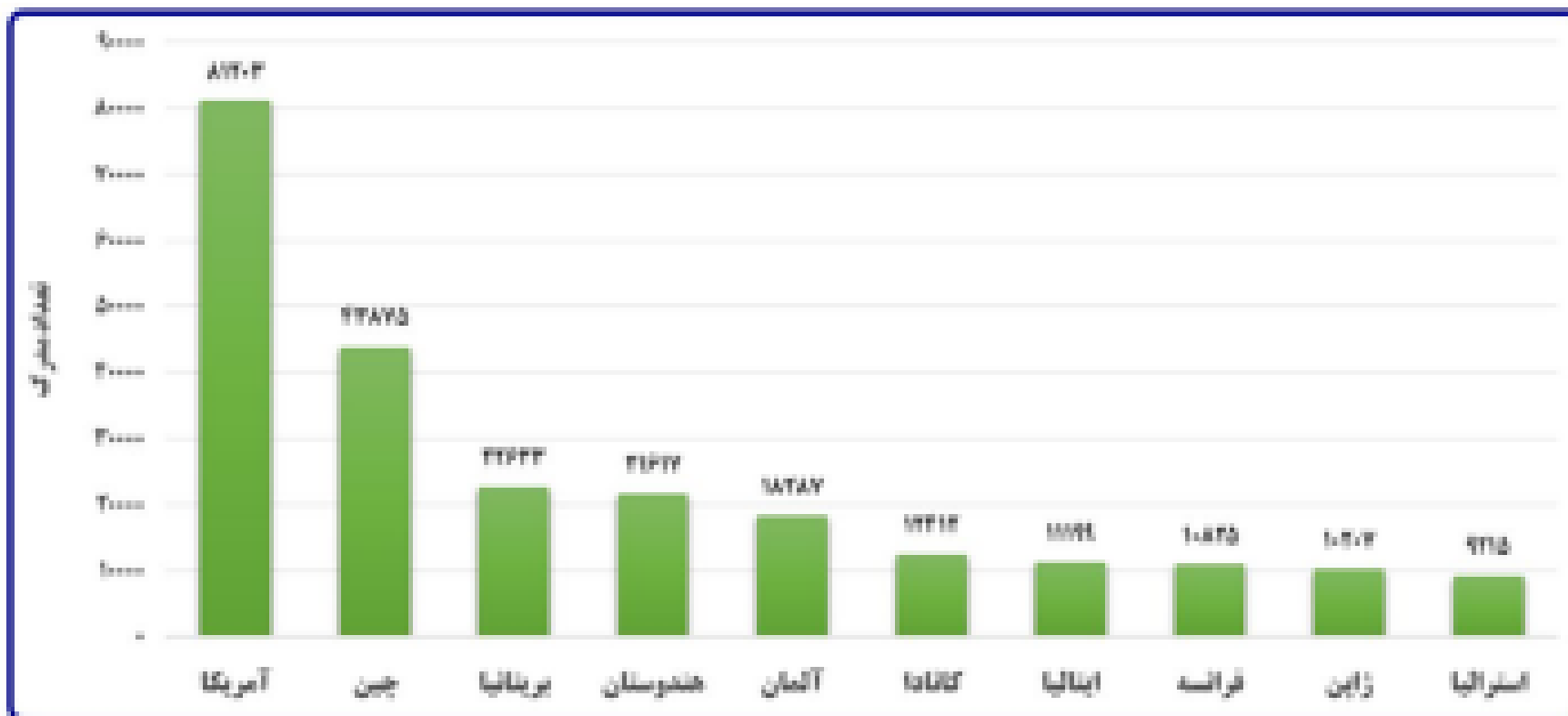
شکل ۳: کشورهای دارای بیشترین سند منتشر شده در زمینه «کاربرد هوش مصنوعی در حوزه سلامت» (سال‌های ۲۰۲۰-۱۹۵۷)

شکل ۷: جایگاه ایـران در میـان رقبـای مطـرح در سـند چشـم‌انداز ۱۴۰۴ در زمینه «کاربـرد هوش مصنوعی در حوزه سلامت» (سال‌های ۱۹۸۳–۲۰۲۰)
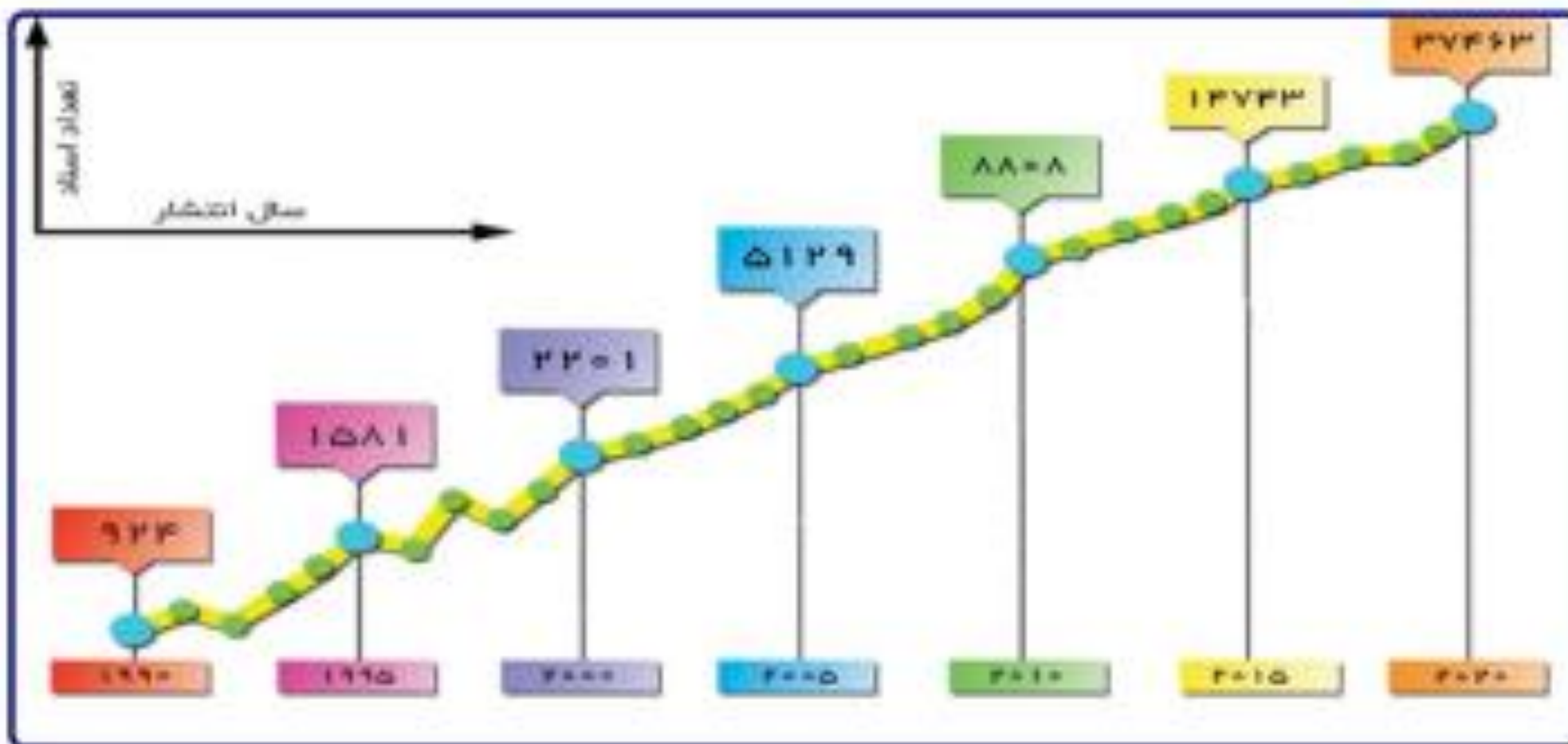
شکل ۵: روند اسناد منتشر شده جهان در زمینه «کاربرد هوش مصنوعی در حوزه سلامت»
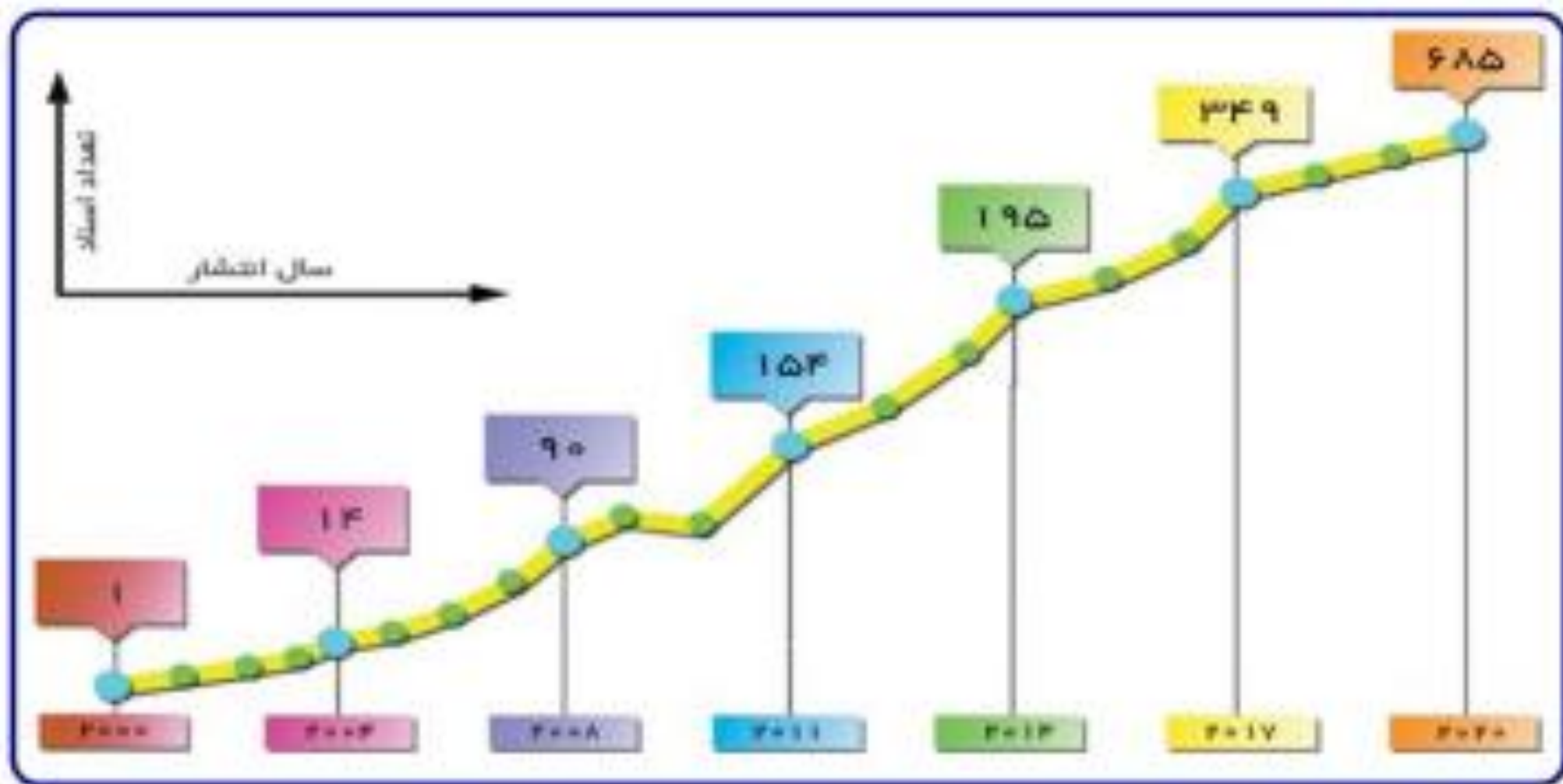
شکل ۹. روند اسناد منتشر شده ایران در زمینه «کاربرد هوش مصنوعی در حوزه سلامت»

نقدی بر «سند ملی هوش مصنوعی جمهوری اسلامی ایران» مصوب شورای عالی انقلاب فرهنگی

هشت نکته برای یک سند

فواد قادری
دانشیار هوش مصنوعی،
دانشگاه تربیت مدرس

متن کامل مقاله را
اینجا بخوانید

شماره ۱۲۸   آبان ۱۴۰۳   ۲۸   پیوست

محورهای اصلی نقدها بر سند ملی هوش مصنوعی

- **فقدان ارائه تصویر دقیقی از وضع موجود**
  - لذا تناسبی بین مولفه های سند (چشم انداز تا همکاری‌های بین المللی) وجود ندارد.
- **لزوم اولویت بندی اهداف و برنامه‌ها بر اساس توان و ظرفیتهای کشور**
- **فقدان نگاشت نهادی دقیق**
  - مخاطبین برای اقدامات مشخص نیستند و فهرستشان هم ناقص است.
  - نقش بخش خصوصی در این سند کم رنگ است.
- **تداخل وظایف و هم شکلی نهادی**
  - تدوین و ابلاغ اساسنامه سازمان ملی هوش مصنوعی و ارائه نگاشت نهادی دقیق و شفاف در آن ضروری است.
- **لازم است مشخص شود این سند «با هوش مصنوعی» است یا «بر هوش مصنوعی»**

محورهای اصلی نقدها بر سند هوش مصنوعی

- **هدفگذاری های کمی غیرواقع بینانه و دست نیافتنی**

  - برای مثال، دستیابی به زیرساخت های پردازشی با ظرفیت هایی در مقیاس اگزافلاپس نیازمند چند ده هزار GPUاست که تهیه آنها اگر به دلیل تحریم ها هم غیرممکن نباشد، از نظر تامین منابع مالی با موانع جدی روبرو است.

  - شاخص دیگر دستیابی به ۳اسکوی ایرانی بهره مند از هوش مصنوعی با بیش از ۲۰۰میلیون کاربر است که به نظر می رسد در بازه زمانی ۵ساله دست نیافتنی است.

  - تناسبی میان هدف های کلان (مثلا رسوخ هوش مصنوعی در حوزه های مختلف اقتصادی) با شاخص ها (تعداد ثبت اختراعات و تعداد محصولات دانش بنیان مبتنی بر هوش مصنوعی) وجود ندارد.

- **طرح های اولویت دار هوش مصنوعی**

  - اولویت ها همه در مرحله کاربرد است و در مورد اولویت های پژوهشی حرفی زده نشده است.

  - رویکرد ماموریت گرایی و مسئله محوری حاکم نیست و به فهرستی از طرح ها اشاره شده که بعضا نیاز اساسی از کشور را حل نمی کنند.

- **فقدان رویکرد آینده نگاری و آینده پژوهی تدوین**

  - مشخص نیست میان اهداف، برنامه ها و اولویت های سند با کلان روندهای فناورانه، اجتماعی، فرهنگی، سیاسی و زیست محیطی حاکم بر کشور و جهان چه رابطه و نسبتی وجود دارد.

  - برای مثال، سند در زمینه مشاغلی که در آینده از طریق هوش مصنوعی جایگزین می شوند یا از بین می روند، سکوت اختیار کرده و برنامه ای ویژه برای آن ندارد.

Iran ranks 13th worldwide in artificial intelligence

December 3, 2021 - 17:22   Society

Presidency of the Islamic Republic of Iran
Vice Presidency for Science, Technology and
Knowledge Based Economy

The Vice Presidency for Scientific and Technological Affairs is a very important organization and what it does is very sensitive. A few years ago, this organization was formed at my insistence and later on, the National Elites Foundation was formed. My advice to the officials in charge of Vice Presidency for Scientific and Technological Affairs and the National Elites Foundation is that they should pursue the matter. You should not start to do things all over again. Outstanding work has been carried out in this regard. You should move forward according to such work. You should try to find and remove shortcomings and weak points and you should not forget about your strong points.   Supreme Leader 2013-10-09

Today : Saturday Jan 18 2025

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Iran Has Ranked 16th in the World in Terms of Artificial Intelligence

Iran Has Ranked 16th in the World in Terms of Artificial Intelligence

According to the public relations and information center of the Vice-Presidency for science and technology affairs, Mohammad Taghi Joghataei, senior advisor of the cognitive sciences and technologies development headquarter, stated: currently, the efforts at the international level are in the path of science and wealth creation. In order to obtain this goal inside the country, effective cooperation and collaboration in various science and

Thanks for your attention

The Simple Key Areas in Healthcare and Medicine

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