POLICY TOOLKIT

THE EMERGENCE OF ARTIFICIAL INTELLIGENCE AND ITS APPLICATION IN HEALTH
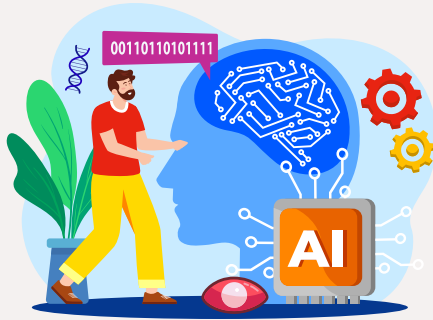
THIS TAILORED POLICY TOOLKIT combines the wide array of U.S. Federal and California state agencies that are and can support the advancement of equitable artificial intelligence usage for Californians. It contains hyperlinks to help seamlessly navigate between the various federal agencies that are actively engaged in ensuring AI technologies in health care are equitably delivered, as well as the state agencies that have the opportunity to create and transform California's artificial intelligence health policy landscape.

What is Artificial Intelligence (AI)?

Artificial Intelligence (AI) is commonly defined as a technology that enables machines to simulate human intelligence and problem-solving.[1,2,3] Mimicking human autonomy allows AI systems to make predictions, recommendations, or decisions that influence real or virtual environments. AI systems learn from human-input data to conduct such activities, particularly automating tasks.[2] To mirror human-like behavior, AI utilizes technology techniques like machine learning, deep learning, and natural language processing.

AI is a rapidly evolving tool, being the technology behind smart assistants like Siri and Alexa and Large Language Models like OpenAI's ChatGPT. However, AI has been used in health care for several decades, dating back to early applications with medical diagnosis and medical imaging in the 1950's, but it has significantly accelerated in recent years due to advancements in technology and data availability.[4,5] AI plays a significant role in revolutionizing health care, driving innovation, enhancing efficiency and accuracy, and ultimately improving better health outcomes.

Medical Diagnosis
(Radiology Reads)

Revolutionize Health Care

Medical Imaging

Improve Health Outcomes

ITUP Publications

- Catalyzing Artificial Intelligence to Advance Health Equity in California Communities

AI Policy Legislation Tracker

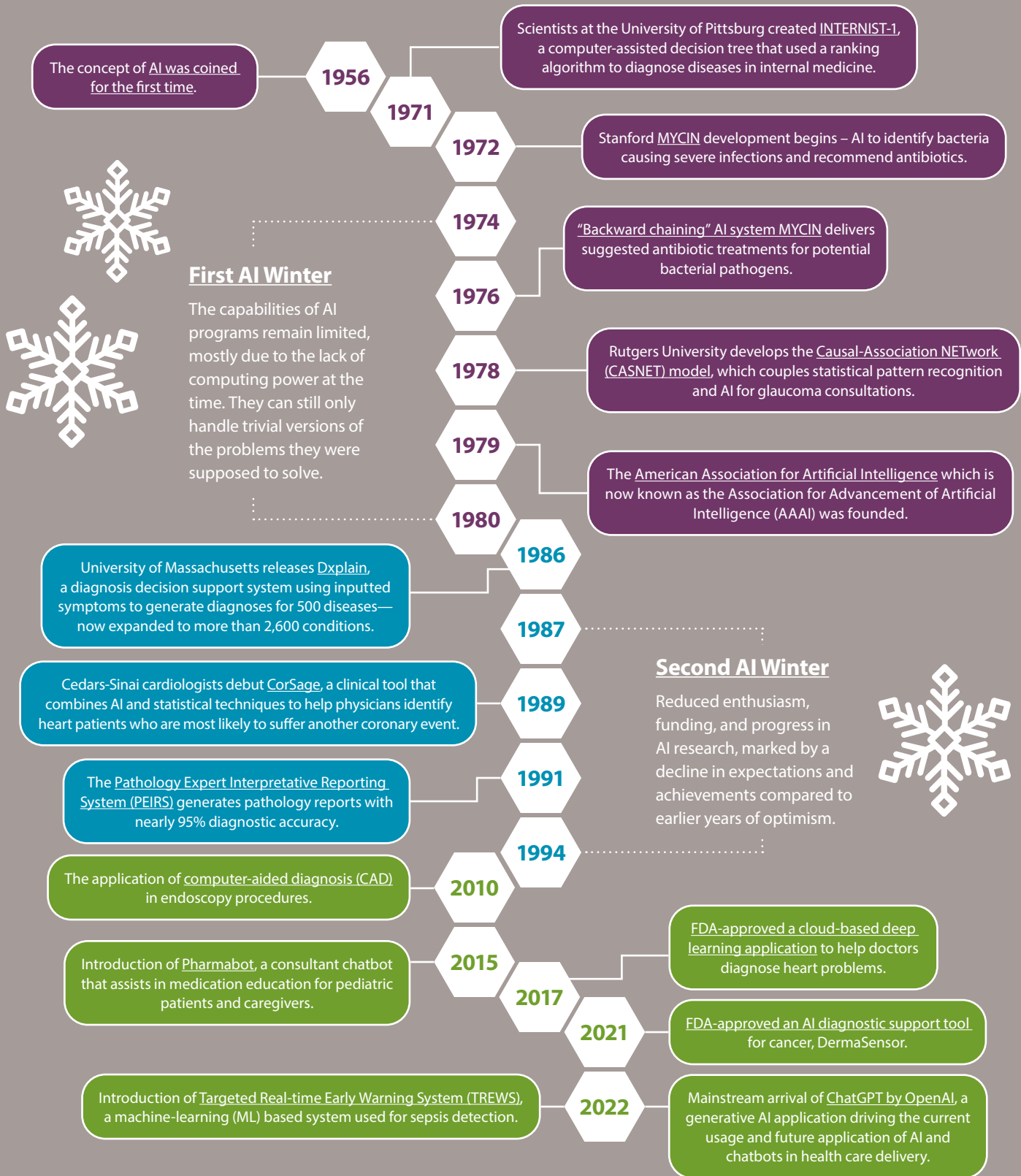The Center for Human-Compatible AI (CHAI) at UC Berkeley developed an AI Policy Tracker, containing over 1,000 bills related to AI. The AI Policy Tracker captures all bills and laws in the United States that contain AI-related keywords.

Check it out here: AI Legislation Tracker in California and Federally

The Ascendance of AI: Key Health Milestones

While AI has a long history in health care, recent advancements in computational capabilities, data availability, and algorithmic sophistication have propelled its integration into everyday clinical practice and health care management.[6]

The concept of AI was coined for the first time.

1956

1971

Scientists at the University of Pittsburg created INTERNIST-1, a computer-assisted decision tree that used a ranking algorithm to diagnose diseases in internal medicine.

1972

Stanford MYCIN development begins – AI to identify bacteria causing severe infections and recommend antibiotics.

1974

First AI Winter

The capabilities of AI programs remain limited, mostly due to the lack of computing power at the time. They can still only handle trivial versions of the problems they were supposed to solve.

1976

"Backward chaining" AI system MYCIN delivers suggested antibiotic treatments for potential bacterial pathogens.

1978

Rutgers University develops the Causal-Association NETwork (CASNET) model, which couples statistical pattern recognition and AI for glaucoma consultations.

1979

1980

The American Association for Artificial Intelligence which is now known as the Association for Advancement of Artificial Intelligence (AAAI) was founded.

1986

University of Massachusetts releases Dxplain, a diagnosis decision support system using inputted symptoms to generate diagnoses for 500 diseases—now expanded to more than 2,600 conditions.

1987

Second AI Winter

Reduced enthusiasm, funding, and progress in AI research, marked by a decline in expectations and achievements compared to earlier years of optimism.

Cedars-Sinai cardiologists debut CorSage, a clinical tool that combines AI and statistical techniques to help physicians identify heart patients who are most likely to suffer another coronary event.

1989

The Pathology Expert Interpretative Reporting System (PEIRS) generates pathology reports with nearly 95% diagnostic accuracy.

1991

1994

The application of computer-aided diagnosis (CAD) in endoscopy procedures.

2010

Introduction of Pharmabot, a consultant chatbot that assists in medication education for pediatric patients and caregivers.

2015

2017

FDA-approved a cloud-based deep learning application to help doctors diagnose heart problems.

2021

FDA-approved an AI diagnostic support tool for cancer, DermaSensor.

Introduction of Targeted Real-time Early Warning System (TREWS), a machine-learning (ML) based system used for sepsis detection.

2022

Mainstream arrival of ChatGPT by OpenAI, a generative AI application driving the current usage and future application of AI and chatbots in health care delivery.

Federal Agencies

Several federal agencies hold various roles and responsibilities concerning the usage of AI in health care. These agencies are essential in collaboratively addressing regulatory challenges, fostering innovation, safeguarding patient privacy, and ensuring that AI technologies in health care deliver safe, effective, and equitable outcomes for both patients and providers.

Food and Drug Administration (FDA):

- The FDA is responsible for regulating medical devices, including AI-powered software used in health care settings. This includes software intended for diagnosis, treatment recommendations, and decision support. The FDA ensures that AI-based technologies meet safety and efficacy standards through premarket and ongoing monitoring.

Centers for Medicare & Medicaid Services (CMS):

- The CMS oversees federal health care programs, including Medicare and Medicaid. It plays a role in determining reimbursement policies for AI technologies and ensuring they provide value and meet quality standards in health care delivery.

Department of Health and Human Services (HHS):

- Office of Civil Rights (OCR)
  The OCR enforces HIPAA (Health Insurance Portability and Accountability Act) regulations, which govern the privacy and security of health information. The OCR ensures that AI applications in health care comply with HIPAA requirements to protect patients' sensitive health data.
- Office of the National Coordinator for Health Information Technology (ONC)
  The ONC oversees the adoption and use of health information technology (IT) and electronic health records (EHRs). It promotes the interoperability of AI technologies with existing health IT systems and ensures that AI enhances, rather than disrupts, health care workflows.

National Institutes of Health (NIH):

- The NIH funds and conducts biomedical research, including AI applications in health care. It supports research projects aimed at developing AI tools for disease diagnosis, treatment optimization, and biomedical data analysis.

Agency for Healthcare Research and Quality (AHRQ):

- The AHRQ is tasked with improving the quality, safety, and efficiency, and effectiveness of health care. It funds research on AI applications that enhance health care delivery, patient outcomes, and health care system performance.

California State Agencies

In California, oversight and regulation of AI usage in health care primarily fall under state agencies responsible for health care regulation, consumer protection, and privacy. The following section includes key state agencies that may have jurisdiction or can play significant roles in overseeing AI usage in health care.

California Health and Human Services Agency (CalHHS):

- The CalHHS oversees various departments and offices related to health care and social services. It may coordinate efforts related to AI in health care across different state agencies and ensure alignment with state health policies.

California Department of Public Health (CDPH):

- The CDPH regulates health care facilities and services, including hospitals, clinics, and laboratories. It may have oversight over AI applications used within health care facilities to ensure compliance with state health regulations.

California Department of Consumer Affairs (DCA):

- The DCA regulates licensed health care professionals and certain health care services. It may have jurisdiction over AI applications used by licensed health care providers, ensuring that they adhere to professional standards and regulations.

California Department of Managed Health Care (DMHC):

- The DMHC regulates health plans and certain health care services, including potential oversight of how AI technologies are integrated into health plan operations and patient care.

California Department of Technology (CDT):

- The CDT provides guidance on technology policy and oversees the implementation of technology initiatives across state agencies. It may play a role in advising on best practices for AI implementation in health care to ensure data security and interoperability.

Center for Data Insights and Innovation (CDII):

- The CDII promotes the use of health information technology and ensures the protections of patient health information. It may provide guidance on the use of AI in health care settings to ensure compliance with state privacy laws, such as the California Consumer Privacy Act (CCPA).

Key Terms

Algorithm: The "brains" of an AI system. Algorithms drive the actions of AI systems and enable them to process data and make decisions.[7]

Artificial Intelligence (AI): Machine-based technology that enables computer systems to perform tasks normally requiring human intelligence, i.e., recognizing patterns, learning from experience, drawing conclusions, making predictions, etc.[1,2,3]

Data Privacy: The principle that a person should hold autonomy over their personal data. In organizations, data privacy secures people's personal identifiable information and protected health information, including the ability to decide how organizations collect, store and use their own data.[8]

Deep Learning (DL): A subset of machine learning that focuses on mirroring humans' neural networks. Involves algorithms and artificial neural networks processing large amounts of data to then automatically extract patterns from such complex data.[7]

Large Language Models (LLMs): Advanced algorithms designed to process, generate and discern human language and behavior on a vast scale. LLMs are trained on large amounts of data from various sources, enabling them to generate content at a sophisticated level (think ChatGPT and Gemini).[9]

Machine Learning (ML): A subdiscipline of AI; the use of computer systems and algorithmic data to learn and perform complex tasks without human intervention or explicit directions.[7]

Natural Language Processing (NLP): A subfield within AI that focuses on the interaction between computers and humans through natural language. NLP is a key component of LLMs' ability to interpret human language.[7]

Responsible AI: A set of guiding principles and regulations that help the design, development, and deployment of ethical and trustworthy AI applications for organizations and their stakeholders.[10]

Endnotes

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About ITUP

ITUP is an independent, nonprofit, health policy institute that has been a central voice in the California health policy landscape for more than two decades. ITUP serves as a trusted expert, grounded in statewide and regional connections with a network of policymakers, health care leaders, and stakeholders. The mission of ITUP is to promote innovative and community-informed policy solutions that expand access to equitable health care and improve the health of all Californians.

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- California Health Care Foundation
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