Opportunities and Challenges of Medical Artificial Intelligence

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eICU Collaborative Research Database
电子病历的二次分析利用
—医疗大数据分析方法导论

Secondary Analysis of Electronic Health Records

原著 MIT CRITICAL DATA
主译 张政波 曹德森

人民卫生出版社
>30 Health Datathons and Data Science Workshops in 5 Continents
Artificial Intelligence in Global Health
Defining a Collective Path Forward
AI-Enabled Population Health

• Prediction of disease outbreaks
• Limited health data from different regions across the country and no means to incorporate non-health data
• View, analyze, and react to health data in real time rather than analyzing outdated data after the fact
Community Health Worker Virtual Assistant

• Rapid and accurate triage and diagnosis using real-time patient data collected by CHWs
• Avoid unnecessary trips to hospitals that may be hours away
• Unclog overburdened tertiary health facilities
Patient Virtual Assistant

• Collection of real-time data by the patients
• Use of chatbots to provide recommendations on if, how, and where someone should seek care from a health professional
• Chatbot uses speech recognition and speech generation to process and answer questions, and machine learning to analyze questions and provide answers
Physician Decision Support

- Image recognition software to provide a second pair of eyes
- Less straightforward cases are identified to maximize physician time
- Faster diagnosis turn-around time
## Challenges for AI in Healthcare

### Challenges likely to be rate-limiting for specific use case groupings
- Data availability and quality
- Business model sustainability
- Privacy, ethics, and ownership
- Regulations and policy

### Cross-cutting challenges likely to require attention at systemic level
- Integration into health system
- Required evidence of positive impact

### Challenges likely to be resolved as technology continues to evolve
- Gaps in AI building blocks
- Gaps in required infrastructure
Data mirror the unequal health system that we see today.
ACM Conference on Fairness, Accountability, and Transparency (ACM FAT*)

A computer science conference with a cross-disciplinary focus that brings together researchers and practitioners interested in fairness, accountability, and transparency in socio-technical systems.
• No current definition of acceptable performance standards, accuracy rates, and patient health outcomes against which to measure AI

• Trust issues around collecting and using digital data

• While the international community talks about data as a public good, in reality data is often politicized.
• Governments and healthcare organizations do not have the human resources and/or IT capabilities to implement AI
• Uncertainties around when and where regulations on AI are needed
• Impact will be negated if local health systems lack capacity and resources to implement population-level interventions or effectively treat at-risk patients
What Can We Do?

• Support development and deployment of data collection systems
• Create open platforms for data sharing
• Add terms to grants/investments requiring funded projects to collect and share data that meets minimum standards
• Establish government-academia-industry partnership around health data science
Requirement for Interoperability

• Common language and standards
• Common architecture to build applications
• Standards for data sharing
Comment: The FAIR Guiding Principles for scientific data management and stewardship

Mark D. Wilkinson et al.*
To be Findable:

F1. (meta)data are assigned a globally unique and persistent identifier

F2. data are described with rich metadata (defined by R1 below)

F3. metadata clearly and explicitly include the identifier of the data it describes

F4. (meta)data are registered or indexed in a searchable resource
To be Accessible:

A1. (meta)data are retrievable by their identifier using a standardized communications protocol

A1.1 the protocol is open, free, and universally implementable

A1.2 the protocol allows for an authentication and authorization procedure, where necessary

A2. metadata are accessible, even when the data are no longer available
To be Interoperable:

I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.

I2. (meta)data use vocabularies that follow FAIR principles

I3. (meta)data include qualified references to other (meta)data
To be Reusable:

R1. meta(data) are richly described with a plurality of accurate and relevant attributes

R1.1. (meta)data are released with a clear and accessible data usage license

R1.2. (meta)data are associated with detailed provenance

R1.3. (meta)data meet domain-relevant community standards