Medical Artificial Intelligence: Futuristic Prospects and Ethical Responsibilities

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Background

- Artificial intelligence (AI) is highly sensitive to small pattern changes [1]
  - **Diagnostic accuracy**: sensitivity, specificity, positive predictive values, and negative predictive values upwards of 70% [2]
- Lack of breaks → greater diagnostic efficiency [3]
- When utilized in combination with clinicians, AI systems improved behavioral-health patient outcomes by more than 30% [4]
Objective

Propose a theoretical multifaceted approach for the equitable implementation of medical AI systems in healthcare facilities

❖ Feasibility
➢ Data collection
➢ Manufacturing and maintenance

❖ Patentability
➢ Applications
➢ Legal responsibilities

Visualization of how a futuristic medical AI system may be used by a clinician to aid in the diagnosis of a patient.
Source: Medical News Life Sciences
Feasibility and Equitable Accessibility

- Extensive validation and access to large volumes of well-selected data [5]
- Automated data collection methods
- Self-dependence for data
- Eliminates human resources
- Quickly adapt to change
Feasibility and Equitable Accessibility (Cont.)

- Reduce manufacturing and maintenance costs for lower selling prices [5]
  - Complexity
  - Upgradations
- Monetary assistance from governments

Figure 3. As part of the Coronavirus Aid, Relief and Economic Security (CARES) Act, the U.S. Department of Health and Human Services has provided over $175 billion USD to healthcare providers via the Provider Relief Fund. Similar policies could also be enacted for hospitals and facilities seeking to implement medical AI systems. Source: American Dental Association
Patentability

- Subject matter eligibility [6]
  - Step 2A ✔
  - Step 2B ✗

- Differentiate AI products from conventional clinical diagnosis methods in patent applications

Figure 4. Flowchart of subject matter eligibility test. Steps 2A and 2B assess whether the product targets a patent-ineligible concept and is an inventive concept, respectively (see red boxes).
Source: United States Patent and Trademark Office

United States Patent and Trademark Office
Patentability (Cont.)

- Long-term viability
  - Medical supervision
- AI developers and manufacturers are liable for unintentional harm to patients due to malfunctions
  - Ease financial burden on healthcare providers, who have lost an average of $50.7 billion USD monthly due to COVID-19 [7]

University of Maryland surgeon supervising the Smart Tissue Autonomous Robot (STAR). Source: University of Maryland
Conclusion

❖ Medical AI could greatly assist healthcare providers in terms of accuracy and efficiency
❖ Governments, AI manufacturers, and healthcare providers should consider the following proposed methodologies to address the ethical responsibilities involved in medical AI’s implementation
➢ **Feasibility:** automated data collection systems, reduced manufacturing costs, government financial support
➢ **Patentability:** drafting patent applications, medical supervision, financial liabilities
Future Work

❖ Analyze patent law in additional countries
❖ Improve the theoretical design of proposed methods by surveying healthcare providers, AI manufacturers, legislators, and patients
❖ Conduct a small-scale pilot study to assess the empirical effectiveness of proposed methods
❖ Expand testing to multiple case studies to affirm reliability
❖ Dependent on the success of further experimentation, work with AI manufacturers and legislators to draft and implement policies in accordance with proposed methods
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