



Artificial Intelligence in Health Systems

Clinical Management

Health Systems Performance

Population Health

Diagnosis & Admission

Reading and interpreting imaging data (such as X-rays, CT scans, etc.) for faster and better diagnostics.	Automatic cardiac imaging analysis and pathology detection.
Snake-bite detection.	Identification and diagnostics of skin cancer.
MRI image analysis to identify schizophrenia.	Detection of cancer metastasis.
Analysis and classification of digitized slides for blood, fecal, bone aspirate and PAP smear samples.	Analysis of EHR, lab, post-acute care, claims and biometric data to provide advanced insights into disease/condition progression.
Continuous evaluations of biomedical parameters in diabetes, cancers, and cardiovascular diseases using data from wearables.	Development of the next generation of radiology tools that are accurate and detailed enough to replace the need for tissue samples in some cases.
Wearable vest for screening for breast cancer at early stage.	Extracting early signs of disease from patient medical history data.
Image analysis of cervix for early stage cancer diagnosis.	Classifying lung cancer severity with ensemble machine learning in health care claims data.
Modeling progression free survival in breast cancer with recurrent neural networks.	Stable selection of interpretable rules for preterm birth prediction.
Visual indicators of dementia: training algorithms to assess eye movement patterns to track and correlate cognitive function and brain activity.	Prediction of language ability in cochlear implant recipients: machine learning algorithms to analyze brain scans to predict hearing loss.
Classification of retinal images from optical coherence tomography for early diagnosis of retinal diseases.	Learning robust features using deep learning for automatic seizure detection.
Speech monitoring for dementia: machine learning to analyze speech patterns to detect and monitor dementia progression.	Using EHR logged events over time to predict survival outcomes with piecewise approximations of arbitrary hazard functions.
Collecting and analyzing heart rate and breathing patterns, to detect and predict diseases.	Temporal prediction of multiple sclerosis evolution from patient-centered outcomes.
Method for automatically rating ataxia from video data.	Predicting malnutrition from body images.
Predicting long-term mortality with first week post-operative data after coronary artery bypass grafting using machine learning models.	Using EHR data to identify infection patterns in hospitals and highlight patients at risk before they begin to show symptoms.
Skin image analysis: machine learning and computer vision to analyze images to predict and prevent the onset of skin disease.	

Treatment Choices

Inference on unstructured free-text medical documents such as doctor's notes and treatment protocols in order to determine which treatments best suit a patient's medical history.	Improving access and quality of healthcare by turning your mobile phone into your personal medical doctor, thus you receive personalized medical diagnosis and treatment.
DNA data analysis in order to compare it to the cases from the database so that oncologists can see in real time the different survival rates for different treatments of patients similar to their own.	Nursing-care robot that is able to lift and move patients in and out of bed into a wheelchair, help those who need assistance to stand, and even turn patients in bed to prevent bedsores.
Automatic generation of radiation therapy plans.	Robot assisted surgery.
Predicting health deterioration and implementing change protocols to avoid it.	Continuous state-space models for optimal sepsis treatment - a deep reinforcement learning approach.
Dynamic treatment regimes on medical registry data.	Robot for dispensing and prescribing medication.
Real-time detection and exploratory discovery of anomalies for pediatric ventilator management.	Predictive hierarchical clustering of CPT codes for improving surgical outcomes.
Robots therapy administration in hospitals.	Mortality prediction of intensive care unit (ICU) patients.
Analyzing which supplies were used by different surgeons for a single procedure, along with their costs to identify the appropriate supplies for the correct patient at the best price possible.	Skincare treatment personalization: recommendation engines to tailor skincare treatment recommendations to user skin type.
Mathematical models for progression of HIV infection and treatment.	Predicting surgery duration with neural heteroscedastic regression.
Closed captioning personalization: using natural language processing to personalize closed captioning by transcribing live conversations in real-time and to automatically translate sign language to text.	Auditory AI assistants to predict the best fit for an individual's cochlear implant to help improve patient outcomes and to assist the hearing impaired with daily tasks.
Real-time prediction of clinical interventions within intensive care units.	Chatbots to talk to people with depression.

Treatment Adherence

Virtual assistants to remind patients of prescription refills and pickups, and even recommend preventive health screenings.	In-home health monitoring and health information access to detect changes in mood or behavior and alert caregivers.
Sending SMS messages to the patient at times when the data about their mobility indicates that they may need medical attention, or tracking response time to notifications.	Checking prescriptions against similar cases in the database and informing the doctor when the prescription contains any deviations from the typical treatment plan.
Monitoring patients with long-term conditions and help them adhere to medication intake.	Patient-centered mobile platform for multiple sclerosis research and care.

Service Delivery

- Analysis of factors as the average length of patient stays; the average cost of patients per day; how many nurses are currently on staff; how many outpatient surgeries were performed in the last week etc.
- Towards vision-based smart hospitals: a system for tracking and monitoring hand hygiene compliance
- Monitoring and directing patient movement as they move from system to system or department to department.
- Determining the optimal location of new health facilities.
- Robots that reduce the bacterial load often associated with an increased risk of healthcare associated infections (HAI).
- Care coordination using practice-based evidences.
- Nutrition optimization in surgery and critical care.

Health Workforce

- Virtual reality and AI combination to train medical workers.
- AI-powered virtual healthcare assistant designed to improve clinical workflow efficiency for healthcare professionals.
- Optimization of the clinic staff scheduling and to reduce the wait times, manage supplies and accounting.
- Surgeon technical skill assessment using computer vision based analysis.
- Directory of rare disease specialists: identifying experts from publication history.

Health Information System

- Natural language processing to enable medical/healthcare companies operationalize their structured and unstructured medical data, images and texts.
- Supplementing existing security systems by identification and reacting to actionable threats, by responding to (and learn from) potential data leak patterns.

Access to Essential Medicine

- Evaluation of interaction between the virus and all existing drugs.
- Drug discovery and drug repurposing.
- Managing drug shortages by drug demand forecasting.
- Prediction of adverse drug reactions.

Financing

- Comparative effectiveness and cost-effectiveness analysis of clinical outcomes data to inform medical decision making and policy on appropriate coverage of tests and medications.
- Selecting candidate targets for performance-based financing in health.
- Medical billing and coding - translating patient record information into standard codes which are used for billing patients and third-party payers such as a medicare and insurance companies.
- Analysis of combined government and clinical databases for proof of the best, most cost-effective treatments for hundreds of conditions.
- Optimization of the purchase and distribution of pharmaceutical, medical-surgical, and clinical engineering supply chain.
- Identification of deterioration or sensing the development of complications to improve outcomes and reduce costs related to hospital-acquired condition penalties.
- Prediction of acute care use and cost of treatment for (asthmatic) patients.
- Predicting risk scores for healthcare insurers.

Epidemiology and Populations at Risk

- Tool to support the response to disease outbreaks by pinpointing to sources, visualizing cases per disease, per area.
- Simulation of epidemic progression to support decision-making.
- Detection of pathogens before they cause outbreaks by turning mosquitoes into devices that collect data from animals in the environment.
- Identification of potential hot spots of drug abuse, while measuring the impact of programs aimed at prevention and treatment.
- Mining social media data for early detection of outbreaks and assessing population needs during emergencies.
- Spatial modeling of diseases.
- Detection of key factors for maternal mortality on different levels of geo-spatial granularity.
- Clustering of mosquito movement patterns when in contact with bed nets for a better understanding of their behaviour in these conditions.
- Identification of areas with disparities, whether disparities are decreasing or increasing, and the factors associated with disparities.
- Patient similarity analysis using population statistics.
- Monitoring the progression of a disease outbreak and predicting its future spread.
- Maternal mortality modeling.
- Predicting new disease (HIV) diagnoses through online data analysis.

Health Education and Awareness

- Using behavior science to determine and help people change their habits, improve their health and reduce their risk of chronic disease.
- Quantifying mental health from social media using learned user embeddings.
- Extracting correlations from survey data to understand what to focus the education campaigns on in different countries to raise awareness on the importance of good nutrition, dietary diversity, and good hygiene for kids, mothers, and farmers.
- Food consumption, nutrient intake, and dietary patterns extraction.
- Tracking and analysis of online conversations related to immunisation on social media and mainstream media on a national level.
- Analysis of social media in order to provide insight on the baseline of public engagement, and explore ways to monitor a new (sanitation) education campaign.
- Using Instagram photos and tweets to extract predictive markers of depression.

Environmental and 'One' Health Approaches

- Analysis and clustering of malnutrition data to determine which supplements are the most important because of lack of nutrients from food (Vit A, Vit B12)
- Monitor health status on the community level to identify community health problems.
- Analysis of air quality data from polluted areas and attempting to match it with healthcare datasets for insights into respiratory disease.
- Investigating environment-related diseases by geospatial mapping, finding correlations between people on similar locations.
- Image recognition for identification and quantification of different kinds of cyanobacteria in water.
- Quantifying food and nutrient intakes and assessing the adequacy of micronutrient intakes among young children and their mothers.
- Extracting statistics and mapping of bacterial resistance data.
- Mapping water bodies using satellite imagery.
- Microbiome data analysis to understand the connection with diseases.

Survey and Research Practices

- Machine reading and comprehending research papers in order to understand the topic and speed up the research.
- Personalized medicine discovery by DNA genome analysis.