Experiment 3.2

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Aim: Case Studies on Cloud based machine-learning solutions in healthcare.

Objective: The Objective of this experiment is to do a Case Studies on Cloud based machine-learning solutions in healthcare.

Theory:

Diagnostic Imaging:
Image Recognition: ML algorithms on the cloud can analyze medical images, such as X-rays, MRIs, and CT scans, to aid in the diagnosis of diseases like cancer, fractures, or neurological disorders.
Deep Learning Models: Deep learning models, particularly convolutional neural networks (CNNs), are employed for tasks like tumor detection, segmentation, and classification.

Clinical Decision Support Systems:
Predictive Analytics: Cloud-based ML models can analyze patient data to predict disease progression, readmission risks, and potential complications.
Decision Support: ML algorithms assist healthcare professionals in making more informed decisions based on patient history, current symptoms, and relevant medical literature.

Drug Discovery and Development:
Virtual Screening: ML algorithms assist in virtual screening of potential drug candidates, saving time and resources in the drug discovery process.
Biomarker Discovery: Cloud-based ML tools help identify potential biomarkers for diseases and predict responses to specific treatments.

Remote Patient Monitoring:
Wearable Devices: ML algorithms analyze data from wearable devices to monitor and predict health conditions, enabling timely interventions and reducing hospital readmissions.
Continuous Monitoring: Cloud-based solutions facilitate continuous monitoring of patients with chronic conditions, improving the overall management of health.

Natural Language Processing (NLP) in Healthcare:

Electronic Health Record (EHR) Analysis: NLP algorithms on the cloud extract valuable information from unstructured clinical notes, aiding in clinical research and decision-making.
Voice Recognition: Cloud-based solutions enable voice-activated systems that assist healthcare professionals in documenting patient information efficiently.

Case Studies:

1st Study:

In the realm of healthcare, where data is abundant and critical, Google Cloud is dedicated to empowering organizations to harness this wealth of information for transformative breakthroughs in patient care and operational efficiency. Over the past year, our efforts have been marked by significant milestones and partnerships aimed at driving innovation and addressing the industry's evolving needs.
We've welcomed numerous healthcare institutions to the Google Cloud family, witnessing firsthand how they leverage data to enhance both patient outcomes and operational effectiveness. For instance, the National Institutes of Health (NIH) partnered with us under the STRIDES Initiative to facilitate access to vital biomedical datasets, while initiatives like BARDA DRIVe Solving Sepsis utilize our technology to predict and mitigate sepsis, potentially saving countless lives annually.

Collaborating with key partners is integral to our mission. Through partnerships with entities such as Health Level 7 (HL7) and Imprivata, we're advancing data interoperability and bolstering security measures, ensuring seamless integration and secure access to healthcare systems. Additionally, solutions like Flywheel's integration of Google's Healthcare API and Life Image's adoption of our platform for breast cancer screening underscore our commitment to driving innovation in medical imaging and data management.

Security and compliance remain paramount concerns, and Google Cloud is at the forefront of addressing these challenges. With over three dozen HIPAA-compliant products and services, including recent additions like Apigee Edge and AutoML Natural Language, we're ensuring that healthcare providers can securely leverage our technology to meet regulatory standards such as GDPR and HITRUST CSF certification.

In essence, Google Cloud's unwavering dedication to healthcare extends beyond providing cutting-edge technology—it's about fostering a collaborative ecosystem where data-driven insights pave the way for improved patient care and operational excellence.

2nd Study:

Takeda, a leading global R&D pharmaceutical company, was seeking to improve the accuracy of its prediction models for various disease states. They believed AI could be a powerful tool in this effort, but needed to create a model that could prove their hypothesis. To achieve their goals, they enlisted the help of Deloitte to create a cloud solution. Using a small, proven real world data set on Treatment Resistant Depression and NASH, a severe form of hepatitis, Takeda and Deloitte deployed a scalable, AWS cloud-based machine learning solution called Deep Miner to rapidly test predictive models.

Cloud delivered—accelerating the development of the solution and delivering insights faster. Just as Takeda hoped, the solution generated unprecedented insights their teams can now apply across a range of data to refine drug development and planning of clinical trials. The model proved highly accurate in its predictions, outperforming previously tested traditional analyses. Accuracy jumped almost 40%, which will inform drug development, product pipeline planning, and help Takeda to appreciate unmet needs of patients and improve patient outcomes. And, Cloud made it happen.

3rd Study:

Prescribing ML for new use cases

In our AI/ML-powered platform, we integrate human-in-the-loop programs alongside advanced algorithms, fostering personalized patient care. Coaches, therapists, and dieticians engage with each patient, offering tailored advice and maintaining accountability. Digitized patient-provider interactions form a rich training dataset, now utilized with Google tools to enhance operational efficiency.

Employing BigQuery ML, our mobile app features a "next action recommender," guiding patients through their treatment journey based on past data. Recommendations evolve with prolonged usage, adapting to individual needs.

For providers, Vidapedia offers comprehensive treatment protocols. Vidapedia cards, codified clinical protocols, aid decision-making, reducing cognitive load. Using BigQuery ML, we analyze patient data to recommend relevant protocols efficiently, streamlining care delivery.

ML also revolutionizes our customer acquisition. By analyzing diverse data inputs, we predict potential platform users, optimizing marketing efforts and reducing costs traditionally associated with healthcare startups.

Through these innovations, we ensure patient-centric care, empower providers, and enhance cost-effectiveness, driving transformative impact in healthcare delivery