Use of Big Data in Public Health

Real-Life Use of Machine Learning in Healthcare: Chronic Diseases
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Topics for discussion

- Story about IBM's Watson

- Healthcare Market Forces

- Industry Impact

- Path Forward

- Use Case: Diabetes

- Other applications of Artificial Intelligence

- Challenging road ahead

- Wrap up

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Story about IBM's Watson

- "Hello Watson"….probably most of you have seen one or more of the commercials

- The response to that question: a series of critical, computed data points tailored towards the individual featured in the conversation

- Let's talk about a simple use case:

    - At IBM's Watson world, they had a robot playing rock, paper, scissors

    - 1M interactions stored; studies human pattern; finds hidden behaviors

- How do we leverage machine learning to better predict chronic diseases?

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Healthcare Market Forces

- Affordable care act resulted in tighter risk management

- Payers have to shift their focus to their entire population

  - Tighter budgets means more targeted, more accountable investments in foundational infrastructure

- Providers have to contemplate infrastructure investments in core capabilities to take on risk

- The focus shifts to data transparency and promotion of healthy behaviors

- We are at the critical junction that has made machine learning, artificial intelligence, and automation the big buzzwords in the industry

What does this all mean for an industry with legacy infrastructure and primarily paper-based mode of operation

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Industry Impact

- For the industry, it created major areas of focus:

    - Data consolidation and ability to exchange data with all key stakeholders

    - Digital transformation and process automation

    - Empowering the member/patient to take charge of their own health with self-service tools and apps

- For Venture Capital and product companies, it created significant opportunity:

    - Wearable technology

    - Telehealth

    - Medical devices focused on chronic conditions, eg. Bluetooth glucomoters

> The explosion of technology for this industry exacerbated the data management and automation challenges

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Path Forward

- Artificial intelligence, the ability to perform operations analogous to learning and decision making in humans took center stage

- The industry looked at this as an opportunity to reduce administrative overhead, react faster, increase accuracy and ultimately as a market differentiator

- But is the industry ready for it? What will it take to put a Ferrari engine on a 15 year old car?

- Takeaway:

  - Significant data consolidation

  - Analysis for patterns

  - Capability required to determine the next best action

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Use Case: Diabetes

- There is a focus on the diabetic population, empowering them through providing glucometers, and analyzing data in real-time

  - Data gets consolidated, process management platform in real-time will be able to identify next best action and engage with the provider, nurse, or member

- A real-life application of machine learning can lead to earlier intervention in both pre-diabetics and diabetic patients:

  - Aggregating data for diabetic patients over a 2-3 year period

  - Early Identification - machine learning will analyze the data (lab, vital signs, admissions, prior diagnoses, etc) - identify future diabetic population

  - Enhancing care plans based on intervention history

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Other Applications of Artificial Intelligence

- There are other areas of machine learning that are of interest to the industry:

  - Utilization management – Automation of approval rules for inpatient and outpatient based on prior decisions will reduce administrative overhead

  - Remote patient monitoring – virtual nursing assistants to follow up with patients to ensure medication adherence

  - Predictive analytics platforms – data analysis leading to patient risk scoring and readmission reduction

  - Oncology – Pathway Genomics is looking in to blood samples from high-risk individuals who have never been diagnosed with the disease to determine if early detection is possible

- "By 2025, AI systems could be involved in everything from population health management, to digital avatars capable of answering specific patient queries." — Harpreet Singh Buttar, analyst at Frost & Sullivan.

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Challenging road ahead

- The fundamental challenge is data – who owns it, who will aggregate it, who will take action on it?

Payer

Provider Groups & Hospitals

Member

- Member Information
- Claims Data
- Provider Network
- Clinical History
- Clinical Criteria
- Medical Policy

- Patient demographic
- Medical history
- Medication
- Allergies
- Immunization
- Lab results

- Wearable data
- Apple Health kit
- Heart rate
- Exercise patterns

- How do you aggregate and ensure that the right data is tied to the correct person?

- How do you evaluate quality from each data source?

- How do you ensure security of the data?

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Wrap up

- There are significant opportunities for leveraging machine learning to better identify and manage members which chronic conditions

- Adoption and maturity to fully leverage machine learning in healthcare is still a few years away; there are definitely pockets of success stories but mass industry adoption has not occurred yet

- At the heart of machine learning, is data and it is proving to be challenging for the industry to aggregate its data

- Scott Lundstrom discusses "A decade of disruption" – the decade of transformation starts in 3 years

- The focus for the industry today is aggregation, process automation, and digital transformation

- Machine learning is waiting in the wings for those who are first adopters in the market

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