Main Stage: Artificial Intelligence and its Role in Reducing Administrative Burden, and Improving Patient Care

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Lily Peng, MD, PhD

Product Manager, Google AI Healthcare Team, Mountain View, California

Dr. Peng is a physician-scientist and product manager for Google AI Healthcare. She and her team focus on applying deep learning to medical data, especially medical imaging. Some of her team’s recent work includes building models to detect diabetic retinopathy at physician-level accuracy, predicting cardiovascular health factors from retinal images, and detecting breast cancer metastasis from histopathology slides. Before working at Google, Dr. Peng was a product manager at Doximity, the “LinkedIn for physicians.” She is a co-founder of Nano Precision Medical (NPM), a medical device start-up that has developed a small implantable drug delivery device. She earned a Bachelor of Science degree with honors and distinction in chemical engineering from Stanford University, California. She then earned a doctorate in bioengineering and a medical degree from the University of California, San Francisco.
Punit Soni

Co-founder/CEO, Suki, Redwood City, California

Soni is the co-founder and CEO of Suki, a start-up that is using machine learning and voice to build an artificial intelligence (AI)-powered digital assistant. Currently, he is leading a team of practicing surgeons, engineers, and other health care professionals to create innovative solutions to improve health care and eliminate physician burnout. Suki recently gained recognition as the Best New Start-up(www.top50indigitalhealth.com) in Rock Health’s Top 50 in Digital Health for 2019.

Prior to starting Suki, Soni was Chief Product Officer of Flipkart, a $15 billion Indian e-commerce company. He also previously worked at Google in positions including Vice President of Product Management for Motorola Mobility, Lead Product Manager for Google+ Mobile and Google Mobile Apps; and Product Manager for News, News Archive, and Search. His background also includes start-up experience in the enterprise software space. He earned a Master of Business Administration degree from The Wharton School, Philadelphia, Pennsylvania, and a Master of Science degree in electrical engineering from the University of Wyoming, Laramie.

Learning Objectives

1. Recognize how artificial intelligence can improve patient care by optimizing patient engagement and communication at the point of care.

2. Consider how artificial intelligence can be used as a tool to improve patient care by providing enhanced screening and diagnosis, while allowing physicians to optimize their time spent with patients.
Suki™
Bring Joy Back to Medicine
Our vision is to make healthcare tech invisible and assistive, allowing doctors to do what they love:

Take care of patients.
### Artificial Narrow Intelligence

Really good at one thing:
- Beat humans at chess
- Drive a car
- Voice Recognition

### Artificial General Intelligence

Like a human:
- Reasons
- Plan
- Solve Problems

### Artificial Super Intelligence

Better than a human:
- Who knows what this means for us?

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**Our Distorted View of Intelligence**

![Graph showing intelligence over time](waitbutwhy.com)
Many Others
54% of doctors say they are burned out.¹

88% of doctors are moderately to severely stressed.²

59% of doctors wouldn’t recommend a career in medicine to their children.³

¹ Mayo Clinic 2014.
² VITAL WorkLife & Ciejka Search Physician Stress and Burnout Survey 2015.
Suki: The Digital Assistant for Doctors

- 100% accurate
- AI-powered
- No hardware
- Fast on-boarding
- EHR integrated
- 100% accurate
- Voice-enabled

**Syntax Matrix**
- Syntax Analysis

**Tuning**
- Custom Intentions

**Intention Models**
- Intender
- Object of Intention

**Machine Learning**
- Syntax Matrix
- Patterns
- Candidate Intentions
- Machine Learning

**Is it really an intention?**
Bring Joy Back to Medicine

Suki™

Bring Joy Back to Medicine
Using AI for Healthcare

Lily Peng, MD, PhD
Product Manager, Google AI

Artificial Intelligence
Science of making things smart

Machine Learning
machines that learn to be smarter

Deep Learning
particular kind of machine learning
What is Deep Learning?

Modern Reincarnation of Artificial Neural Networks
Collection of simple trainable mathematical units, organized in layers, that work together to solve complicated tasks

Key Benefits
Highly accurate
Learns features from raw data

Why apply machine learning to medicine?

Lots of data to look through
Screening & routine imaging

Expertise is limited
Algorithm can scale and enhance experts

Global shortage of radiologists, but also true for other medical specialities

Silvestrin C, 2016. Europe’s Looming Radiology Capacity Challenge
Application in Cancer Screening

Lung Cancer is the leading cause of cancer death
Compared to 6 radiologists, model had absolute reductions of 11% in false positives and 5% in false negatives.
Applications in Cancer Diagnosis

Detecting Breast Cancer Metastases in Lymph Nodes

Sentinel lymph nodes
Reading sentinel lymph node biopsies is a difficult task

~24% SLN biopsies had a change in nodal status with additional review¹


10 Gigapixels per slide. Needle in a haystack.

Pathologists find 73% of the cancer lesions with 0 false positives per slide

Our trained model found >95% of the cancer lesions with 8 false positives per slide

Combination of pathologist + model more accurate than either alone

Bejnordi BE, et al. JAMA 2017
Diabetic retinopathy: fastest growing cause of blindness

415M people with diabetes

Regular screening is key to preventing blindness
How DR is Diagnosed: Retinal Fundus Images

Healthy

Diseased

Hemorrhages

No DR  Mild DR  Moderate DR  Severe DR  Proliferative DR

India

Shortage of 127,000 eye doctors  45% of patients suffer vision loss before diagnosis
AI’s performance is on par with eye specialists

J. Krause, et al. Ophthalmology, 2018
V. Gulshan, et al. JAMA, 2016

Deploying AI in real world screening programs

Partnerships & Hardware

Clinical Trials & Regulatory
Promising results lead to prospective studies and pilot deployments

- **Thailand.** Pilot study started in December 2018, scaling in 2 regions over the next few months
- **India.** Scaling pilot deployments at partner hospitals

Making AI accessible to tackle more healthcare challenges

- Google AI
- SERI Consortium
  - DR, AMD, Glaucoma Suspect
- Stanford
  - Detecting skin cancer with AI
- High school student Abu
  - Detecting breast cancer with AI
Thank you