



Crisis as Catalyst: The COVID-19 Impact on Innovation

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Sep 28, 2020

X-LXMERT: Paint, Caption and Answer Questions with Multi-Modal Transformers

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Code and Demo: <https://prior.allenai.org/projects/x-lxmert>

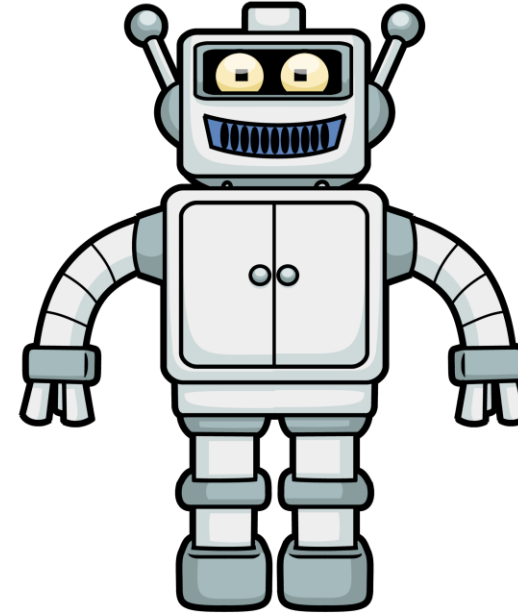
Abstract

Mirroring the success of masked language models, vision-and-language counterparts like ViLBERT, LXMERT and UNITER have achieved state of the art performance on a variety of multimodal discriminative tasks like visual question answering and visual grounding. Recent work has also successfully adapted such models towards the generative task of image captioning. This begs the question: *Can these models go the other way and generate images from pieces of text?* Our analysis of a popular representative from this model family – LXMERT – finds that it is unable to generate rich and semantically meaningful imagery with its current training setup. We introduce X-LXMERT, an extension to LXMERT with training refinements including: discretizing visual representations, using uniform masking with a large range of masking ratios and aligning the right pre-training datasets to the right objectives which enables it to paint. X-LXMERT’s image generation capabilities rival state of the art generative models while its question answering and captioning abilities remains comparable to LXMERT. Finally, we demonstrate the generality of these training refinements by adding image generation capabilities into UNITER to produce X-UNITER.

on a variety of vision and language tasks including visual question answering, visual grounding and image retrieval. These impressive results as well as recent probing mechanisms (Ilharco et al., 2020) suggest that these models are able to capture a variety of semantics in images including objects, attributes and their relationships and ground these in natural language.

While these models have been extensively evaluated over several discriminative tasks, relatively little attention has been paid to their generative capabilities. Bidirectional transformer models like BERT which exploit context preceding and following the current token are not explicitly designed for generation. Recent work for language-only transformers (Wang and Cho, 2019; Dong et al., 2019; Liao et al., 2020) adapt these models towards this capability using sampling procedures. Such techniques have also been adapted successfully for image captioning – inputting an image and sampling the textual side of the model to generate a relevant caption (Zhou et al., 2020). This begs the question: Can we go the other way and sample images from input pieces of text? i.e. *Do vision-and-language BERT models know how to paint?*

In this work, we probe the ability of a powerful and popular representative from this family of models – LXMERT (Tan and Bansal, 2019), to produce



ITXIV:2009.11Z/0V1 [cs.CV] 23 Sep 2020

First: What Does “AI” Really Mean Just Now?

- Cool, cutting-edge technology?
 - “Cool” is certainly cool, but if it has no impact in immediate future it’s of limited utility today
- Must focus on data-driven technology that can have impact (i.e., improve life) over near-term horizons



All Business Has Changed

**Today, two illustrative
examples: healthcare &
financial services**



The Entrepreneur's Perpetual Question



For the COVID-19 world

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Ten threats to global health in 2019

Needs - the present:

- High volume healthcare
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The Answer: The Future is Now

Needs - the future:

- High volume healthcare
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Innovation: Two Basic Guideposts

- Healthcare is a human right
 - But we don't have enough of it anywhere
- Healthcare is a zero-sum game
 - A dollar spent on X is a dollar that cannot be spent on Y
- With the above two in mind, healthcare innovation has to focus on maximizing ***impact***



9 ways coronavirus changed treating patients

Doctors and nurses are learning how to practice medicine differently.

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Ten threats to global health in 2019

Crisis as Catalyst

- Solving the entrepreneur's challenge: COVID-19 has brought the future to us
 - If we solve the **healthcare scalability** equation in the age of COVID-19...
 - ... we may also solve "healthcare as a human right" for our future



Digital Health

- Impact in the human right of healthcare – through diagnosis, prevention, treatment – is most scalably provided by digital solutions
 - Ubiquitous: meet patients where they are
 - Targeted: providing bridges to care
- Both now and in our post-COVID-19 future



Impact-driven Innovation

- If a = impact and b = complexity...
- ... then identify the unsolved a/b innovation equations with the biggest values of a , not b
- Digital healthcare solutions have biggest impact due to ubiquity of mobile devices and our deluge of data



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Novartis CEO Who Wanted To Bring Tech Into Pharma Now Explains Why It's So Hard

David Shaywitz Contributor
Healthcare

$b \rightarrow \infty$

The current challenge for data science and technology (DST) in the “dancing bear” stage, where “the wonder is not how well the dances at all.” It’s time for DST to evolve past the novelty public demonstrate its ability to materially impact health and disease.



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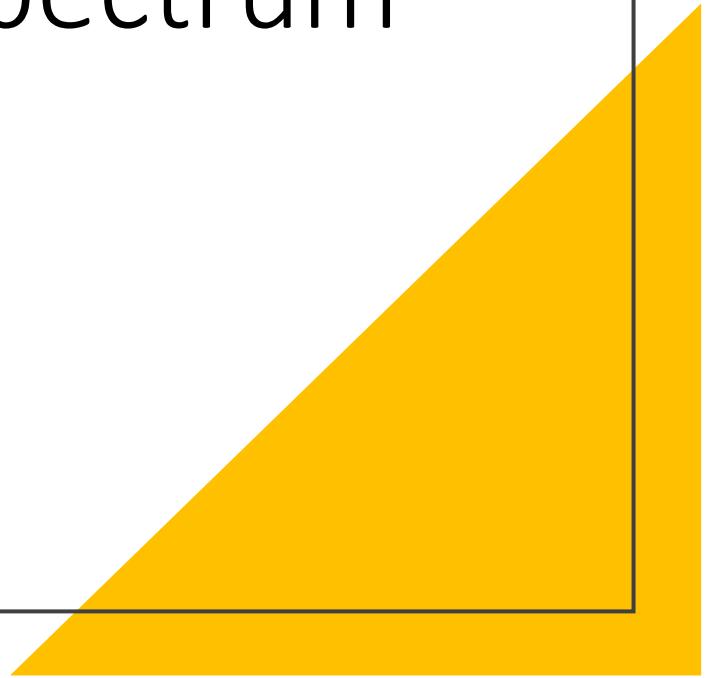
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Daily step tracker, free pedometer & map tracker to count steps and calories.

Health & Fitness

$b \rightarrow 0$

Rating and reviews

Digital Health: A Broad Spectrum



Impact Innovation

- Start-ups will never have enough \$ to innovate on “large b ” problems. Leave that to the giants.
- Innovate on large a , with tractable b

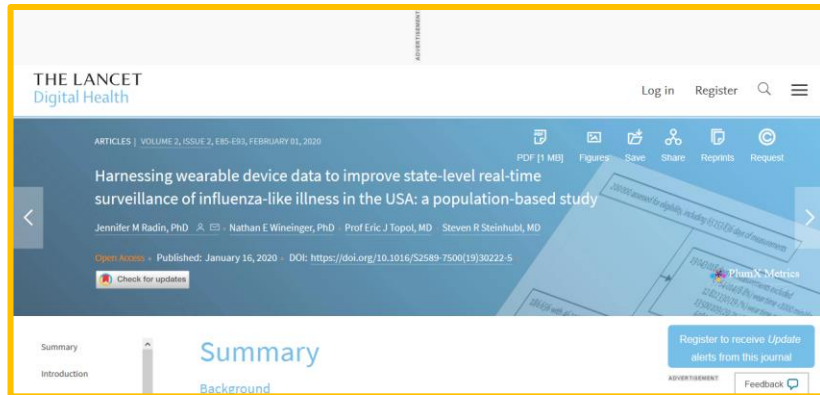


Harnessing wearable device data to improve state-level real-time surveillance of influenza-like illness in the USA: a population-based study

Jennifer M Radin, Nathan E Wineinger, Eric J Topol, Steven R Steinhubl

Summary

Background Acute infections can cause an individual to have an elevated resting heart rate (RHR) and change their routine daily activities due to the physiological response to the inflammatory insult. Consequently, we aimed to evaluate if population trends of seasonal respiratory infections, such as influenza, could be identified through wearable sensors that collect RHR and sleep data.



Large a , Tractable b : An Example

corresponding to an improvement of 6–32.9%. Correlations of the final models with the CDC ILI rates ranged from 0.84 to 0.97. Week-to-week changes in the proportion of Fitbit users with abnormal data were associated with week-to-week changes in ILI rates in most cases.

Interpretation Activity and physiological trackers are increasingly used in the USA and globally to monitor individual health. By accessing these data, it could be possible to improve real-time and geographically refined influenza surveillance. This information could be vital to enact timely outbreak response measures to prevent further transmission of influenza cases during outbreaks.

'Silent hypoxia' may be killing COVID-19 patients. But there's hope.

By Stephanie Pappas - Live Science Contributor 22 days ago

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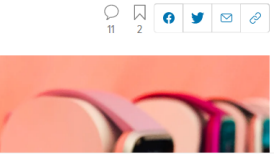
Fitbit is rolling out blood oxygen monitoring to supported Versa, Charge, and Ionic devices

The company's most recent fitness trackers have all had an SpO2 sensor built-in, but its data hasn't been visible until now.

By Jason Cipriani | January 15, 2020 -- 20:44 GMT (12:44 PST) | Topic: Mobility



Fitbit Really Wants to Be Able to Diagnose Your Sleep Apnea



Virtualized Healthcare: Fitbit Again

Large a , Tractable b

The New York Times article: *When Mental Distress Comes Home*. The pandemic has closed many mental-health residential centers, sending... challenge...

JAMA Network article: **The Mental Health Consequences of COVID-19 and Physical Distancing**. The Need for Prevention and Early Intervention. Sandro Galea, MD¹; Raina M. Merchant, MD²; Nicole Lurie, MD³. JAMA Intern Med. Published online April 10, 2020. doi:10.1001/jamainternmed.2020.1562

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UN health agency reports depression now 'leading cause of disability worldwide'

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The number of people with depression and anxiety is increasing

416 million in 1990

615 million in 2013

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Full - Published Online: 21 April 2016

Speaking one's mind: Vocal biomarkers of depression and Parkinson disease

The Journal of the Acoustical Society of America 139, 2193 (2016), <https://doi.org/10.1002/14950530>

Satiraj S. Ghosh
 * McGovern Inst. for Brain Res., MIT, 43 Vassar St., 46-4035F, Cambridge, MA 02139, satraj@mit.edu
 Gregory Ciccarelli
 more...

TOPICS

- Diseases and conditions
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- Speech production
- Machine learning
- Speech communication

ABSTRACT

Mental health disorders affect one in four adult Americans and have a staggering impact on the economy. Improved assessment and early detection of mental health state can reduce this impact. Voice analysis has been linked to depression and other mental health disorders. However, difficulties in data collection, variation in collection methods, and computational demands of analysis methods have limited the use of voice in mental health assessment. The pervasive use of smartphones offers a unique opportunity to understand mental health symptoms and speech variation in large groups. We have developed open source mobile applications to collect data and developed voice-based algorithms for predicting mental health state in major depressive disorder and Parkinson disease. We demonstrate the use of biophysical

Suicidal Ideation Detection: A Review of Machine Learning Methods and Applications

Shaoyong Ji, Shirui Pan, Member, IEEE, Xue Li, Erik Cambria, Senior Member, IEEE, Guodong Long, and Zi Huang

Abstract—Suicide is a critical issue in modern society. Early detection and prevention of suicide attempts should be addressed to save people's life. Current suicidal ideation detection methods include clinical methods based on the interaction between social workers or experts and the targeted individuals and machine learning techniques with feature engineering or deep learning for automatic detection based on online social contents. This is the first survey that comprehensively introduces and discusses the methods from these categories. Domain-specific applications of suicidal ideation detection are also reviewed according to their data sources, i.e., questionnaires, electronic health records, suicide notes, and online user content. To facilitate further research, several specific tasks and datasets are introduced and summarized. Finally, we summarize the limitations of current work and provide an outlook of further research directions.

suicidal thoughts [2]. According to the American Foundation for Suicide Prevention (AFSP), suicide factors fall under three categories: health factors, environment factors, and historical factors [3]. Ferrari et al. [4] found that mental health issues and substance use disorders are attributed to the factors of suicide. O'Connor and Nock [5] conducted a thorough review of the psychology of suicide and summarized psychological risks as personality and individual differences, cognitive factors, social factors, and negative life events.

Suicidal ideation detection is to determine whether the person has suicidal ideation or thoughts by given tabular data of a person or textual content written by a person. Due to the advances in social media and

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Speech-based markers for posttraumatic stress disorder in US veterans

Charles R. Marmar, Adam D. Brown, Meng Qian, Eugene Laska, Carole Siegel, Meng Li, Duna Abu-Amara, Andreas Tsiartas, Colleen Richey, Jennifer Smith, Bruce Knuth, Dimitra Vergyri

First published: 22 April 2019 | <https://doi.org/10.1002/da.22890>

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Journal of Medical Internet Research

Behavioral Indicators on a Mobile Sensing Platform Predict Clinically Validated Psychiatric Symptoms of Mood and Anxiety Disorders

Skyler Place¹, PhD  ; Danielle Blanch-Hartigan², PhD, MPH  ; Channah Rubin¹, BA  ; Cristina Gorrostieta¹, PhD  ; Caroline Mead¹, BA  ; John Kane¹, PhD  ; Brian P Marx^{3,4}, PhD  ; Joshua Feast¹, MBA  ; Thilo Deckersbach⁵, PhD  ; Alex "Sandy" Pentland⁶, PhD  ; Andrew Nierenberg⁵, MD  ; Ali Azarbayejani¹, PhD 

Digital Mental Health: Diagnosis at Scale

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The effectiveness of email-based exercises in promoting psychological wellbeing and healthy lifestyle: a two-year follow-up study

Minna Tornainen-Holm Maju Pankakoski Tuomas Lehto, Osmo Saarela, Pekka Mustonen, Kaisa Joutsenniemi & Jaana Suvisaari

BMC Psychology 4, Article number: 21 (2016) | Cite this article

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J. Telemed. Telecare. 2018 Oct 24(8):575-585. doi: 10.1177/1083313117738443. Epub 2017 Sep 20.

Systematic review of lessons learned from delivering tele-therapy to veterans with post-traumatic stress disorder.

Tarassova D¹, Atchuck B¹, Marzly D¹.

Author information

Abstract
Introduction Despite increases in the number of ex-service personnel seeking treatment for post-traumatic stress disorder (PTSD), there remain a number of barriers to help-seeking which prevents many veterans from accessing psychological therapies. Tele-therapy provides one potential method of increasing the number of veterans accessing support. This review aimed to systematically review the literature in order to summarise what lessons have been learned so far from providing trauma-focused tele-therapies to veterans with PTSD. Methods A systematic literature review was conducted from which 41 papers were reviewed. Studies were included if they involved the use of trauma

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Treatment satisfaction of home-based telehealth versus in-person daily [J Telemed Telecare. 2018].

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Eur Arch Psychiatry Clin Neurosci. 2020 Mar 27(2):139-152. doi: 10.1007/s00408-019-0074-3. Epub 2019 Jan 3.

Smartphone applications for depression: a systematic literature review and a survey of health care professionals' attitudes towards their use in clinical practice.

Kent A^{1,2}, Zaleski J³, Gaudet W^{4,5}.

Author information

Abstract
Smartphone applications ("apps") may contribute to closing the treatment gap for depression by reaching large populations at relatively low costs. The general public seems open towards the use of apps for mental disorders but little is known about the attitudes of health care professionals. Therefore, the aim of this study was to examine the available evidence on the effectiveness of apps for depression and to explore the attitudes of health care professionals towards their use in practice. A systematic literature search was performed aimed at studies utilizing smartphone applications for depression. In addition, a survey was conducted to explore health care professionals' attitudes towards

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Smartphone and tablet self-management [Cochrane Database Syst Rev. 2013].

Digital Mental Health: Impact at Scale, Equity

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Report 9: Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand

Neil M Ferguson, Daniel Laydon, Gemma Nedjati-Gilani, Natsuko Imai, Kylie Ainslie, Marc Baguelin, Sangeeta Bhatia, Adhiratha Boonyasiri, Zulma Cucunubá, Gina Cuomo-Dannenburg, Amy Dighe, Ilaria Dorigatti, Han Fu, Katy Gaythorpe, Will Green, Arran Hamlet, Wes Hinsley, Lucy C Okell, Sabine van Elsland, Hayley Thompson, Robert Verity, Erik Volz, Haowei Wang, Yuanrong Wang, Patrick GT Walker, Caroline Walters, Peter Winskill, Charles Whittaker, Christl A Donnelly, Steven Riley, Azra C Ghani.

For the COVID-19 world

Imperial College London

Correspondence: neil.ferguson@imperial.ac.uk

Summary

The global impact of COVID-19 has been profound, and the public health threat it represents is the most serious seen in a respiratory virus since the 1918 H1N1 influenza pandemic. Here we present the results of epidemiological modelling which has informed policymaking in the UK and other countries in recent weeks. In the absence of a COVID-19 vaccine, we assess the potential role of a number of public health measures – so-called non-pharmaceutical interventions (NPIs) – aimed at reducing contact rates in the population and thereby reducing transmission of the virus. In the results presented

For the post-COVID-19 world

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Home / News / Cardiovascular diseases affect nearly half of American adults, statistics show

Published: January 31, 2019

Cardiovascular diseases affect nearly half of American adults, statistics show

By American Heart Association News

Cardiovascular Disease: Curve-flattening

- What if you could (USA):
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Home > Circulation > Vol. 136, No. 8 > Leveraging Behavioral Economics to Improve Heart Failure ...

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Leveraging Behavioral Economics to Improve Heart Failure Care and Outcomes

Leslie L. Chang, Adam D. DeVore, Brad B. Granger, Zubin J. Eapen, Dan Ariely, and Adrian F. Hernandez

Originally published 22 Aug 2017 | <https://doi.org/10.1161/CIRCULATIONAHA.117.028380> | Circulation. 2017;136:765–772

Abstract

Behavioral challenges are often present in human illness, so behavioral economics is increasingly being applied in healthcare settings to better understand why patients choose healthy or unhealthy behaviors. The application of behavioral economics to healthcare settings parallels recent shifts in policy and reimbursement structures that hold providers accountable for outcomes that are dependent on patient behaviors. Numerous

Behavioral economics: the same technique Amazon uses to get you to push the “Buy” button

AMERICAN JOURNAL OF Preventive Medicine

SPECIAL ARTICLE

Behavioral Economics and the Supplemental Nutrition Assistance Program: Making the Healthy Choice the Easy Choice

Alice S. Ammerman, DrPH,^{1,2} Terry Hartman, MPH, MS, CCRC,³ Molly M. DeMarco, PhD^{1,2}

The Supplemental Nutrition Assistance Program (SNAP) serves as an important nutritional safety net program for many Americans. Given its aim to use traditional economic levers to provide access to food, the SNAP program includes minimal nutritional requirements and restrictions. As food choices are influenced by more than just economic constraints, behavioral economics may offer insights and tools for altering food purchases for SNAP users. This manuscript outlines behavioral economics strategies that have potential to encourage healthier food choices within the SNAP program.

Am J Prev Med 2017;52(S2):S145–S150. © 2016 American Journal of Preventive Medicine. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

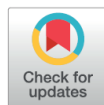


RESEARCH ARTICLE

Cost-effectiveness of financial incentives and disincentives for improving food purchases and health through the US Supplemental Nutrition Assistance Program (SNAP): A microsimulation study

Dariush Mozaffarian¹, Junxiu Liu¹, Stephen Sy², Yue Huang¹, Colin Rehm³, Yujin Lee¹, Parke Wilde¹, Shafika Abrahams-Gessel², Thiago de Souza Veiga Jardim², Tom Gaziano², Renata Micha¹

¹ Friedman School of Nutrition Science and Policy, Tufts University, Boston, Massachusetts, United States of America, ² Harvard T.H. Chan School of Public Health, Boston, Massachusetts, United States of America, ³ Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx, New York, United States of America



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A plea from doctors in Italy: To avoid Covid-19 disaster, treat more patients at home

By SHARON BEGLEY @sxbegle / MARCH 21, 2020

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US population aging and demand for inpatient services

J. Hosp. Med. 2014 March;9(3):193-196

By: Daniel J. Pallin, MD, MPH Janice A. Espinola, MPH, Carlos A. Camargo, MD, DrPH

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The American Journal of Managed Care > October 2015 – Published on: October 09, 2015

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Health Aff (Millwood). 2012 Jun;31(6):1237-43. doi: 10.1377/hlthaff.2011.1132

Costs for 'hospital at home' patients were 19 percent lower, with equal or better outcomes compared to similar inpatients.

Cryer L, Shannon SB, Van Amsterdam M, Laff B.

Author information

Abstract

Hospitals are the standard acute care venues in the United States, but hospital care is expensive and can pose health threats for older people. A 6-month, New Mexico-based Prescription Healthcare Services initiated the Hospital at Home® (Hahome) for the first time.

Public Health & Policy - Medicare

'Hospital-at-Home' Cuts Utilization in Pilot Trial

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By Nicole Liu, Staff Writer, MedPage Today June 25, 2018

Hospital-at-home (Hah) care may be a good replacement for traditional inpatient services among some patients who arrive at the emergency department (ED) with an acute condition, a health system reported.

In 2014, the Icahn School of Medicine at Mount Sinai in New York City was given a Health Care Innovation Award by the Centers for Medicare & Medicaid Services

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COVID-19 as Catalyst for Innovation

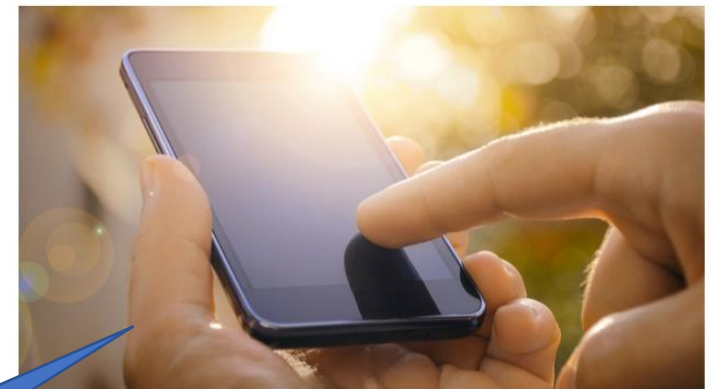
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NSF-funded Smartphone COVID-19 Diagnostic Test Could Put Testing in the Hands of the Public

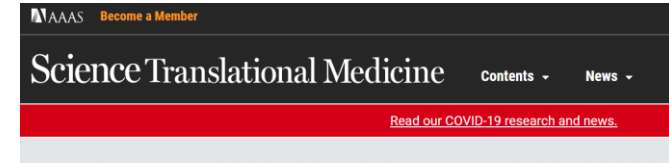
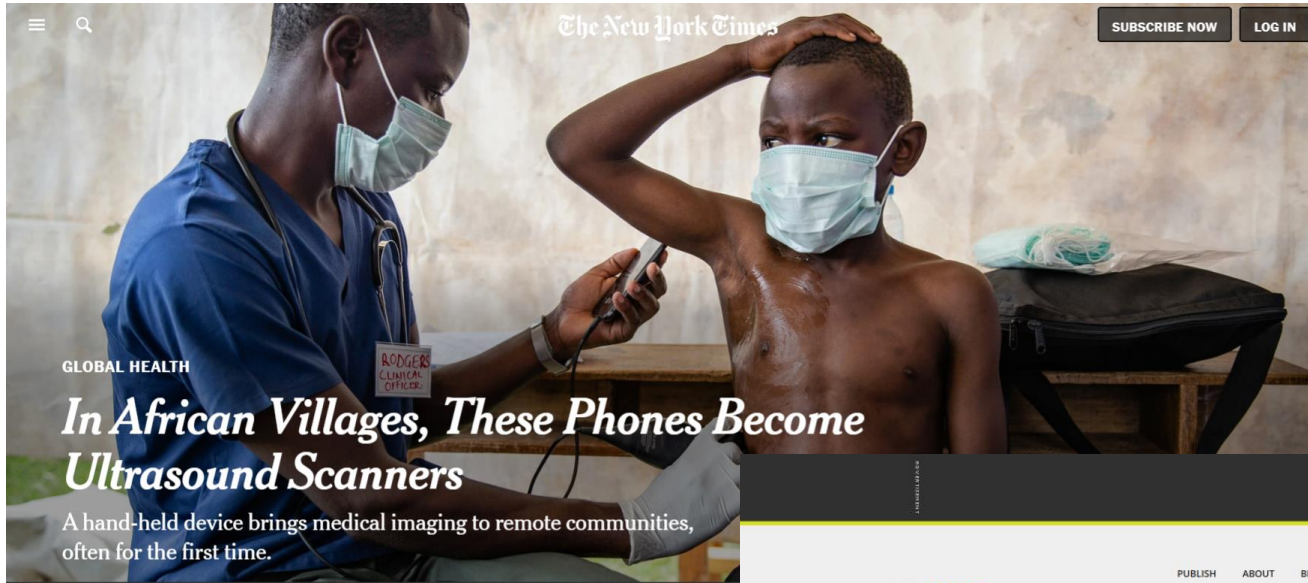
Published: May 11, 2020 | By Gail Dutton



A smartphone diagnostic test for COVID-19 being developed by a University of Utah researcher holds the potential for quick, accurate testing without the need for individual lab visits. The test could be used within two to three minutes.

The personal use of a smartphone diagnostic test for COVID-19 is the best way to contain its spread, and that gold-standard clinical tests are in short supply.

Potentially can also work for Zika, Lassa fever, ...



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Detecting middle ear fluid using smartphones

Justin Chan^{1,2*}, Sharat Raju^{2,3,4,†}, Rajalakshmi Nandakumar¹, Randall Bly^{2,3} and Shyamath Gollakota^{1,†}
* See all authors and affiliations

Science Translational Medicine 15 May 2019;
Vol. 11, Issue 492, eaav1102.
DOI: 10.1126/scitranslmed.aav1102

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Up-to-date information on coronavirus i

PLOS ONE

OPEN ACCESS PEER-REVIEWED RESEARCH ARTICLE

Point-of-care, smartphone-based, dual-modality, dual-view, oral cancer screening device with neural network classification for low-resource communities

Ross D. Ulrich¹, Befan Song², Sunsum Sunny³, Sanjana Patrick, Amritha Suresh, Trupti Kolar, G. Keerthi, Oliver Spires, Afarin Anbarani, Petra Wilder-Smith, Moni Abraham Kurialakose, Praveen Eluru, Rongguang Liang

Published: December 5, 2018 • <https://doi.org/10.1371/journal.pone.0207493>

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Ear infection?

typically diagnosed using specialized equipment to assess eardrum...
ence of fluid in the middle ear, indicative of likely ear infection, limits
Chan *et al.* developed a smartphone system to detect middle ear fluid
rophone and speaker of a phone to emit sound and analyze its reflection
ardrum. The smartphone system outperformed a commercial acoustic
tem in detecting middle ear fluid in 98 pediatric patient ears, and the
asily operated by patient parents without formal medical training. This
screening tool could help aid in the diagnosis of ear infections.

Large *a*, Tractable *b*



Mobile Phone Urine Testing Kit Receives FDA Approval

Developed by Tel Aviv-based Healthy.io, the technology uses computer vision algorithms, artificial intelligence, and a smartphone's built-in camera to run lab-standard urine tests

Tofi Stoler 13:12 26.07.18

Large a , Tractable b

Cardiogram says it can use current wearables to detect signs of diabetes

Don't throw away that original Apple Watch just yet..



Wednesday
February 7, 2018

By Husain Sumra
@hsumra



Non-invasive glucose tracking is the holy grail for diabetics. Everyone who is anyone in the world of wearables is working on ways to crack it, but it's incredibly difficult to do.

Cardiogram, a heart rate tech company, believes it may have found the answer in the heart rate sensor that you're possibly wearing right now. As part of a new study with researchers at UC San Francisco, Cardiogram found that its

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Google to launch bank accounts in 2020

Google is launching bank accounts in the US in 2020 as tech giants continue to deepen their activities in the financial services sector

By Karl Flinders, Essex Content Editor, Computer Weekly | Published: 13 Nov 2019 09:30

Google will offer US consumers bank accounts next year, as the tech industry continues to broaden into the financial services sector.

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MARKETS

Next Up for Amazon: Checking Accounts

Online giant wants to develop product that would appeal to younger customers and those without bank accounts

By Emily Glazer, Liz Hoffman and Laura Stevens
Updated March 5, 2018 2:32 pm ET

Amazon.com Inc. is in talks with big banks including JPMorgan Chase & Co. about building a checking-account-like product the online retailer could offer its customers, according to people familiar with the matter.

The effort is still in its early stages and may not come to fruition, the people said. The talks with financial firms are focused on creating a product that would appeal to younger customers and those without

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As Google, Apple and others get into the banking business, here's what you need to know

PUBLISHED SAT, DEC 19 2015 5:56 AM EST

Stacy Epperson
Jessica Dickler

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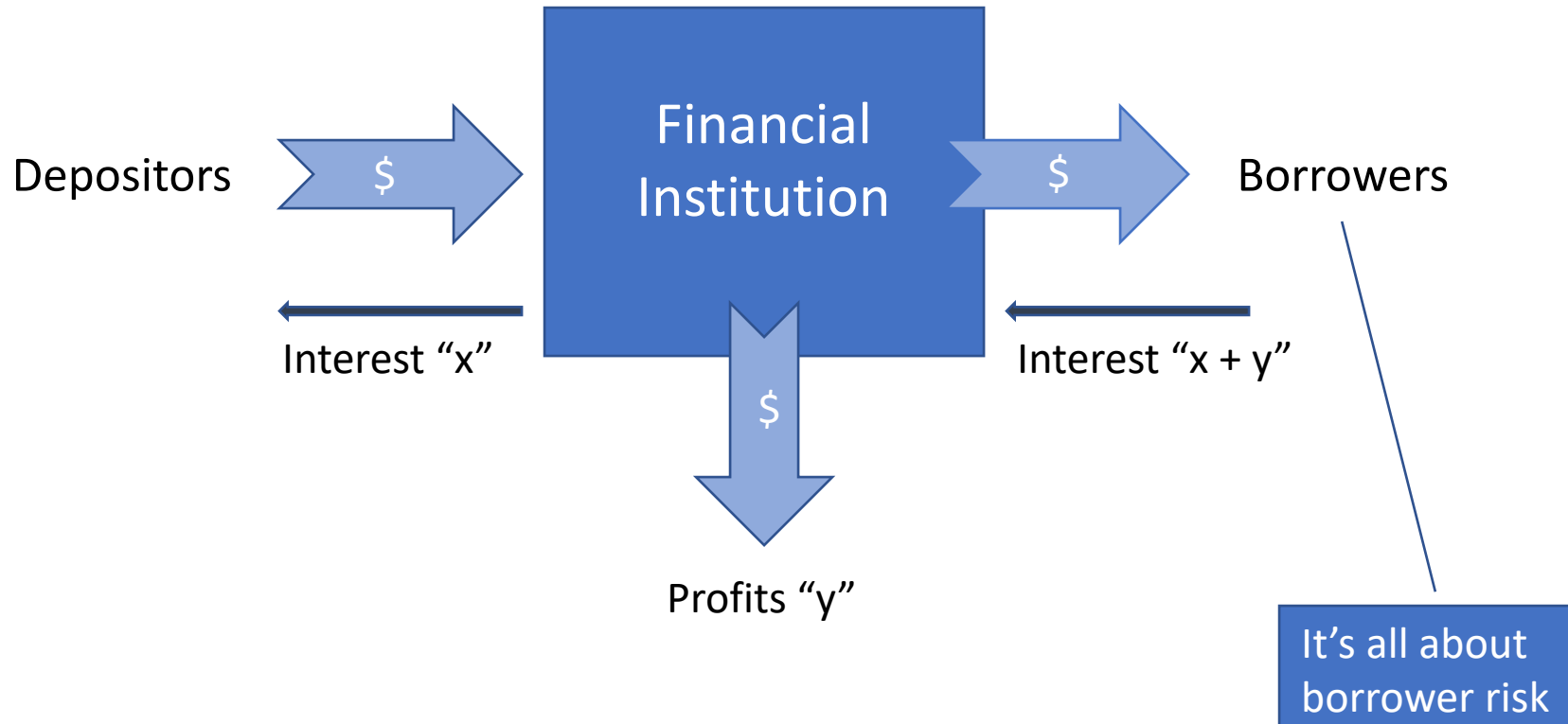
Amazon's Impending Invasion Of Banking

Alan Shulman
Senior Contributor to Forbes



Bank CEO

The Financial Services Business Simplified



Determining Borrower Risk: How to Gauge Integrity?

- Yesterday: low-dimensionality data
 - Credit score
 - Assets
 - Income
- The data may be “big” in that it goes back 100+ years, but it’s still low-dimensionality
- Limited scalability
 - Only people with the defined dimensions get the loans
 - (Social implications?)

- Tomorrow:
 - Highly-dimensional data
 - “All data is credit data”
- Real-time
- Highly scalable
 - Dimensions that “all” of us possess
 - Non-contact

Eponymous Entrepreneurs[†]

By SHARON BELENZON, AARON K. CHATTERJI, AND BRENDAN DALEY*

We demonstrate that eponymy—firms being named after their owners—is linked to superior firm performance, but is relatively uncommon (about 19 percent of firms in our data). We propose an explanation based on eponymy creating an association between the entrepreneur and her firm that increases the reputational benefits/costs of successful/unsuccessful outcomes. We develop a corresponding signaling model, which further predicts that these effects will be stronger for entrepreneurs with rarer names. We find support for the model's predictions using a unique panel dataset consisting of over 1.8 million firms. (JEL D82, L25, L26, M13)

IT'S ALL IN THE NAME: EVIDENCE OF FOUNDER-FIRM ENDOWMENT EFFECTS

Paul Brockman
Perella Department of Finance, Lehigh University

Hye Seung (Grace) Lee
Department of Accounting & Taxation
Gabelli School of Business, Fordham University

Jesus M. Salas
Perella Department of Finance, Lehigh University

Abstract

We use a subset of family firms (i.e., founder-named firms) to test for large-scale endowment effects in US capital markets. In contrast to previous studies that focus on laboratory experiments and surveys, we employ investor-based market valuations to examine the extent to which endowment effects influence real-world decision making. We find that founder-named firms are 7-8% less valuable than non-founder-named firms, and that founder-named-and-managed firms are 17-21% less valuable than their non-endowment susceptible counterparts. We posit that these valuation discounts are the result of founders operating their eponymous firms more from a "current personal use" perspective than from a "potential market exchange" perspective (Kahneman, 2011). Consistent with the presence of endowment effects, we find that founder-named-and-managed firms are less likely to engage in significant corporate restructuring, mergers and acquisitions, strategic asset sales, spinoffs, and major reorganizations. We examine alternative explanations for our findings (e.g., the presence of dual class structures, differential voting/cash flow rights, corporate opacity, CEO overconfidence, weak governance, compensation incentives) and show that none of these alternatives can account for our empirical findings.

The “Eponymity” Effect

Some Multi-dimensional Loan-worthiness Signals

- Email address (eponymous?)
- Cell battery: strength, charging patterns
- Loan time-stamp
- Phone: contacts' responsiveness
- Errors in filling Web forms: spelling, (letter) case
- Typing speed
- (All are scalable across population)



Just How Many Dimensions Are We Talking About?

- LOTS!
 - Prosper (US): 500 dimensions
 - Yongqianbao (China): 1200
 - Jumo Data (South Africa): 10k(!)
- Note: the only dimensions these companies will reveal are the ones that are already well-known (eponymity, cell battery charge, etc.). Everything else a trade secret.



How Might Legacy Banks Evaluate a Small Business Loan for a Coffee Shop?

- Audited financials for each of past 3 years
- Sales projections for next year
- Credit rating
- Multi-dimensional, but a very low value of $n!$



How Might a Next-gen Financial Institution Evaluate a Coffee Shop's Loan?

- Do customers become repeat customers?
- How frequently do they come back?
- How big is an average transaction? Does that grow for repeat customers?
- How much do customers tip?
- Is business volume steady over the day and over the year? Time stamps??
- Granular multi-dimensionality that allows the data owner to understand the quality of the business!



A \$150,000 Small Business Loan—From an App

Square and other tech firms are jumping into banking, using their vast troves of data to determine creditworthiness.

By *Peter Rudegeair*
Dec. 28, 2018 8:00 a.m. ET



Billy Joe Wilson was cooking up tater tots and chicken-fried-steak sandwiches in a



Who Does That Kind of “Multi-dimensional Data” Thing?



Another Example: Data-driven Auto Insurance

You park somewhere and someone breaks into your car

- Traditional low-dimensionality insurance data:
 - Car make & model
 - Owner's driving record
- "One-size-fits-all" price



Harnessing the multi-dimensional data that is so ubiquitous today!

Data-driven Auto Insurance

- Multi-dimensional insurance data:
 - Car make & model
 - Owner's driving record
 - Where you parked
 - Day or night
 - Weekend or weekday
 - For how long
 - Hatchback, and had just come from grocery store (shopping bag...)
 - Etc.
- "On-the-fly" real-time price

Data-driven Auto Insurance

- Hyper-dimensional insurance data
- **“I want ‘parameterized’ insurance against car damage when...”**
 - “An elephant stands on the car...”
 - During a rainstorm...
 - 23 hours after a 5.1 magnitude earthquake...
 - On a weekday...
 - But only if I’m not near public transportation that can take me home.”
- “On-the-fly” customized product



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As Square stock soars, market cap nears Goldman Sachs territory

And the company's valuation is in league with the big banks.



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APPLE GAMING SCIENCE

The FDA just approved the first prescription video game — it's for kids with ADHD


Games just became medicine

By Sean Hollister | @StarFire2258 | Jun 15, 2020, 8:22pm EDT

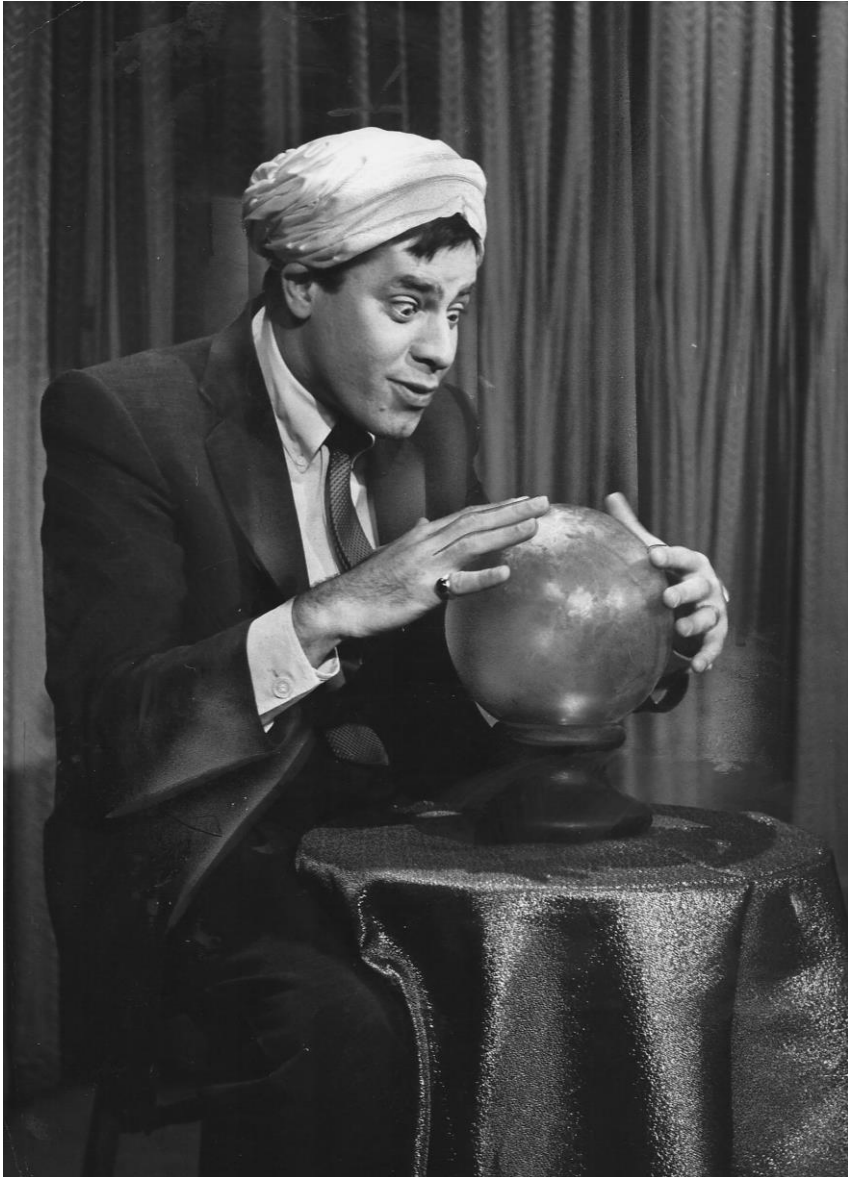
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COVID-19 Crisis Reminds Us: All Businesses Are Now Data Businesses



Some Technology Disruptors

- Increased virtualization (see COVID-19 effects)
- Impact of 5G: multiplayer gaming or telehealth??
- Data becomes even more hyper-dimensional
- Importance of behavioral economics
- Importance of data ethics

Is This a Good Time
to Be an
Entrepreneur? Yes!



The screenshot shows the ScienceDirect website interface. At the top, there is a navigation bar with the ScienceDirect logo, 'Journals & Books' text, a search icon, and buttons for 'Register' and 'Sign in'. A dark banner below the navigation bar contains a message: 'COVID-19 campus closures: see options for getting or retaining Remote Access to subscribed content'. Below this, there are links for 'Get Access', 'Share', and 'Export', along with a search bar and an 'Advanced' search option. The main content area is divided into three columns. The left column contains an 'Outline' section with links to 'Abstract', 'Keywords', and numbered sections: '1. Introduction', '2. Theoretical framework', '3. Method and results', '4. Analysis and results', and '5. Conclusions'. Below the outline are links for 'Appendix 1. Raw data for fsQCA', 'References', and 'Show full outline'. The middle column features the journal logo 'ELSEVIER', the journal title 'Journal of Business Research', and the issue information 'Volume 69, Issue 11, November 2016, Pages 5366-5370'. The article title is 'Entrepreneurship during economic crisis: Success factors and paths to failure' with a star icon. Below the title are the authors 'Carlos Devece', 'Marta Peris-Ortiz', and 'Carlos Rueda-Armengot', a 'Show more' button, and the DOI link 'https://doi.org/10.1016/j.jbusres.2016.04.139'. The right column is titled 'Recommended articles' and lists three articles with 'Purchase PDF' and 'View details' links. At the bottom of the article page, there is an 'Abstract' section, a 'Citing articles (35)' link, and a 'Feedback' button.

Innovation in Times of Crisis

- “innovation and opportunity recognition are more relevant as success factors during periods of recession than during periods of prosperity”
- “entrepreneur’s perception of opportunities may be misleading in strong economies”
- Multi-disciplinarity is key
- In times of crisis, good teams survive and win

Mange tak!

ATV

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