中華民國
無店面零售商業同業公會

2018 年

無店面產業論壇

	時間	分鐘	內容	講者
1	13:30~14:00	30	來賓報到	
2	14:00~14:05	5	主辦單位致詞	無店面公會 王孝慈常務理事
3	14:05~14:10	5	頒發顧問聘書及大合照	王孝慈常務理事 張善政榮譽院長、陳昇瑋執行長
4	14:10~15:00	50	大數據與新零售	東吳大學巨量資料管理學院 張善政榮譽院長
5	15:00~15:50	50	數位經濟與行動支付	金融監督管理委員會 鄭貞茂副主委
6	15:50~16:05	15	中場休息	
7	16:05~16:55	50	人工智慧民主化在台灣	台灣人工智慧學校 陳昇瑋執行長

人工智慧民主化在台灣

讓機器學習及人工智慧在台灣深化，帶動產業發展

陳昇瑋
台灣人工智慧學校執行長
中央研究院資訊科學研究所研究員

WGAN – Poem Generation

由 李仲翊 同學提供實驗結果

Randomly generated

- 升雲白遲丹齋取，此酒新巷市入頭。黃道故海歸中後，不驚入得韻子門。
- 據口容章蕃翎翎，邦貸無遊隔將毬。外蕭曾臺遶出畧，此計推上呂天夢。
- 新來寶伎泉，手雪泓臺蓑。曾子花路魏，不謀散薦船。
- 功持牧度機邈爭，不躚官嬉牧涼散。不迎白旅今掩冬，盡蘸金祇可停。
- 玉十洪沄爭春風，溪子風佛挺橫鞋。盤盤稅焰先花齋，誰過飄鶴一丞幢。
- 海人依野庇，為阻例沉迴。座花不佐樹，弟闌十名儂。
- 入維當興日世瀕，不評皺。頭醉空其杯，駸園凋送頭。
- 鉢笙動春枝，寶粂潔長知。官爲密爛去，絆粒薛一靜。
- 吾涼腕不楚，縱先待旅知。楚人縱酒待，一蔓飄聖猜。
- 折幕故癘應韻子，徑頭霜瓊老徑徑。尚錯春鏘熊悽梅，去吹依能九將香。
- 通可矯目鷃須浄，丹迤挈花一抵嫖。外子當目中前醒，迎日幽筆鈞弧前。
- 庭愛四樹人庭好，無衣服仍繡秋州。更怯風流欲鳩雲，帛陽舊據畝婷儻。

(Slide Credit: Hung-Yi Lee)

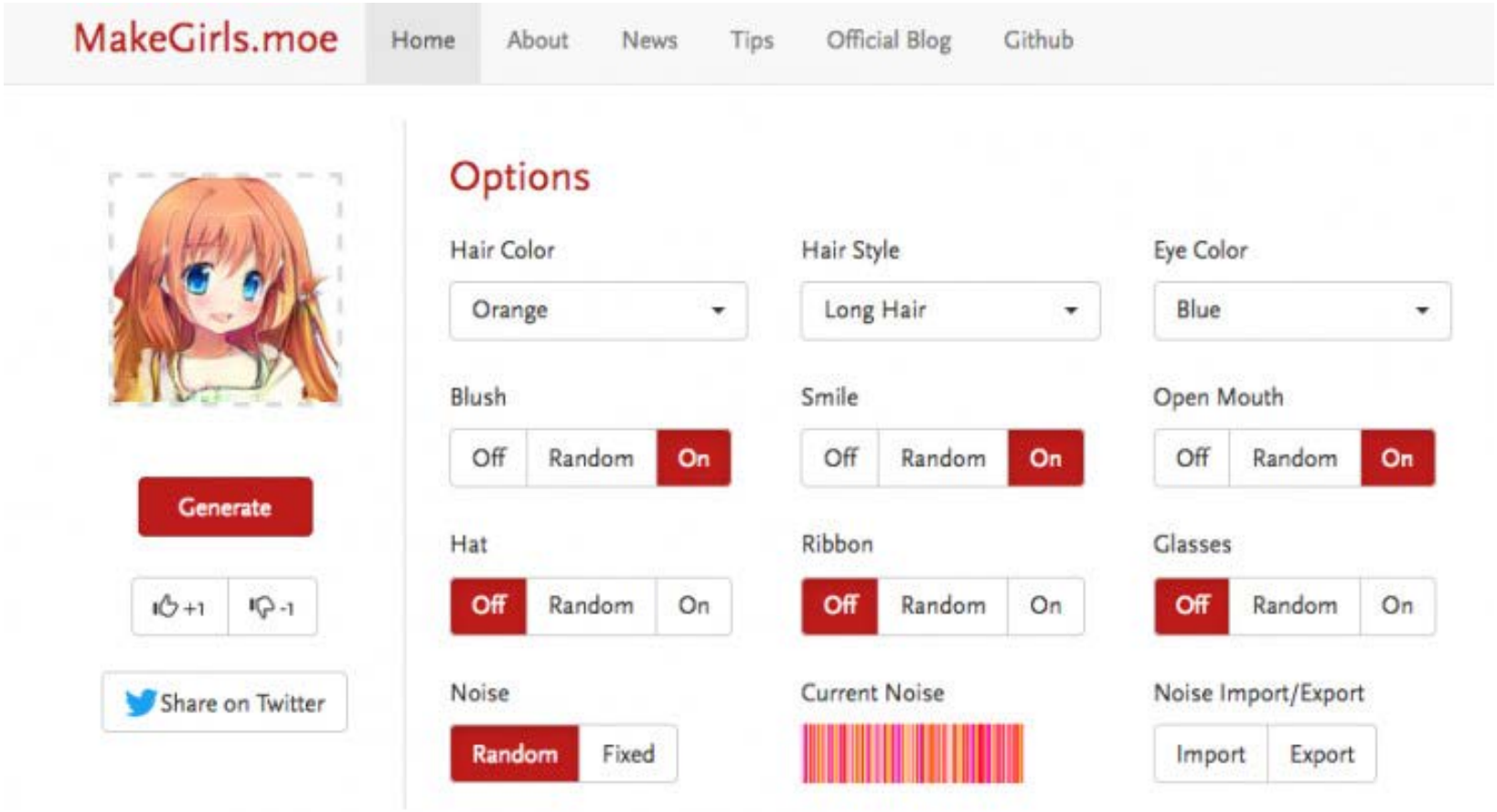
Conditional GAN – Text to Image

"red flower with black center"

Caption	Image
this flower has white petals and a yellow stamen	
the center is yellow surrounded by wavy dark purple petals	
this flower has lots of small round pink petals	

(Slide Credit: Hung-Yi Lee)

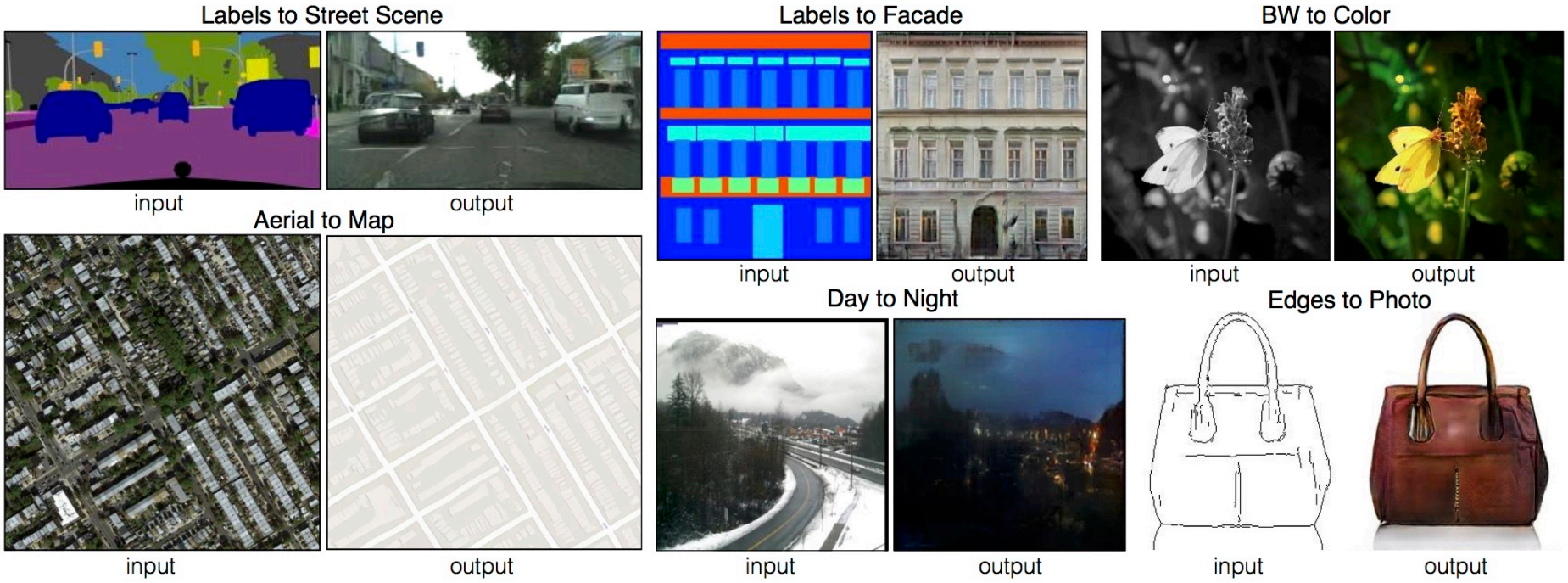
AI 自動生成二次元妹子？
或將替代插畫師部分工作



http://make.girls.moe/#/

http://bangqu.com/b4U76M.html

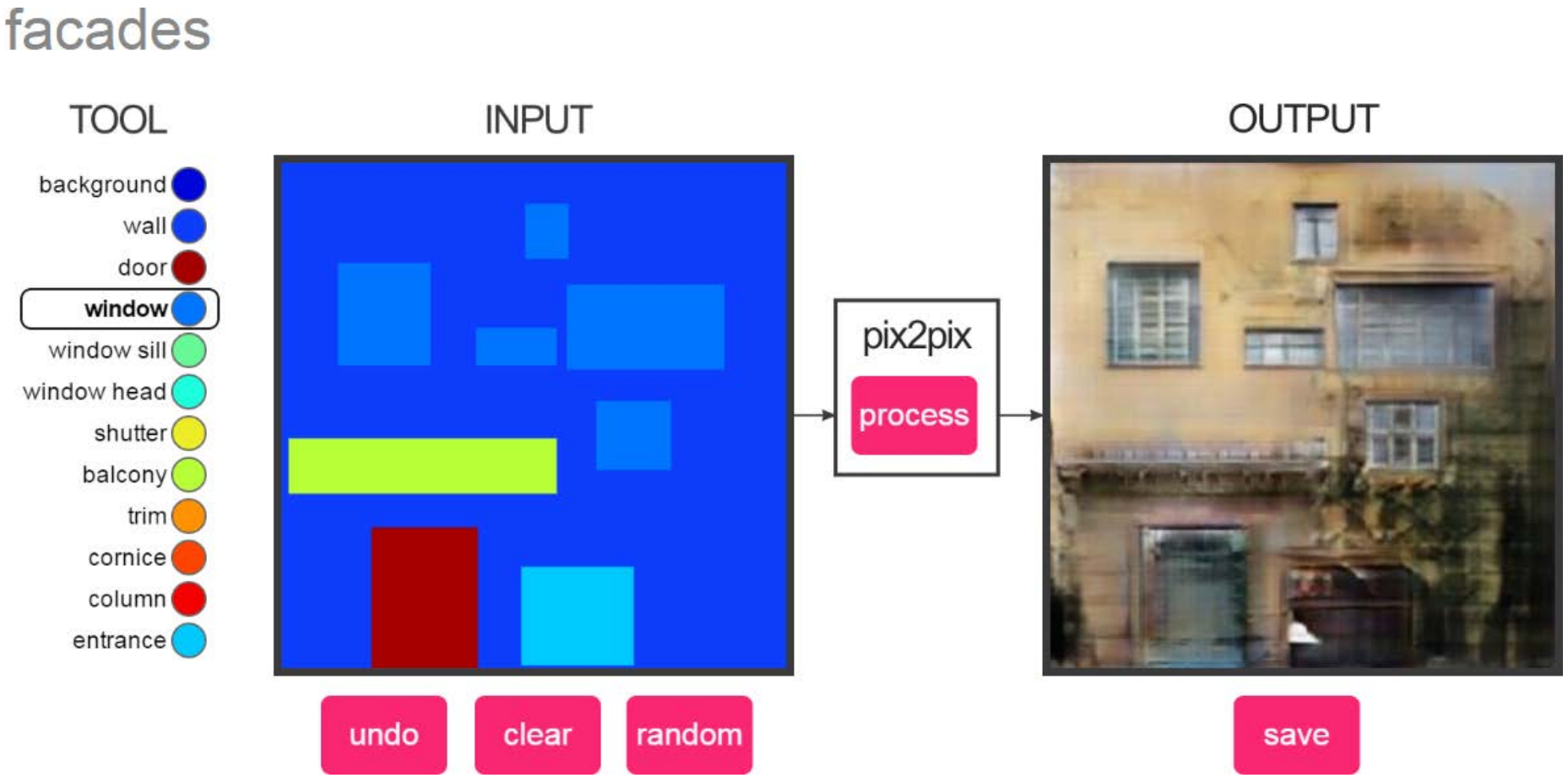
Image-to-image Translation



Phillip Isola, Jun-Yan Zhu, Tinghui Zhou, Alexei A. Efros, "Image-to-Image Translation with Conditional Adversarial Networks", arXiv preprint, 2016

(Slide Credit: Hung-Yi Lee)

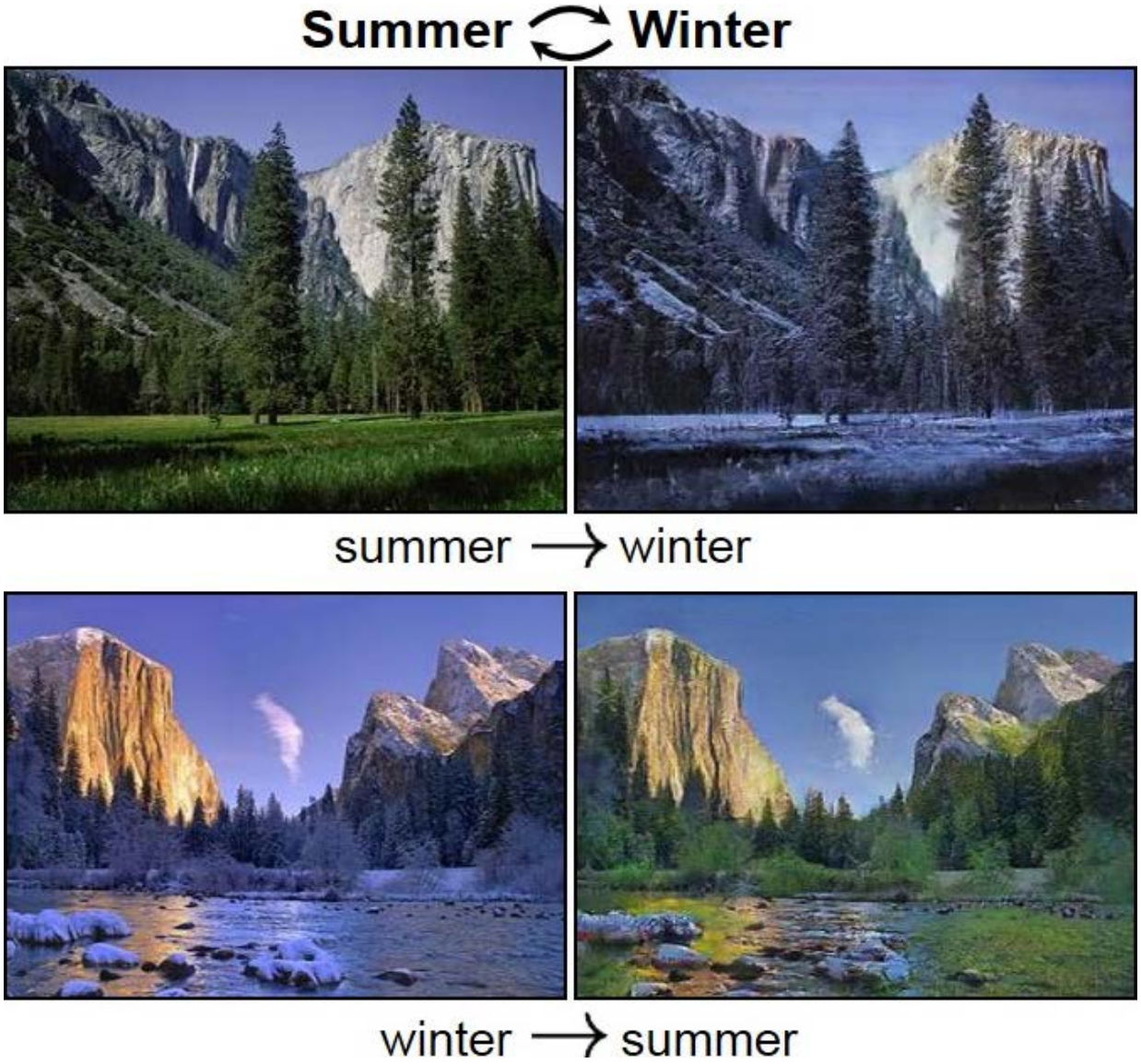
Interactive Image Translation with pix2pix-tensorflow



https://affinelayer.com/pixsrv/

Image to Image Translation: CycleGAN

CycleGAN



Horse <-> Zibra

Video Reenactment

https://www.youtube.com/watch?v=ohmajJTcpNk
https://www.youtube.com/watch?v=9Yq67CjDqvw

Deepfakes

AI 假色情終究來臨：神力女超人 Gal Gadot 臉被移花接木到 A 片中

2017/12/13 · Chris · AI、machine learning

Photo Credit: SendVids

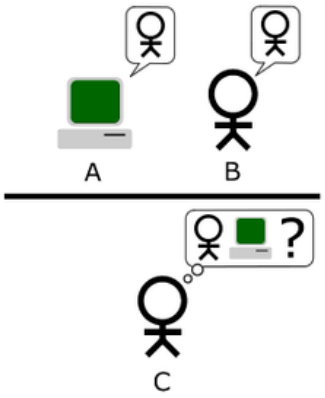
https://www.inside.com.tw/2017/12/13/gal-gadot-fake-ai-porn

Data vs. Machine learning vs. AI

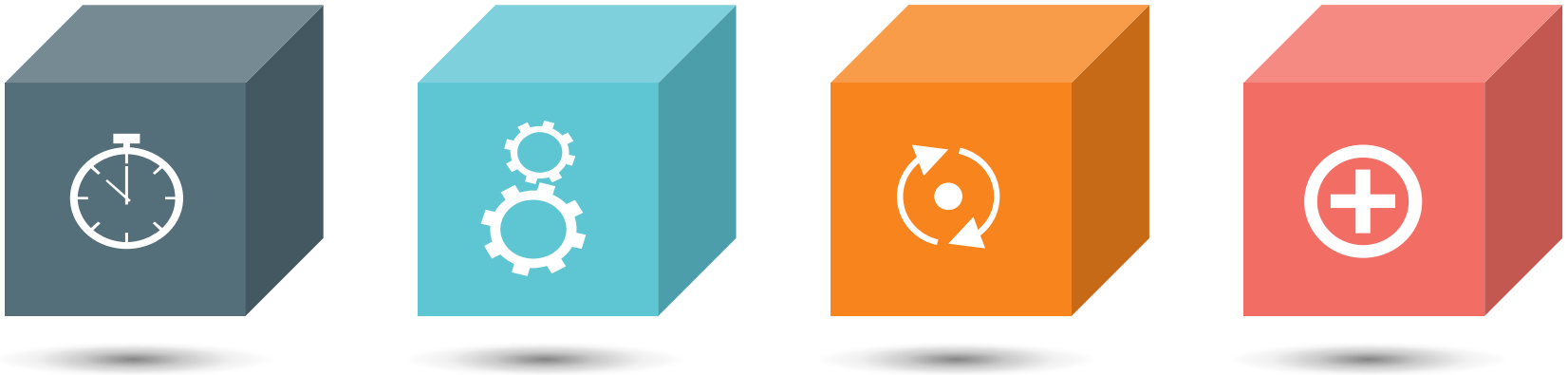
- Data: records of experience

- Machine learning: "*A type of algorithms that gives computers the ability to learn from experience, rather than being explicit programmed.*"

- Artificial intelligence
  - Turing test



McKinsey's Four Dimensions in AI Value Chain



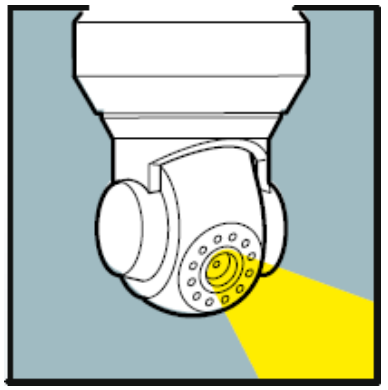
Project	Produce	Promote	Provide
Smart R&D and forecasting	Optimized production with lower cost and higher efficiency	Products and services at the right price, time, and targets	Enriched and tailored user experience

零售業

Project

預測市場對於特定產品類型的需求

自動化與供應商的價格協商



Produce

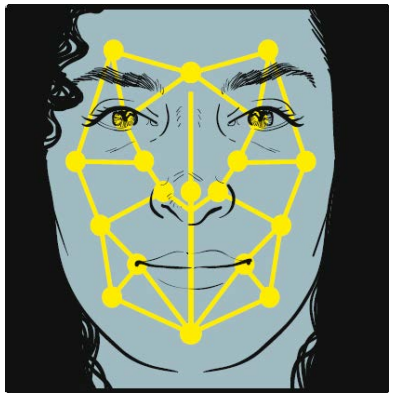
自動化的倉儲管理

最佳化的商品管理及動線、擺設設計

Promote

最佳化訂價

個人化行銷



Provide

個人化購物提醒

即時的 (虛擬) 客服


Laura Ellis
Visit No. - 90
Last Spent - $450
Mark King
Visit No. - 2
Last Spent - $230
Jeff Evans
Visit No. - 75
Last Spent - $304
UNKNOWN
Tylor Hill
Visit No. - 7
Last Spent - $30
Sausages
Fresh Meat
8
Fresh Fish
Fresh Poultry

健康 / 醫療產業

Project

國民健康狀況及特定疾病 / 傳染病的預測

因預施而實施的預防性措拖，減少發病 / 就診率

Produce

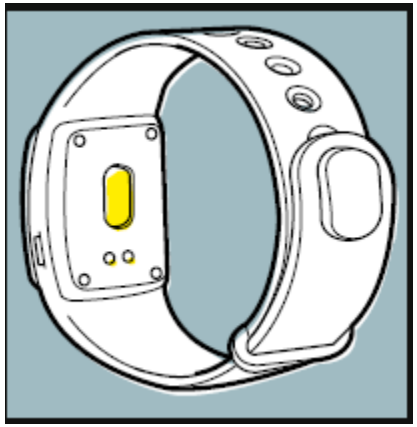
降低醫護人員的工作量

更全面地監測高風險族群 (醫院或居家) 狀況

Promote

個人化行銷提升健康意識

生活中的健康飲食提醒

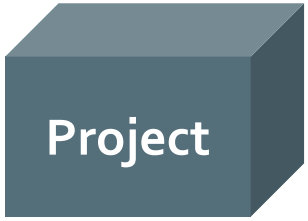


Provide

個人化醫學 / 治療

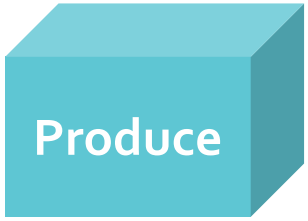
個人化即時身體狀況檢查

金融業



金融市場預測

更精準的放款 / 借款審核及信用卡盜刷偵測



更好的金融商品組合

更切中需求的個人金融商品 (e.g., 信用卡)

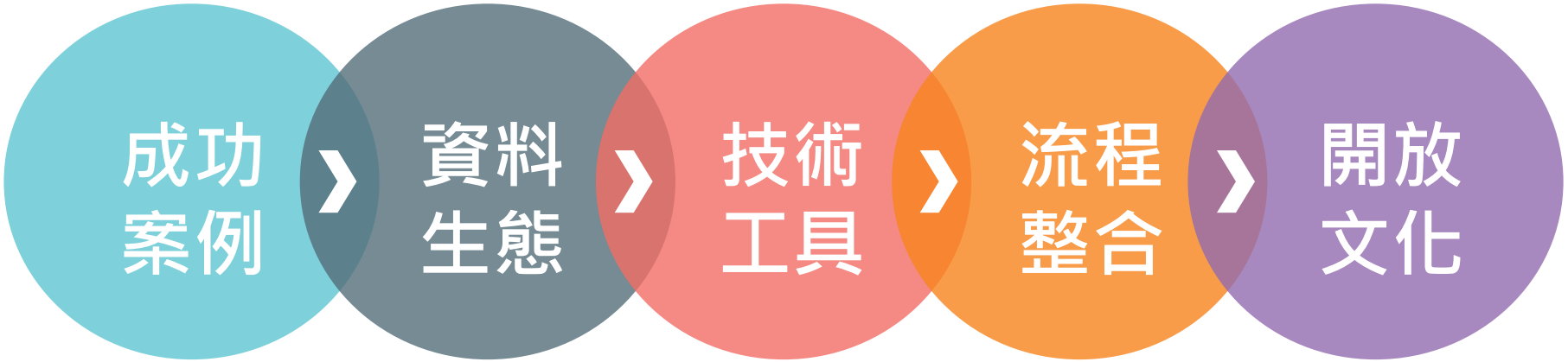
行銷策略設計

個人化行銷

AI 理財 / 客服專員

精準的 churn prediction

AI 導入進程



先以成功案例來創造價值及營造信心

打破部門間的隔閡，讓資料可以分享及集中處理

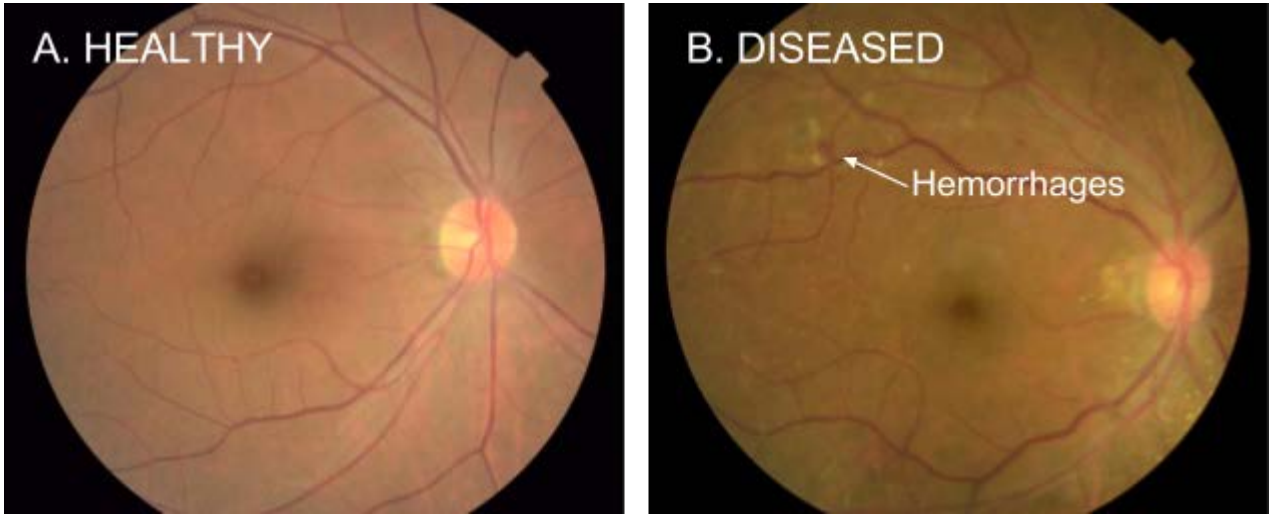
選擇正確的人工智慧技術工具，建立團隊或尋找技術伙伴

讓人工智慧技術成為工作流程的一部分

人與人工智慧協同增進生產力

AI IN MEDICINE

Deep Learning for Detection of Diabetic Eye Disease (2016)



- 128,000 images
- Each image was evaluated by 3-7 ophthalmologists from a panel of 54
- A separate validation set of 12,000 images

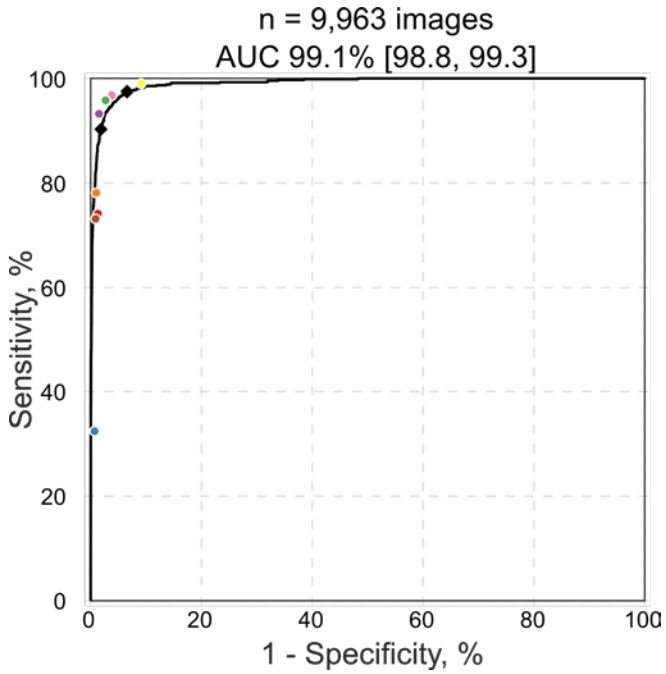
https://research.googleblog.com/2016/11/deep-learning-for-detection-of-diabetic.html

No DR	Mild DR	Moderate DR	Severe DR	Proliferative DR
1	2	3	4	5

JAMA The Journal of the American Medical Association

JAMA | Original Investigation | INNOVATIONS IN HEALTH CARE DELIVERY

Development and Validation of a Deep Learning Algorithm for Detection of Diabetic Retinopathy in Retinal Fundus Photographs



F-score

0.95	0.91
Algorithm	Ophthalmologist (median)

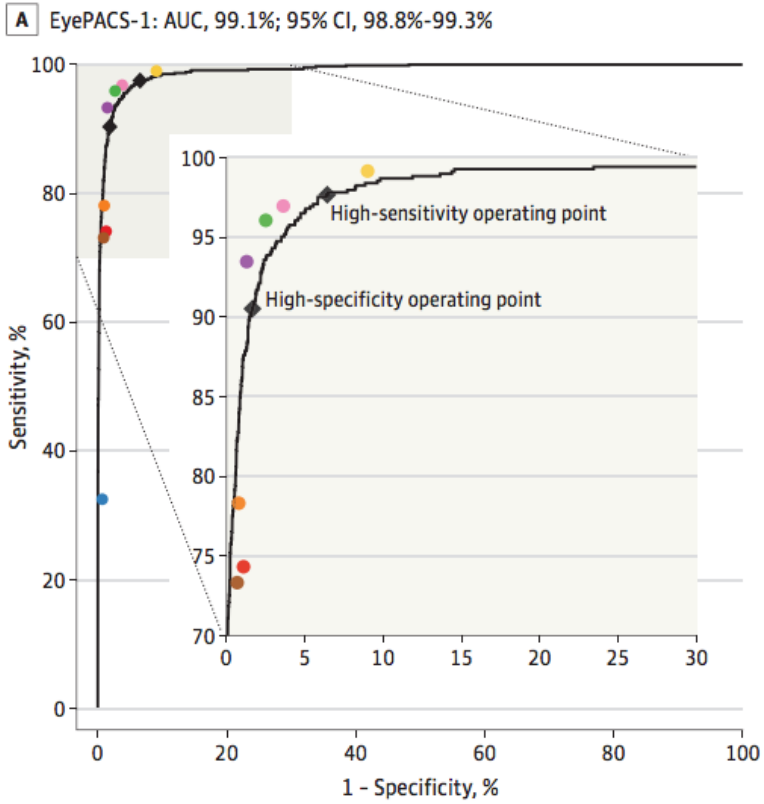
"The study by Gulshan and colleagues **truly represents the brave new world in medicine.**"

Dr. Andrew Beam, Dr. Isaac Kohane
Harvard Medical School

"Google just published this paper in JAMA (impact factor 44.405) [...] **It actually lives up to the hype.**"

Dr. Luke Oakden-Rayner
University of Adelaide

Deep Learning for Detection of Diabetic Eye Disease (2016)



- Algorithm's F1-score: 0.95
- Median F1-score of 8 ophthalmologists : 0.91

Original Research

Thoracic Imaging

Deep Learning at Chest Radiography: Automated Classification of Pulmonary Tuberculosis by Using Convolutional Neural Networks

Author List

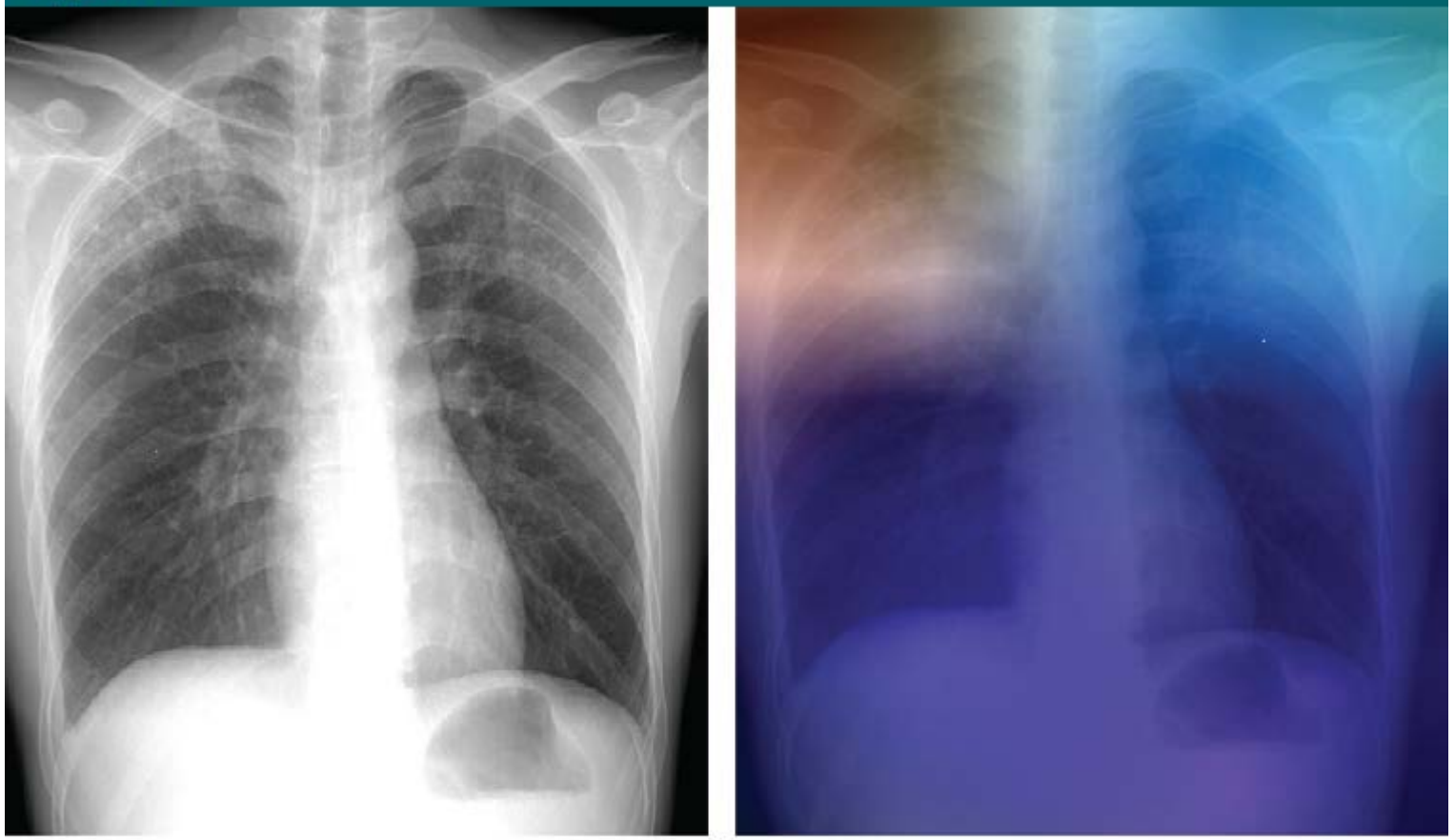
Paras Lakhani, MD, Baskaran Sundaram, MD

- 1007 posteroanterior chest radiographs
- AUC = 0.99 when AlexNet and GoogLeNet are combined using ensemble.

AUC Test Dataset

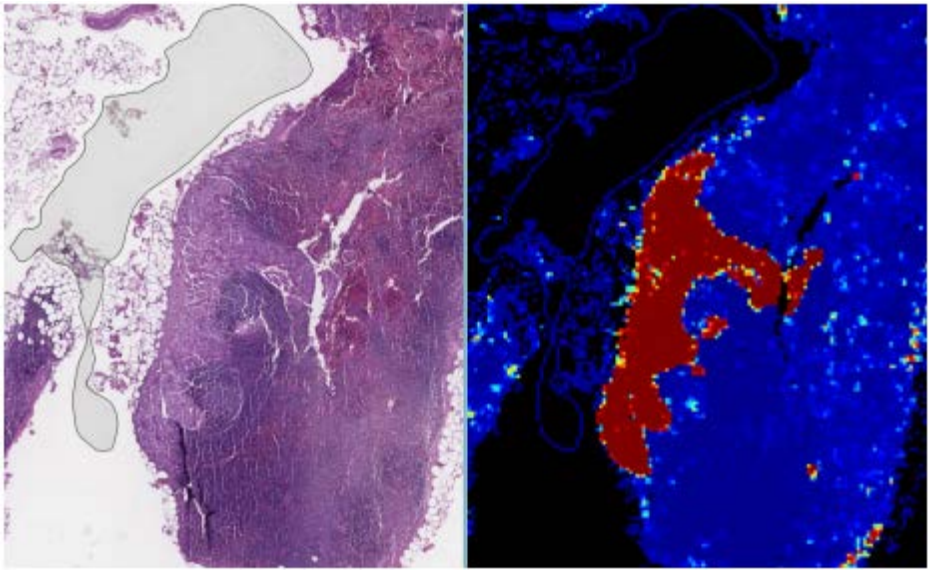
Parameter	Untrained	Pretrained	Untrained with Augmentation*	Pretrained with Augmentation*
AlexNet	0.90 (0.84, 0.95)	0.98 (0.95, 1.00)	0.95 (0.90, 0.98)	0.98 (0.94, 0.99)
GoogLeNet	0.88 (0.81, 0.92)	0.97 (0.93, 0.99)	0.94 (0.89, 0.97)	0.98 (0.94, 1.00)
Ensemble				0.99 (0.96, 1.00)

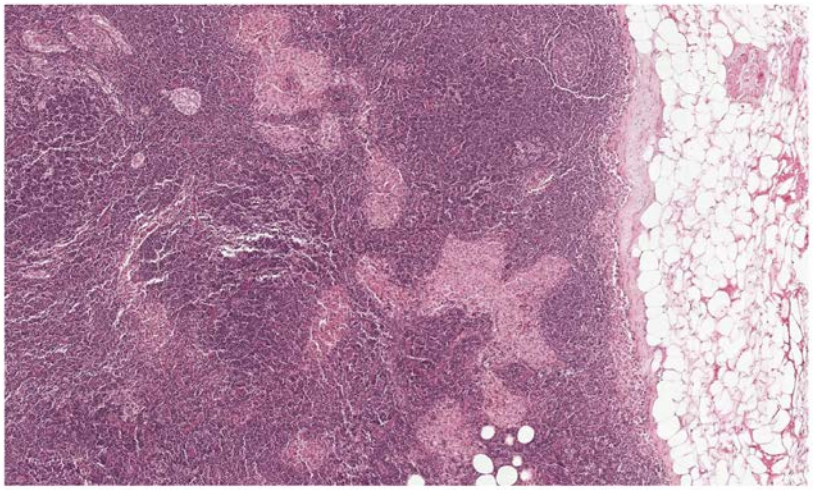
Figure 4

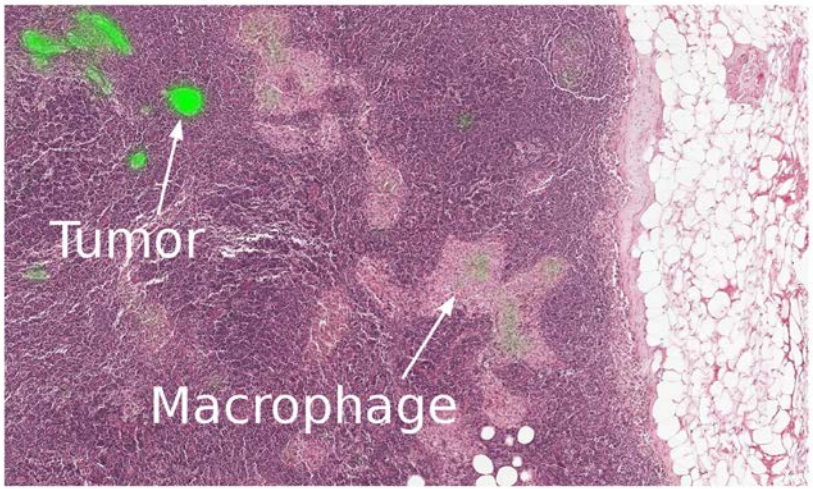


a. b.

Figure 4: **(a)** Posteroanterior chest radiograph shows upper lobe opacities with pathologic analysis–proven active TB. **(b)** Same posteroanterior chest radiograph, with a heat map overlay of one of the strongest activations obtained from the fifth convolutional layer after it was passed through the GoogLeNet-TA classifier. The red and light blue regions in the upper lobes represent areas activated by the deep neural network. The dark purple background represents areas that are not activated. This shows that the network is focusing on parts of the image where the disease is present (both upper lobes).







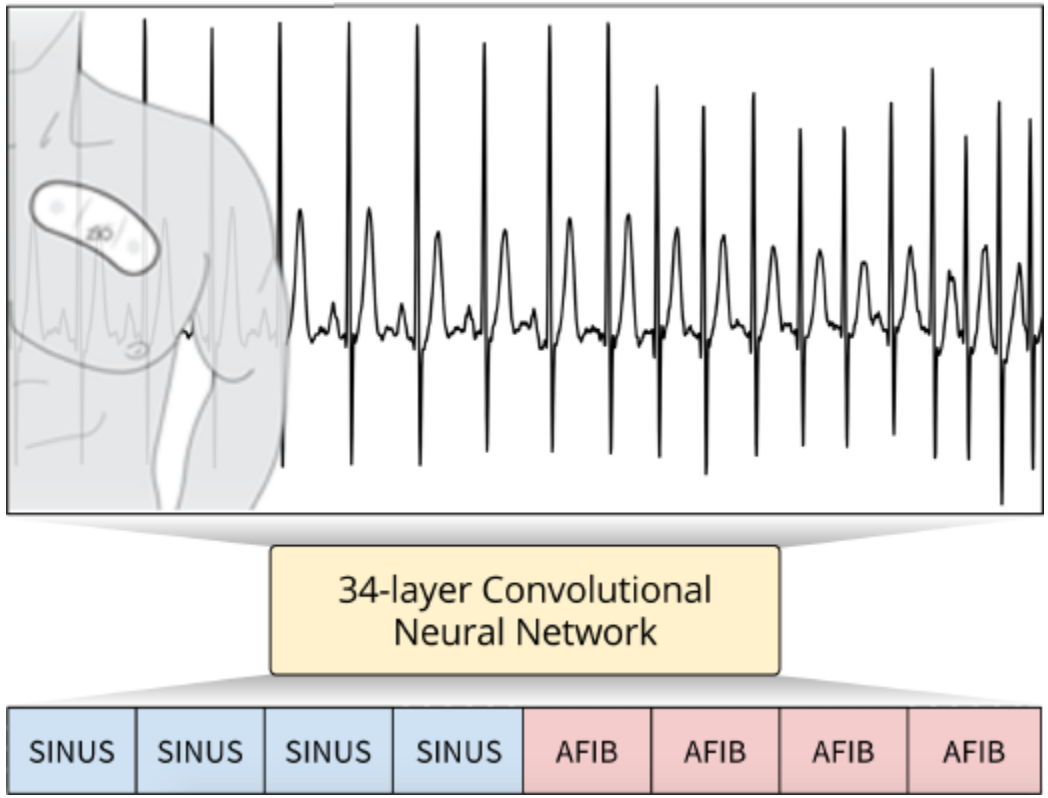
Tumor localization score (FROC):

model:	**0.89**
pathologist:	0.73

arxiv.org/abs/1703.02442

(Slide Credit: Google Brain)

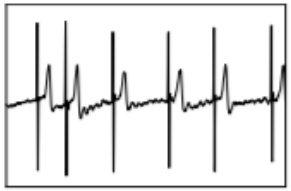
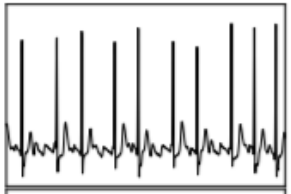
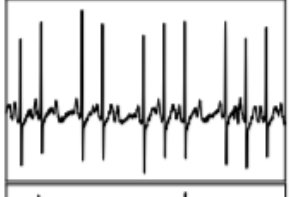
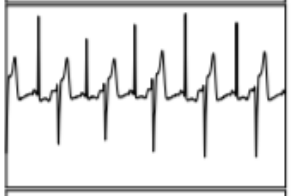
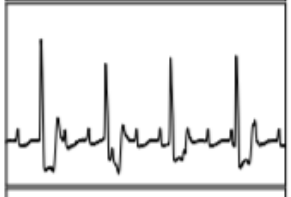
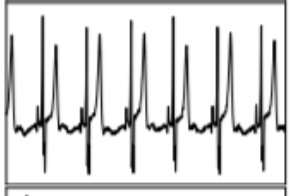
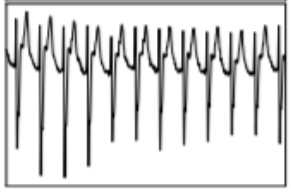
Cardiologist-Level Arrhythmia Detection with Convolutional Neural Networks

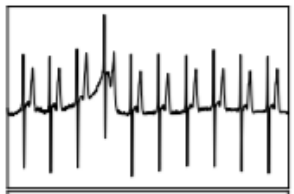
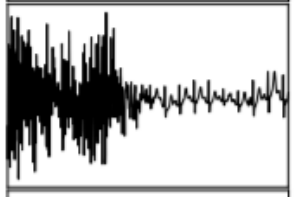
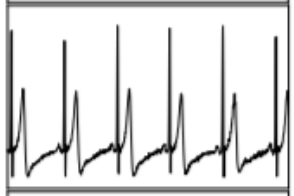
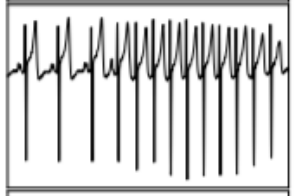
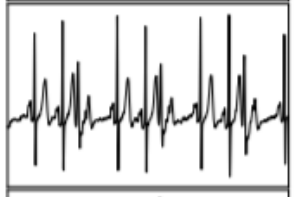
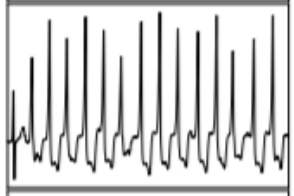
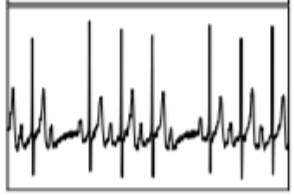


Goal: diagnose irregular heart rhythms, also known as arrhythmias, from single-lead ECG signals better than a cardiologist

Input and Output

- Sequence-to-sequence
- Input: a time-series of raw ECG signal
  - The 30 second long ECG signal is sampled at 200 Hz
- Output: a sequence of rhythm classes
  - The model outputs a new prediction once every second
  - Total 14 rhythm classes are identified

Class	Description	Example	Train + Val Patients	Test Patients
AFIB	Atrial Fibrillation		4638	44
AFL	Atrial Flutter		3805	20
AVB_TYPE2	Second degree AV Block Type 2 (Mobitz II)		1905	28
BIGEMINY	Ventricular Bigeminy		2855	22
CHB	Complete Heart Block		843	26
EAR	Ectopic Atrial Rhythm		2623	22
IVR	Idioventricular Rhythm		1962	34

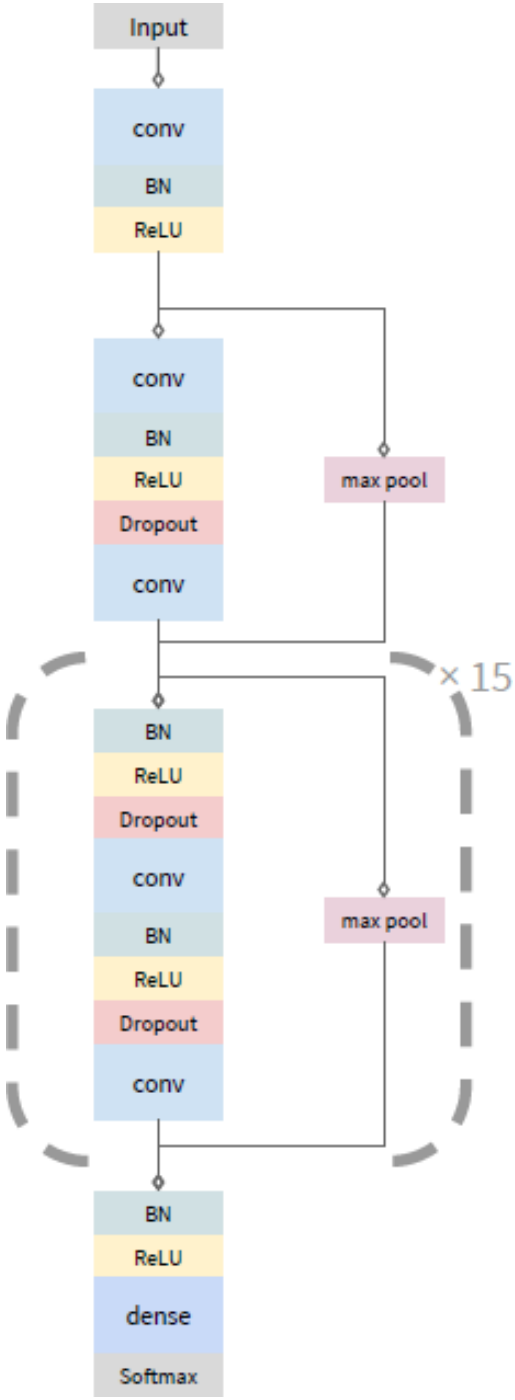
Class	Description	Example	Train + Val Patients	Test Patients
JUNCTIONAL	Junctional Rhythm		2030	36
NOISE	Noise		9940	41
SINUS	Sinus Rhythm		22156	215
SVT	Supraventricular Tachycardia		6301	34
TRIGEMINY	Ventricular Trigeminy		2864	21
VT	Ventricular Tachycardia		4827	17
WENCKEBACH	Wenckebach (Mobitz I)		2051	29

Dataset

- Training dataset
  - Collect a dataset of 64,121 ECG records from 29,163 patients
  - Each ECG record is 30 seconds long and sampled at 200 Hz
  - Annotations are done by a group of Certified Cardiographic Technicians
- Testing dataset
  - 336 records from 328 unique patients
  - Annotations are obtained by a committee of three board-certified cardiologists

Model

- 34 layers NN
- 16 residual blocks
- 2 conv layers per block
- Filter length = 16 samples
- # filter = 64*k, k start from 1 and is incremented every 4-th residual block
- Every residual block subsamples its input by a factor of 2



Results – F1 score

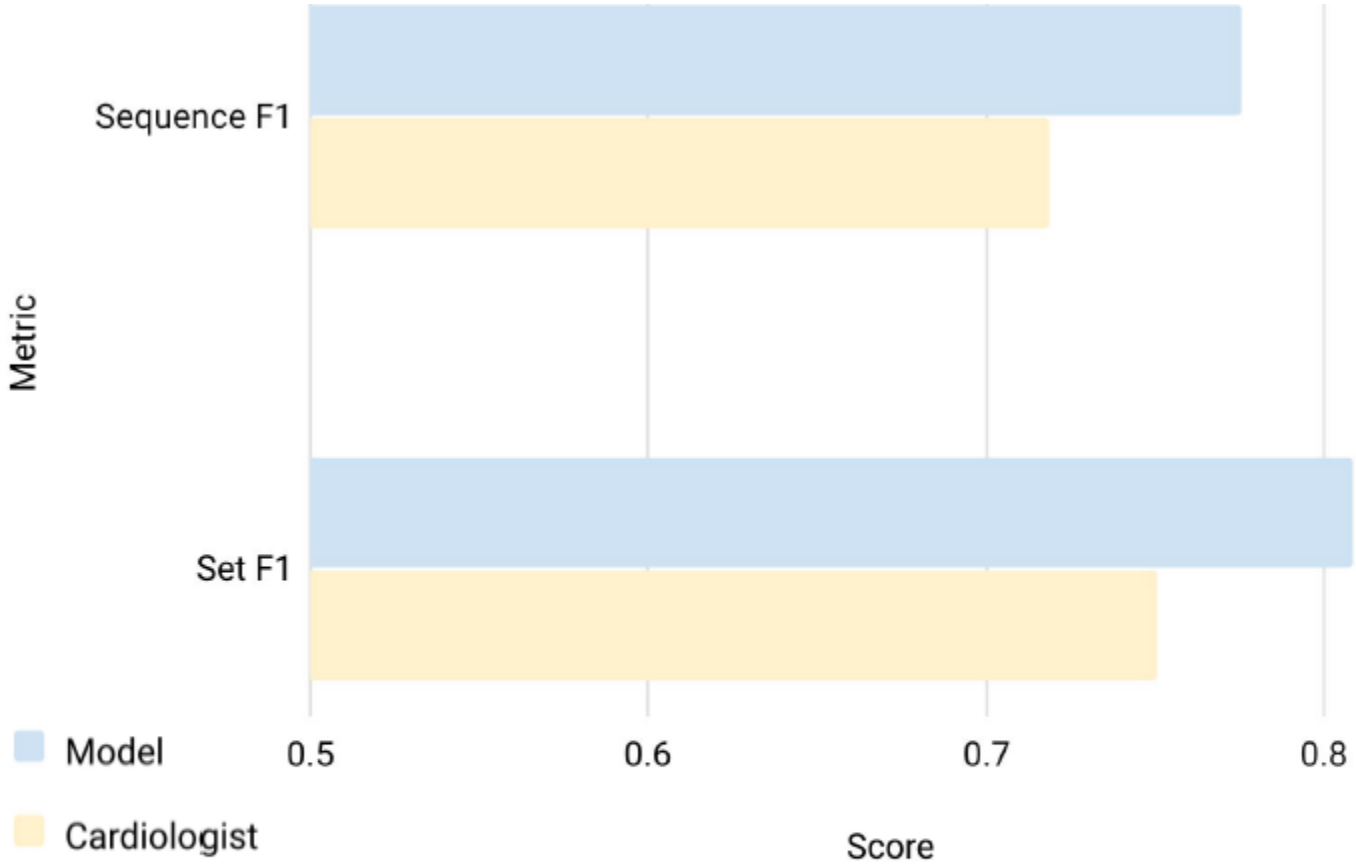
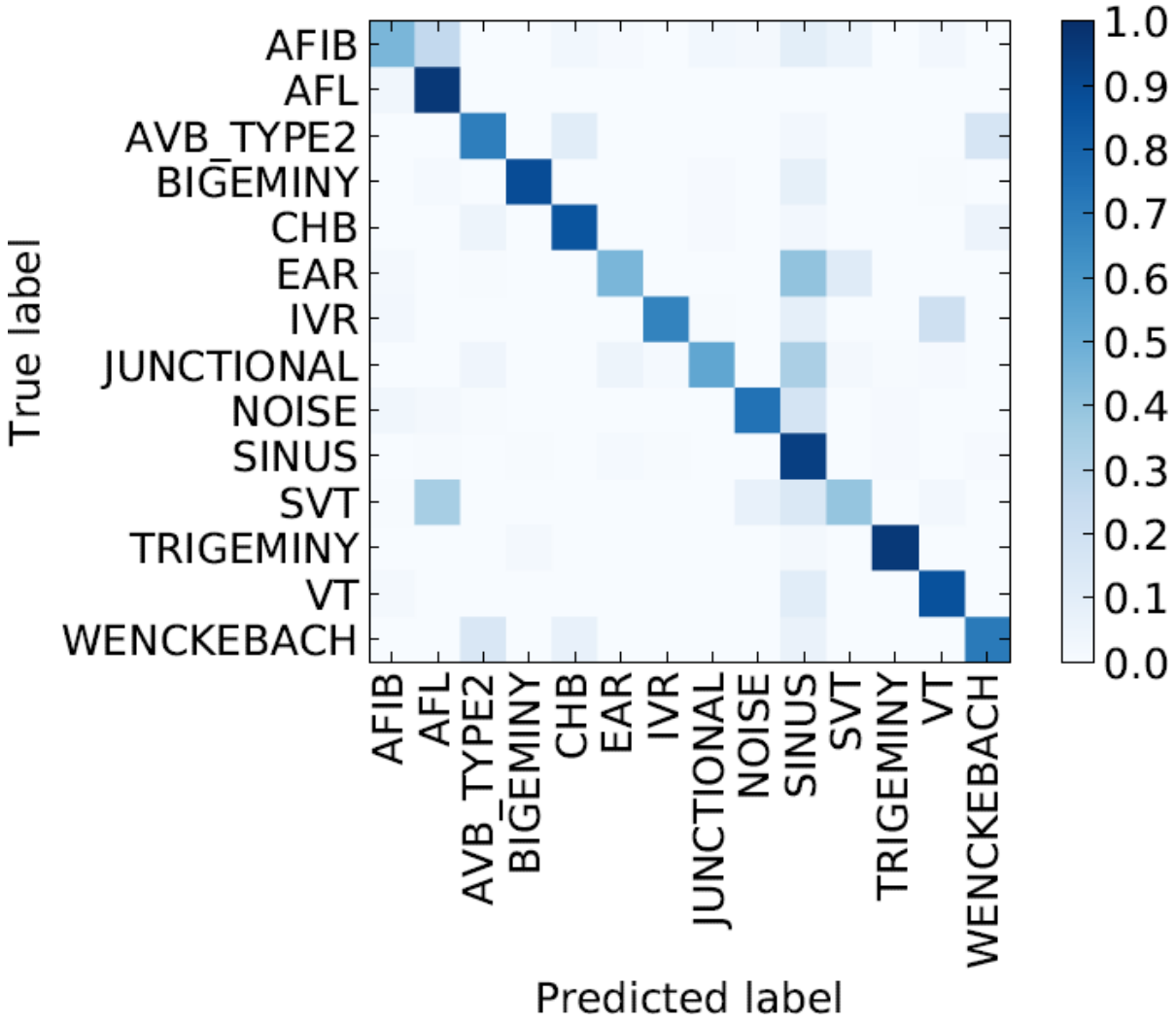


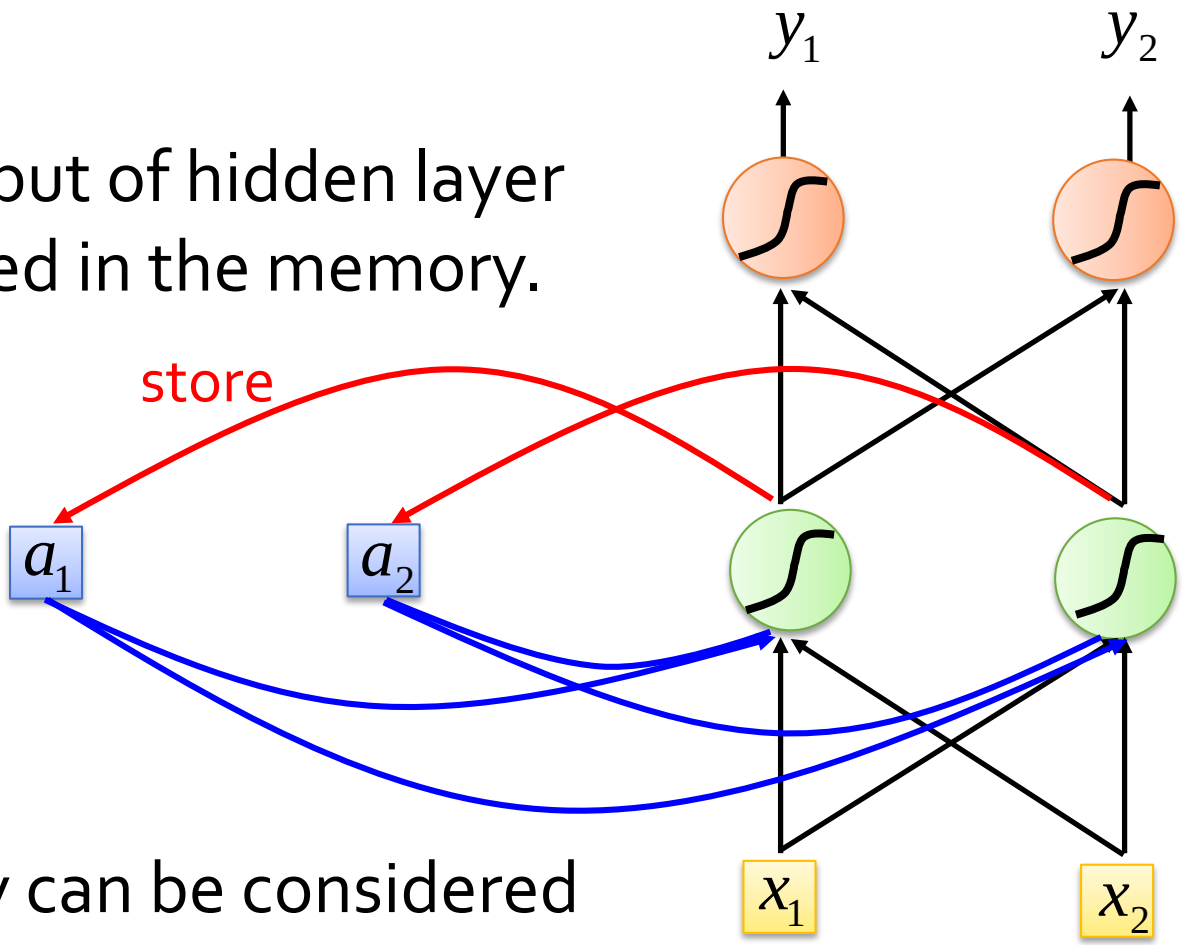
Figure 3. Evaluated on the test set, the model outperforms the average cardiologist score on both the Sequence and the Set F1 metrics.

Results – Confusion Matrix



Recurrent Neural Network (RNN)

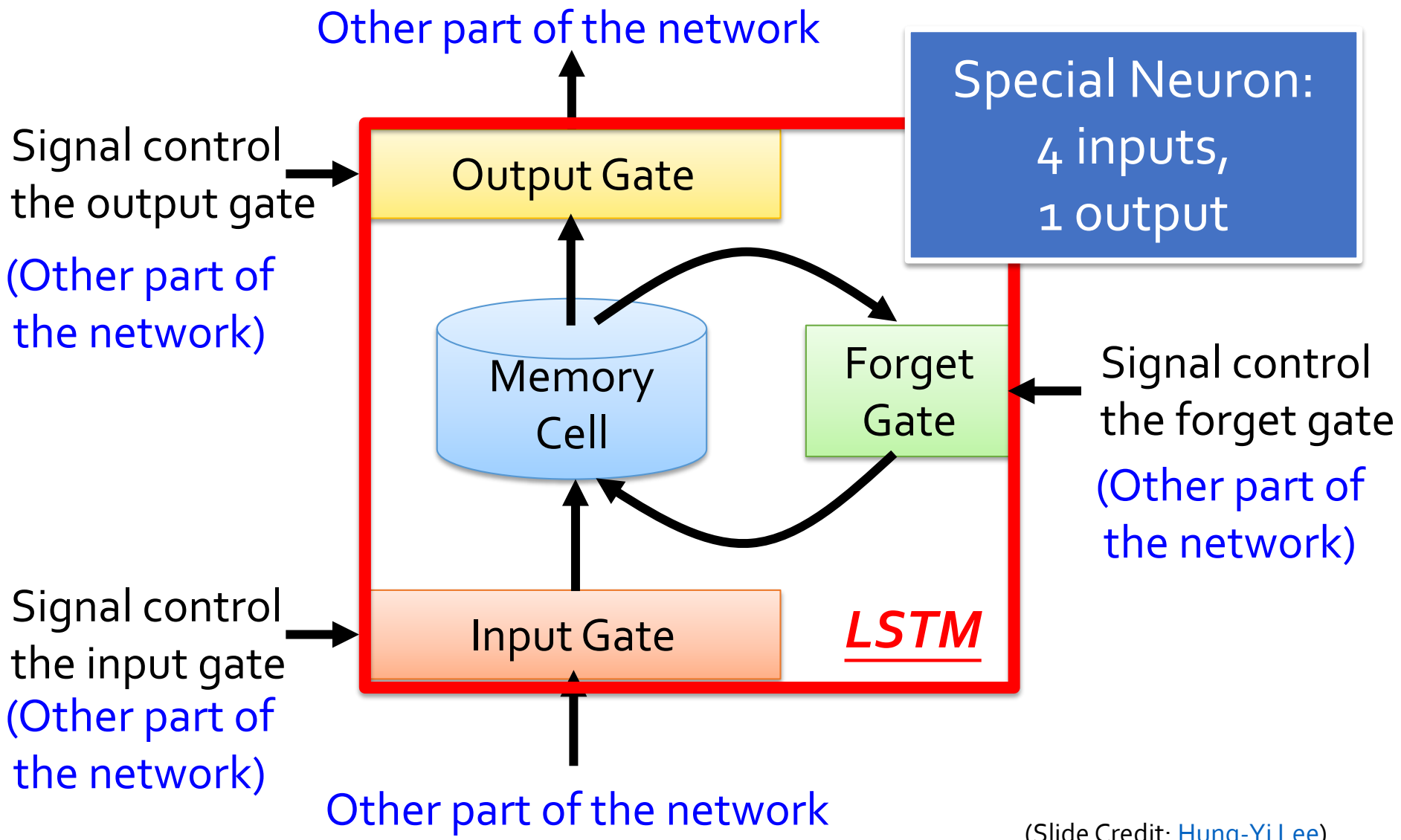
The output of hidden layer are stored in the memory.



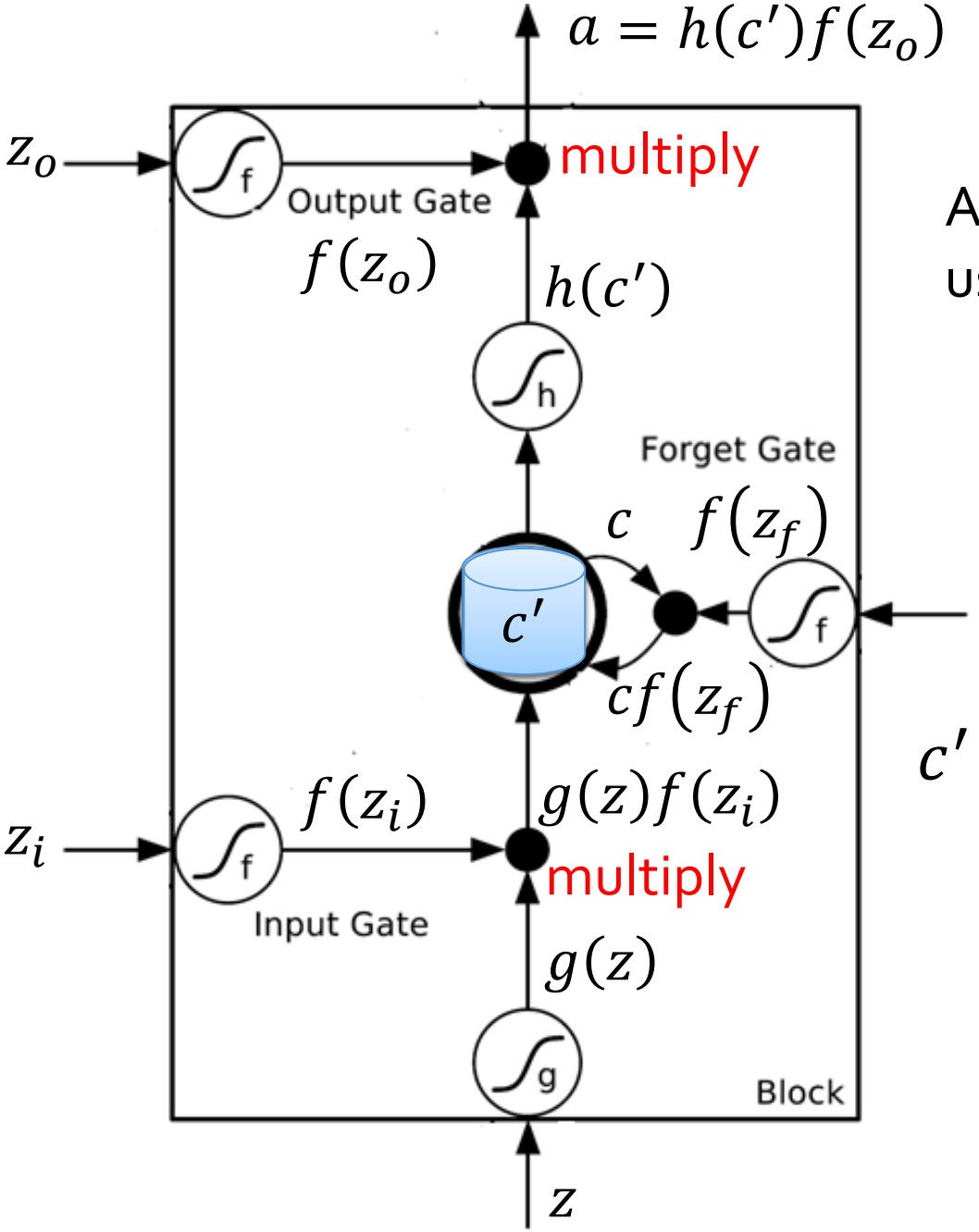
Memory can be considered as another input.

(Slide Credit: Hung-Yi Lee)

Long Short-term Memory (LSTM)



(Slide Credit: Hung-Yi Lee)



Activation function f is usually a sigmoid function

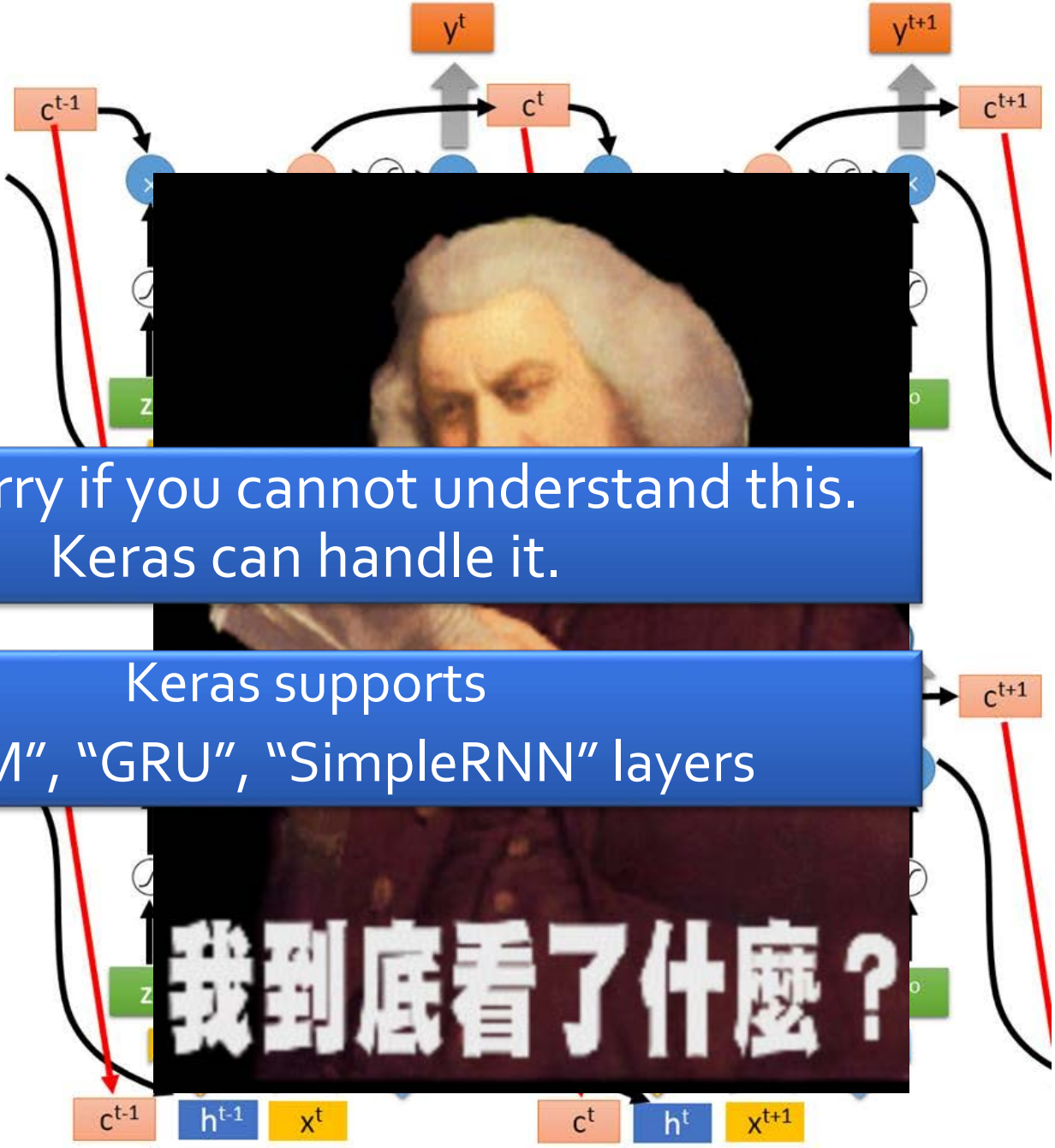
Between 0 and 1

Mimic open and close gate

$$c' = g(z)f(z_i) + cf(z_f)$$

(Slide Credit: Hung-Yi Lee)

Multiple-layer LSTM



This is quite standard now.

https://img.komicolle.org/2015-09-20/src/14426967627131.gif

(Slide Credit: Hung-Yi Lee)

Predictive tasks for healthcare

Given a large corpus of training data of de-identified medical records, can we predict interesting aspects of the future for a patient not in the training set?

- *will patient be readmitted to hospital in next N days?*
- *what is the likely length of hospital stay for patient checking in?*
- *what are the most likely diagnoses for the patient right now?*
- *what medications should a doctor consider prescribing?*
- *what tests should be considered for this patient?*
- *which patients are at highest risk for X in next month?*

and why?

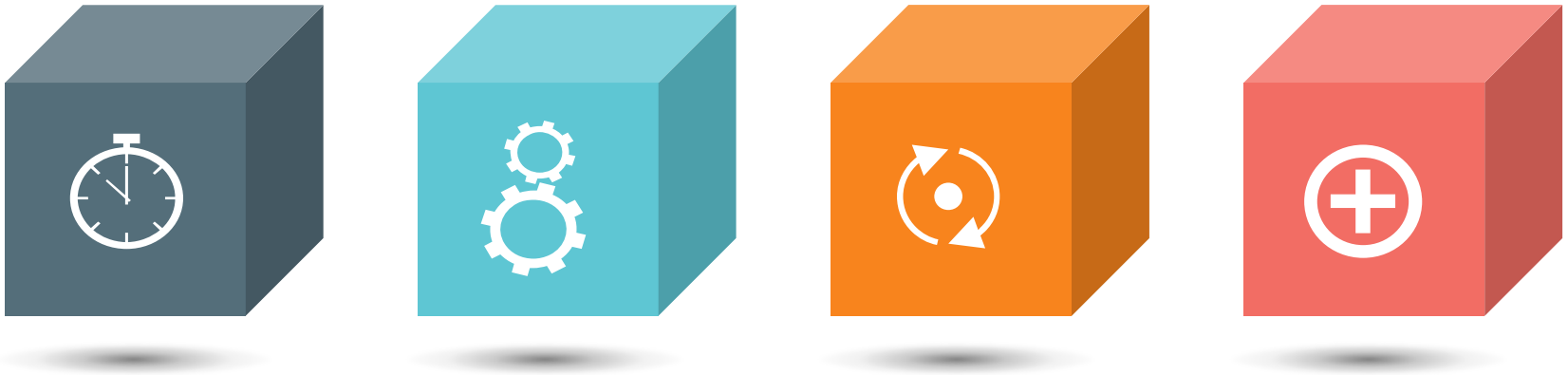
Collaborating with several healthcare organizations, including UCSF, Stanford, and Univ. of Chicago. Have early promising results (no public paper yet)

AI IN MANUFACTURING

1/3 of the GDP

- Manufacturing GDP of **$178B**, almost **1/3** of total GDP
- **30%** of the employment are in the manufacturing sector
- Cheap labor cost of $9.42/hr with average labor productivity of almost $60k in GDP/person
- 17% corporate tax rate

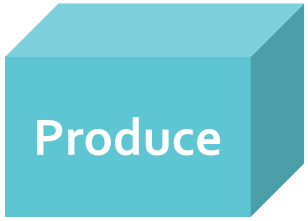
McKinsey's Four Dimensions in AI Value Chain



Project	Produce	Promote	Provide
Smart R&D and forecasting	Optimized production with lower cost and higher efficiency	Products and services at the right price, time, and targets	Enriched and tailored user experience

The Four-P Dimensions in Manufacturing

- Improve product design
- Automate supplier assessment and price negotiation
- Anticipate parts requirements



- Improve manufacturing processes
- Automate assembly lines
- limit product rework

- Optimize pricing
- Predict sales of maintenance services
- Refine sales-leads prioritization

- Optimize flight/fleet planning and route
- Enhance maintenance engineering
- Enhance pilot training

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