Disaster Impact Analysis: What Can AI Do?

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What is Artificial Intelligence?

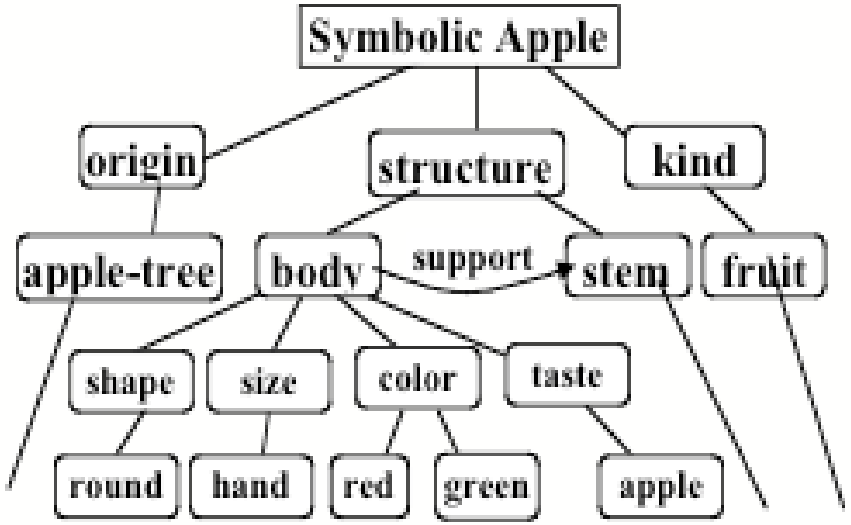
- Artificial Intelligence (AI) is concerned with making computers do things that otherwise require human intelligence.
  - Machine Learning.
  - Natural Language Processing.
  - Perception (Vision, Speech Recognition).
  - Knowledge Processing (Representation, Inference).
  - Problem Solving (Searching, Constraint Satisfaction).
  - Uncertainty Management (Fuzzy Logic, Probability).

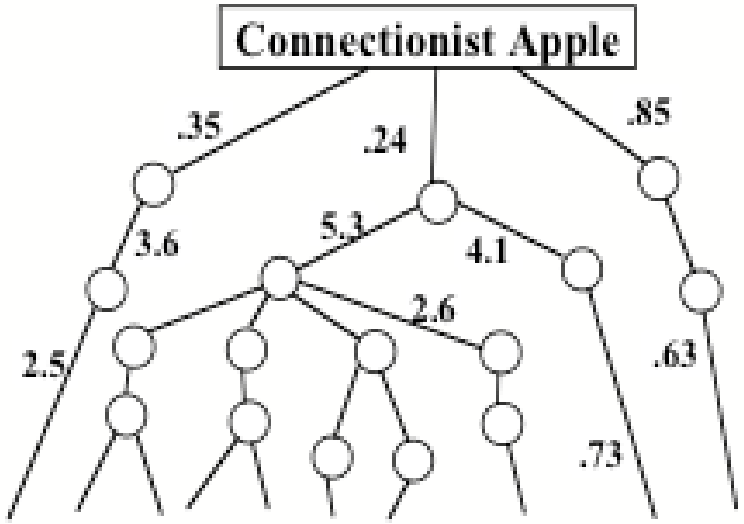
Machine Learning

- Machine learning is concerned with making computer learn without being explicitly programmed.
- Machine learning is used in
  - Natural Language Understanding.
  - Perception (Vision, Speech Recognition).
  - Knowledge based systems/Expert systems (Acquisition, Representation, Inference).
  - Uncertainty Management (Fuzzy Logic, Probability).
  - Problem Solving (Searching, Constraint Satisfaction).

Machine Learning Approaches

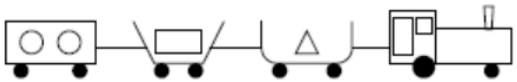
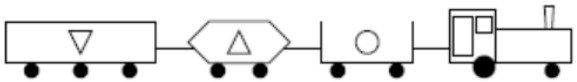
- Symbolic vs Connectionist Models





The Symbolic Approaches

1. TRAINS GOING EAST

1.
2. 
3. 
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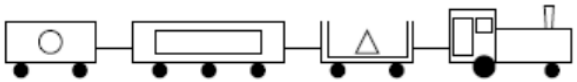
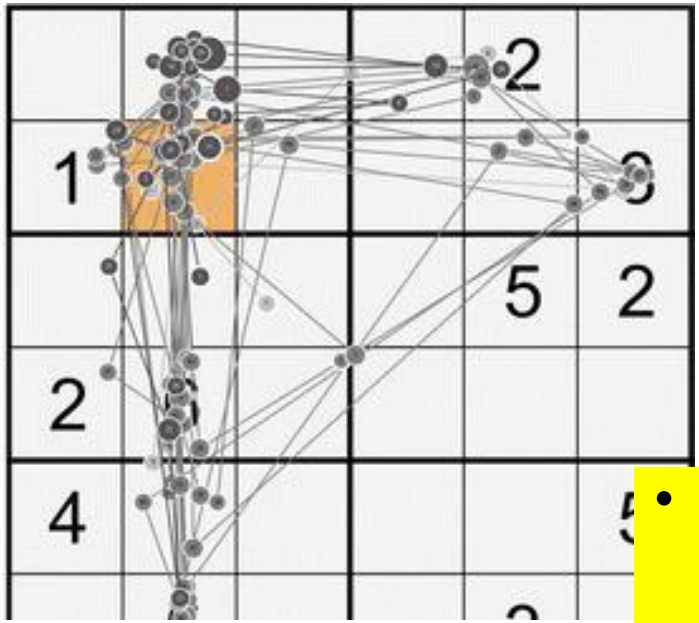
5. 

2. TRAINS GOING WEST

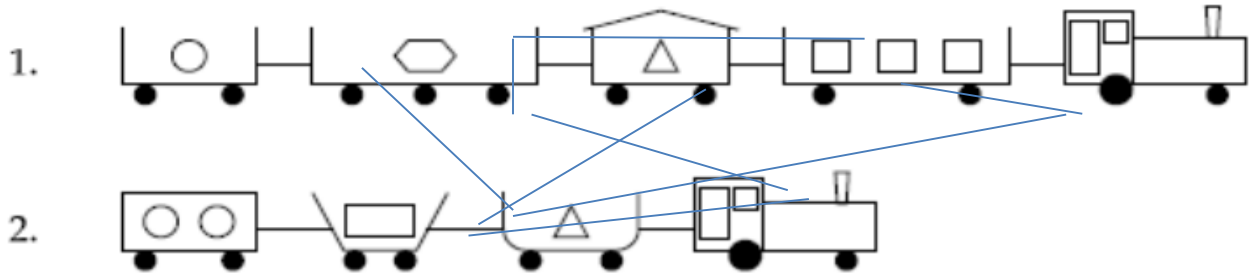
1.
2.
3.
4.
5.

Symbolic Machine learning by simulating human learning



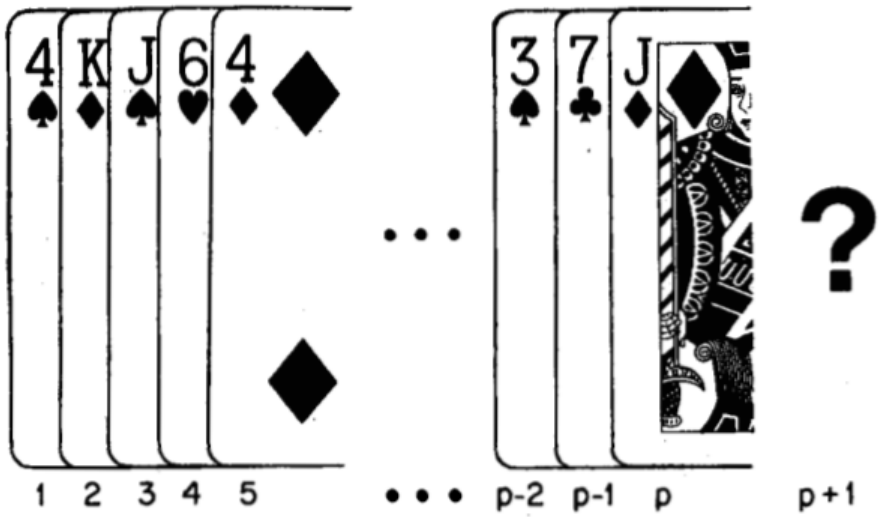
1. TRAINS GOING EAST

- IF Car has two wheels and Car has a roof
  THEN Car going East.

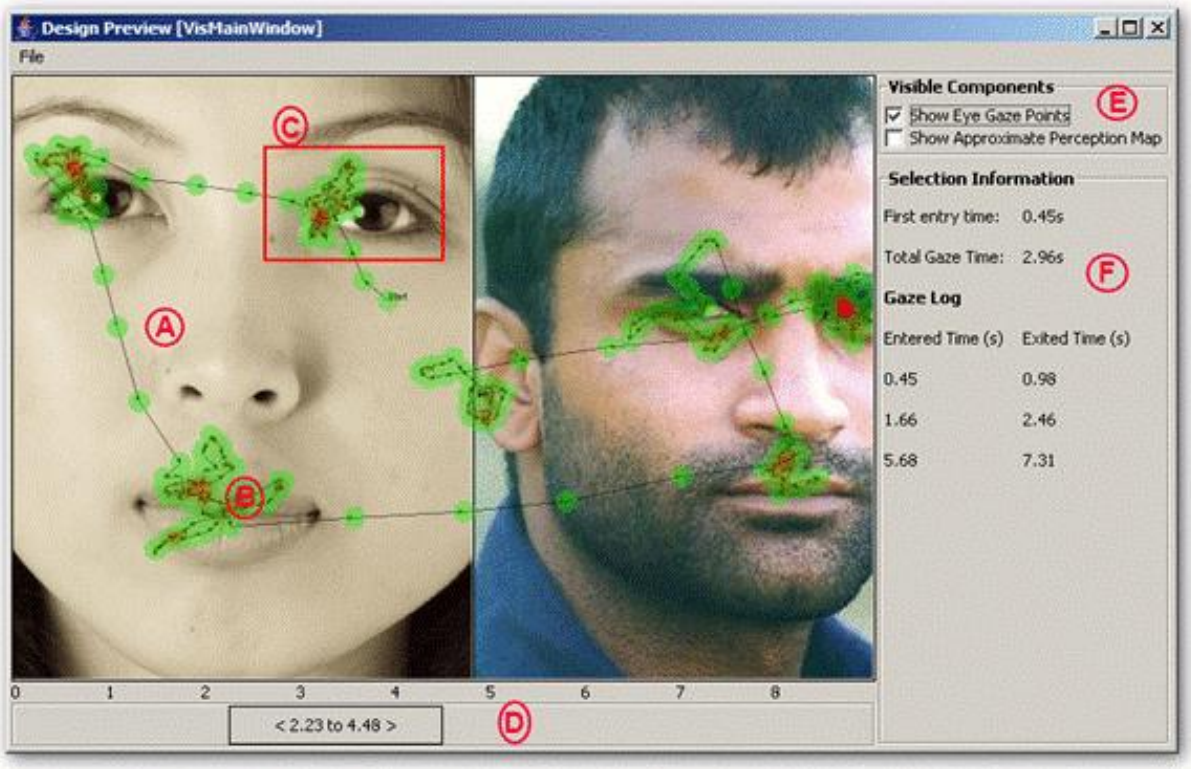


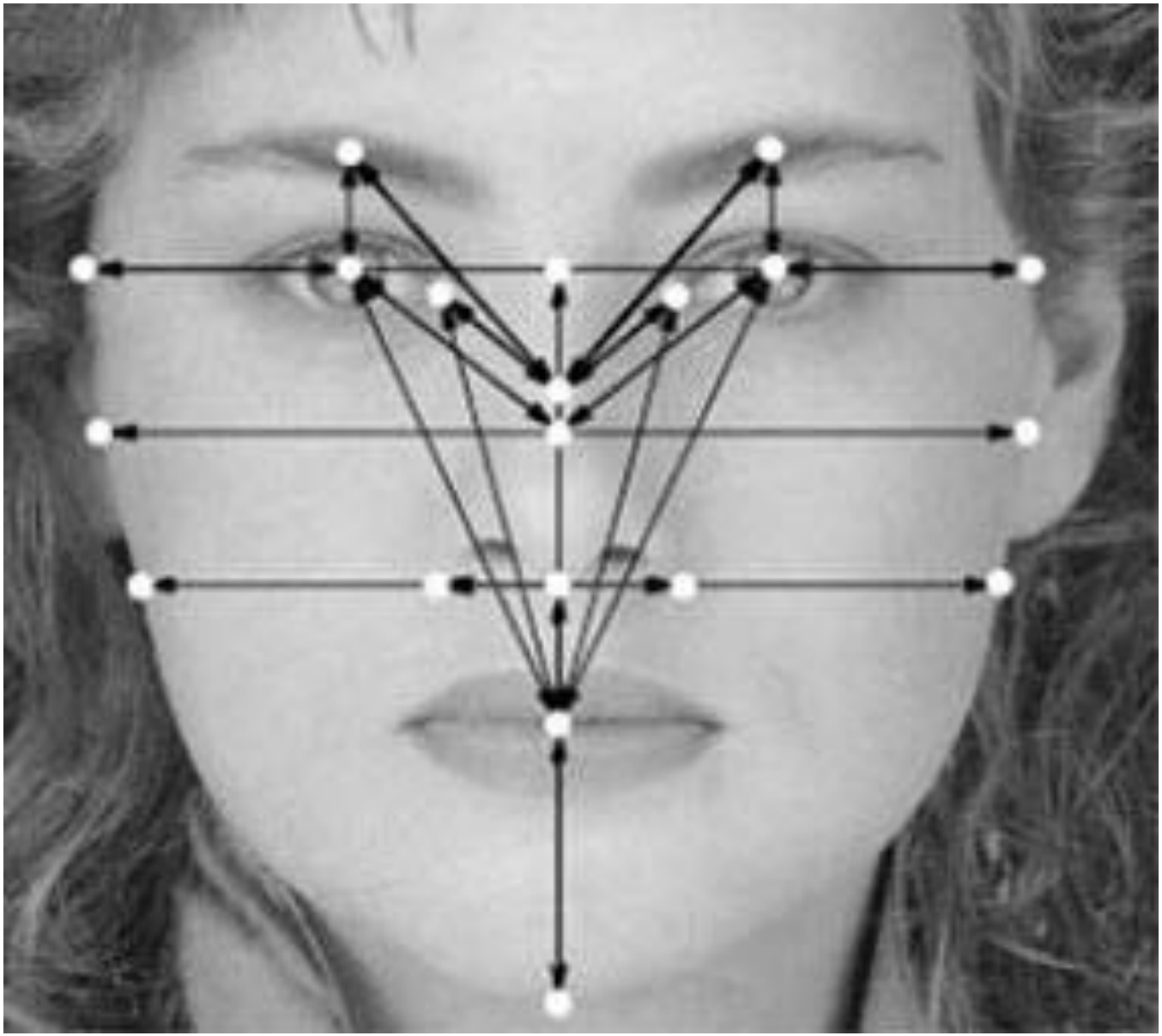
Sequential Pattern Dicovery

- Developing algorithms to allow computers to learn without being explicitly programmed.



How else do human learn?



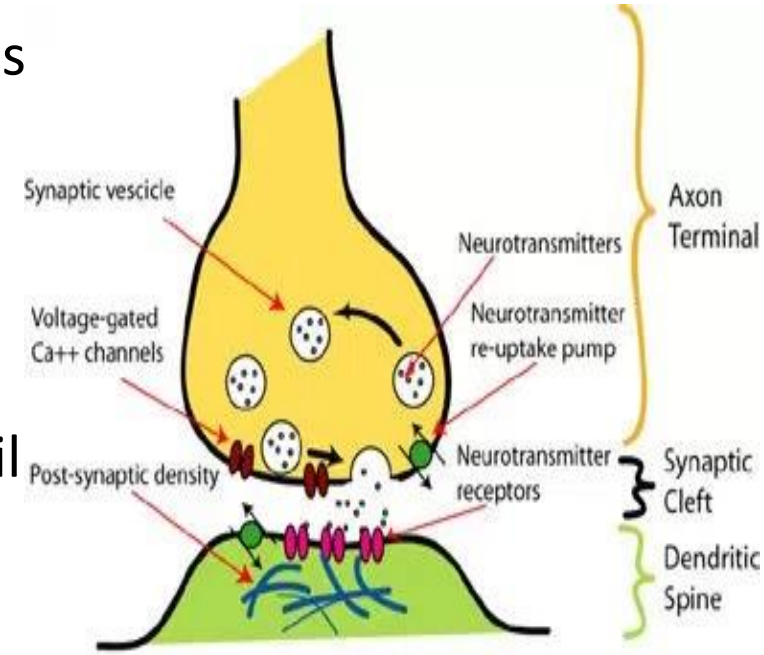


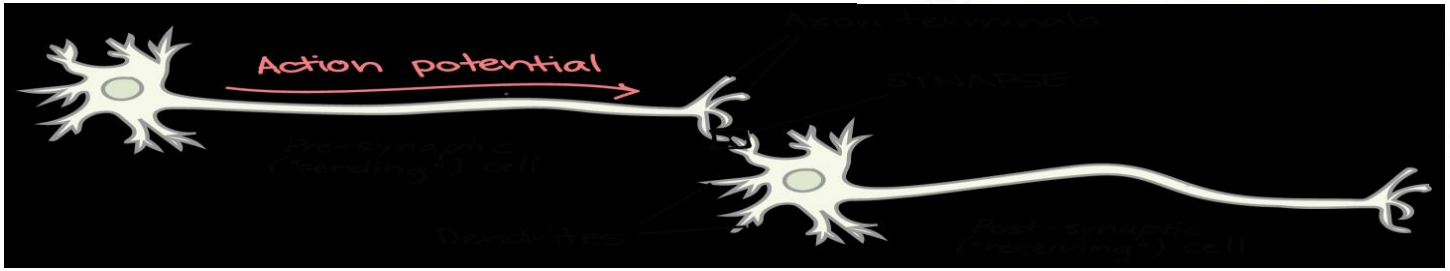
Human vs. Computer

- Computers
  - Good at serial activities (e.g. counting, adding).
  - Not good at tasks such as visual or audio recognition.
  - Execute instructions one after another extremely rapidly.
- Human brain
  - Units respond at ≈10/s (vs. PV 2.5GHz).
  - Work on many different things at once.
  - Vision or speech recognition by interaction of many different pieces of information.

The Synapse

- Neuron accepts many inputs through dendrites.
- Inputs are all added up in synapses.
- If enough active inputs are received at once, neuron wil "fire" through axon.



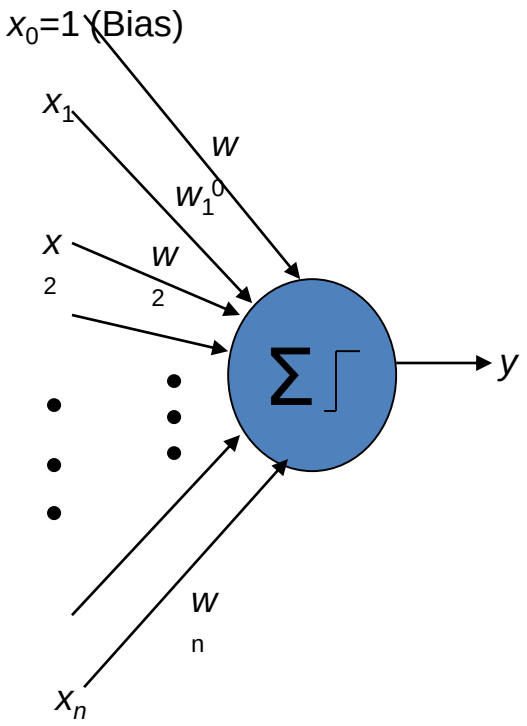


Modeling the Single Neuron

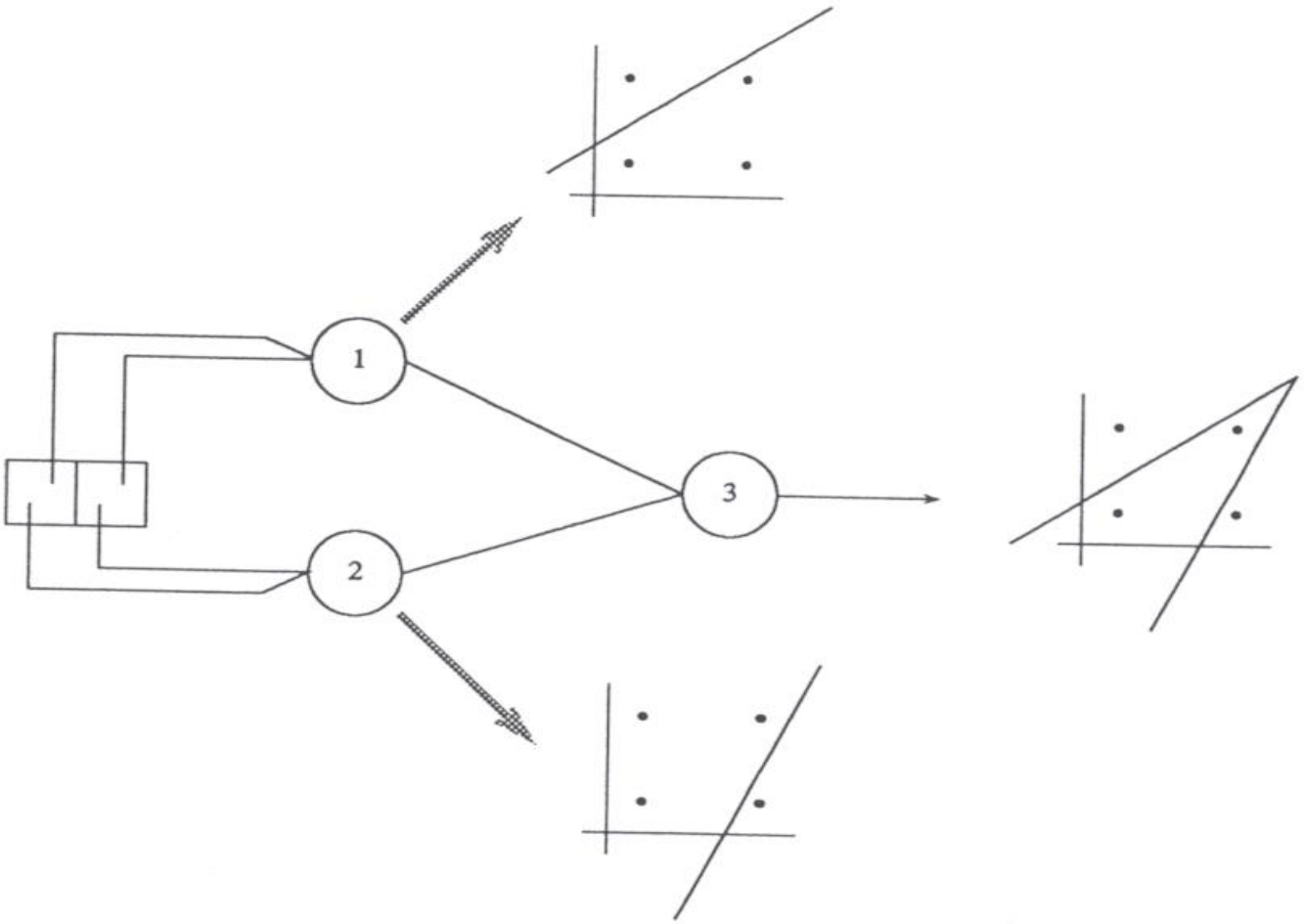
- n inputs + 1 bias.
- Weights on input reflect efficiency of synapses
- Compute weighted sum:

$$SUM = \sum_{i=1}^{n} w_i x_i$$

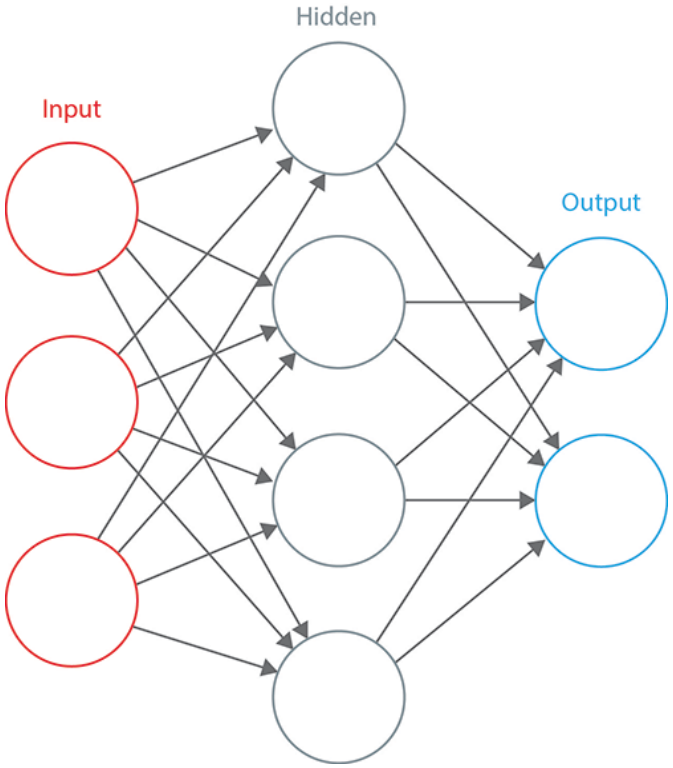
- Fire if *SUM* exceeds a threshold θ.
  - *y*=1 if *SUM* > θ
  - *y=0* if *SUM* ≤ θ.



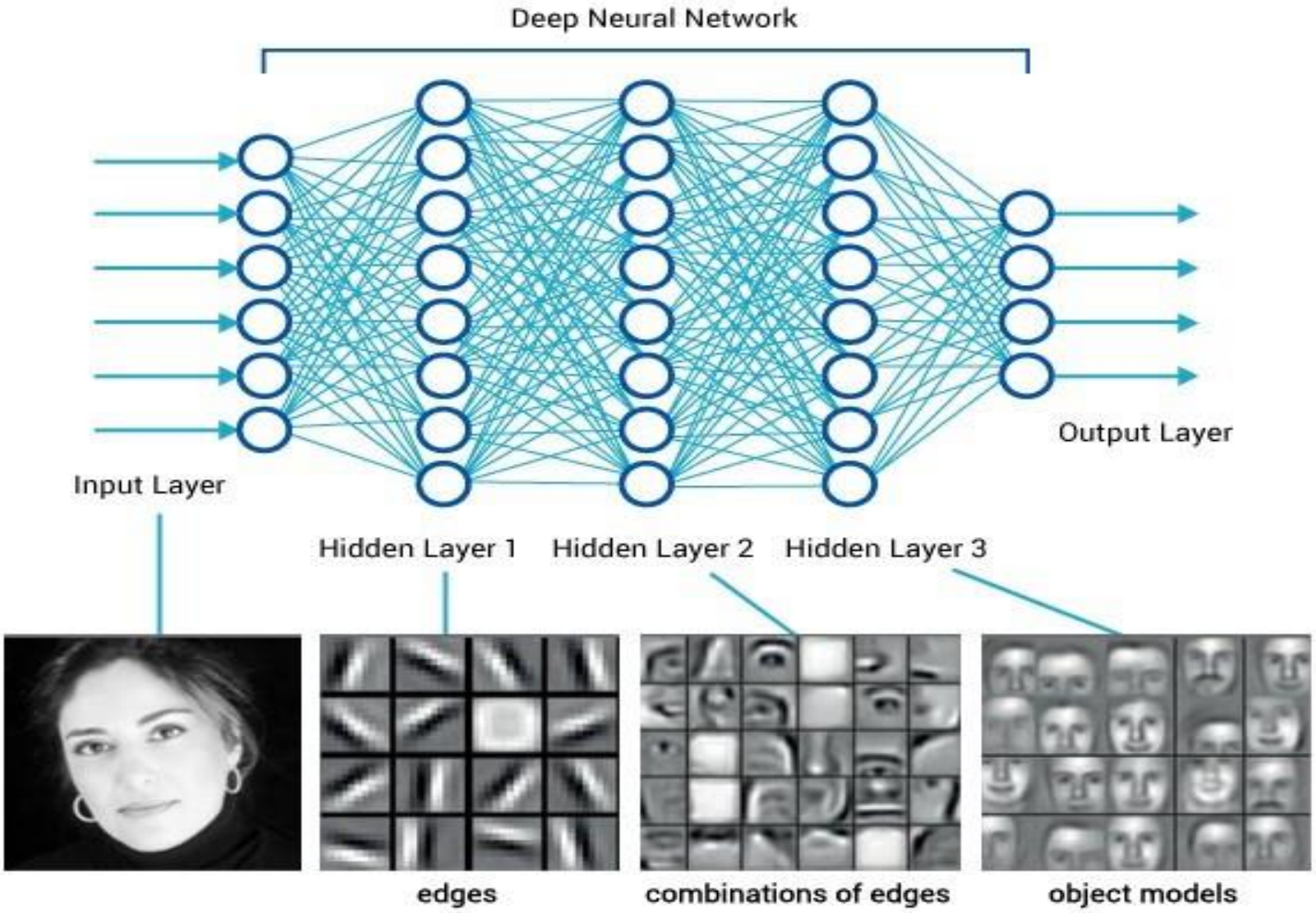
More Neurons Connected



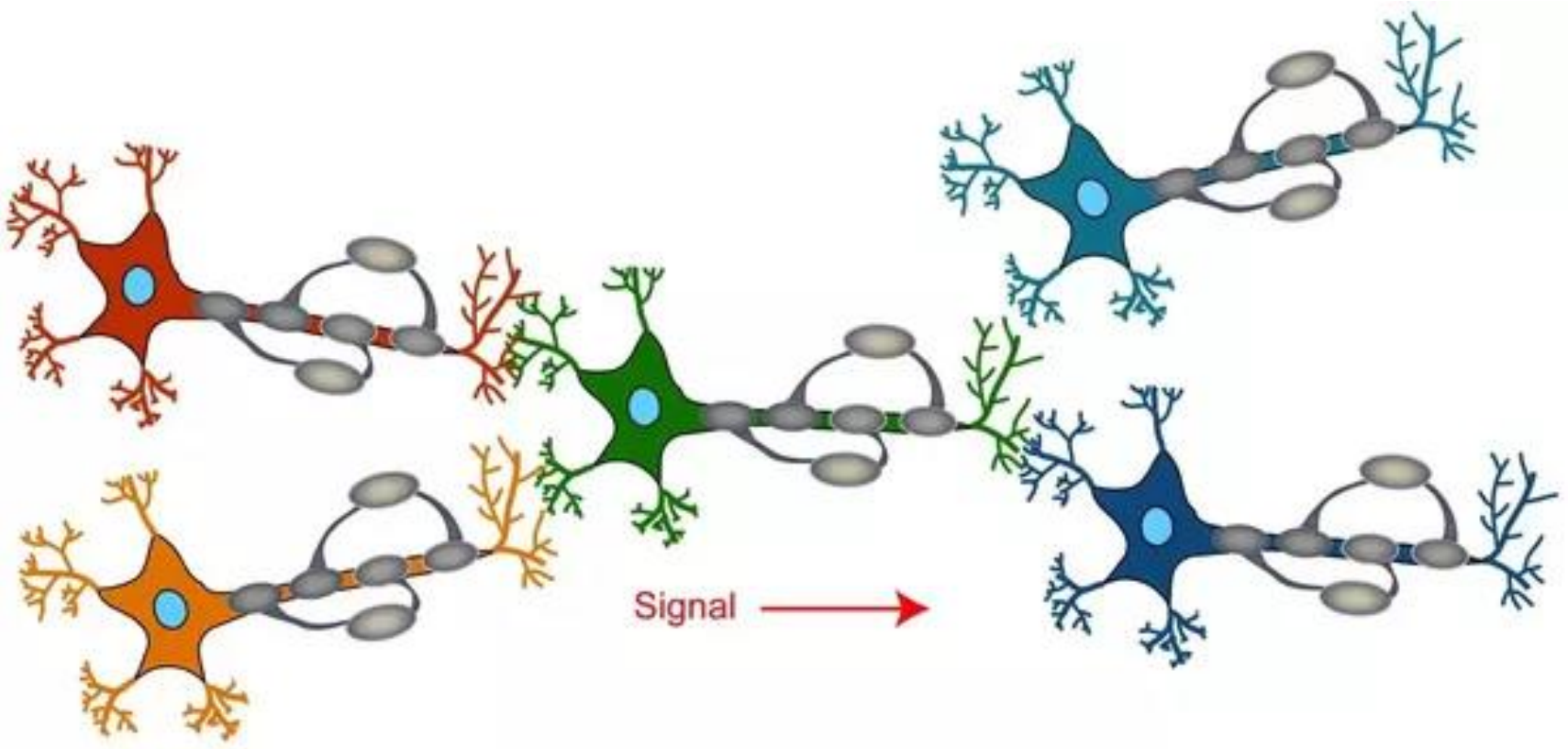
Artificial Neural Networks when more neurons are connected



Deep Learning when even more neurons connected



What makes human able to learn?



Computer Vision

"Is there a dog in this picture?"

After 50 years of work, computer vision systems got this right 72% of the time.

A whole class of similar problems – easy for people and hard/impossible for computers.

Consensus: decades more work.

Then, in 2013, machine learning.

AlphaGo Winning Game Against Lee Sedol. Lee Sedol is 18-time World Champion.

- Adult
- Pants
- Male
- Upper garment grey
- Lower garment grey
成人
长裤
男
上身蓝色
下身灰色
成人
短袖
女
上身粉色
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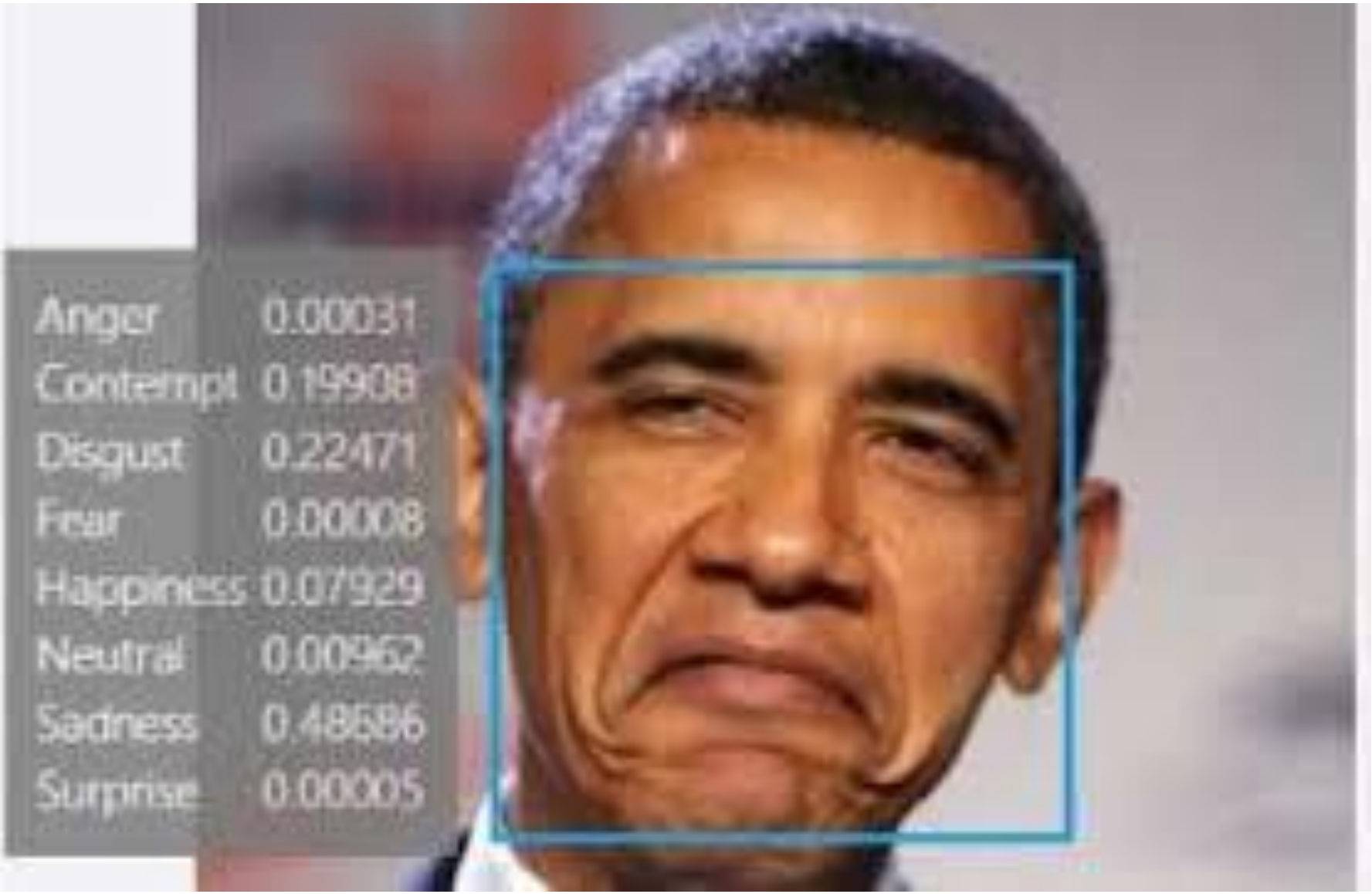
撰文：盧勁揚 2018-10-24 17:42 最後更新日期：2018-10-24 17:42

四大天王之一的張學友近年在內地開了多場演唱會，除了將歌聲帶給樂迷之外，同時亦將大量逃犯「繩之於法」，因而被譽為「逃犯剋星」。有內地媒體分析，張學友可以「協助」拘捕多達55名逃犯的「四大原因」，當中包括張學友的走紅時間、演唱會選址、歌曲風格及逃犯心理等等。

《愛登士家庭》音樂劇


Anger 0.00031
Contempt 0.19908
Disgust 0.22471
Fear 0.00008
Happiness 0.07929
Neutral 0.00962
Sadness 0.48586
Surprise 0.00005

HOME › EXTREME › AI BEATS DOCTORS AT VISUAL DIAGNOSIS, OBSERVES MANY TIMES MORE LUNG CANCER SIGNALS

AI beats doctors at visual diagnosis, observes many times more lung cancer signals

By Graham Templeton on August 18, 2016 at 1:00 pm | 26 Comments

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A Chinese Robot Has Performed the World's First Automated Dent...

WORLD • CHINA

A Chinese Robot Has Performed the World's First Automated Dental Implant

By KEVIN LUI September 22, 2017

Robots could soon be operating on you by themselves at the dentist clinic.

In China, a robot d
what could be the v
South China Morni

HSBC Rc
Don't Wait F
Better Job. A

Harvard Business Review

INFORMATION & TECHNOLOGY

Technology Will Replace Many Doctors, Lawyers, and Other Professionals

by Richard Susskind and Daniel Susskind

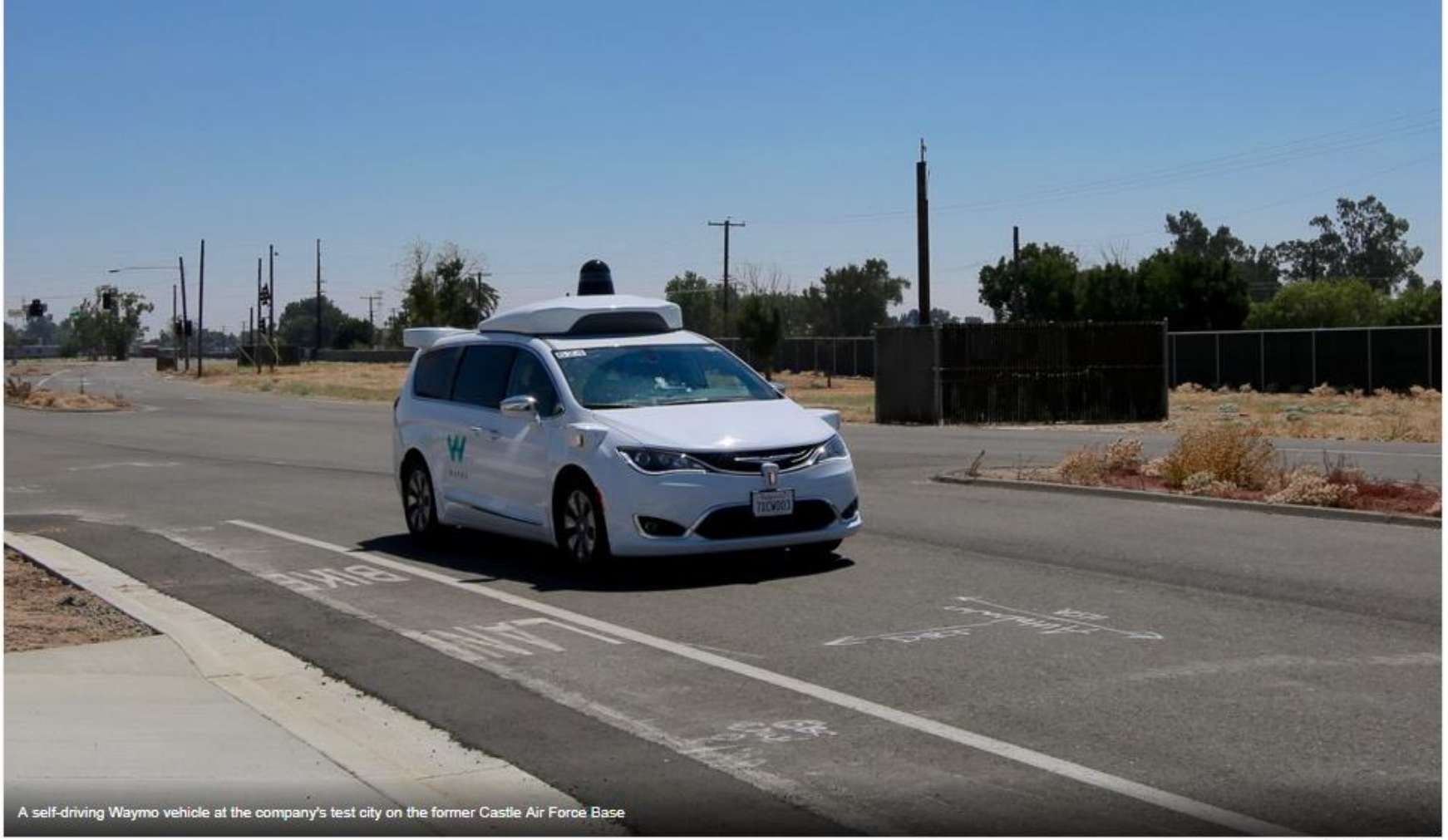
OCTOBER 11, 2016

SAVE SHARE 26 COMMENT TEXT SIZE PRINT $8.95 BUY COPIES

A24 國際

既是圍棋大師 又能行醫救人

谷歌AI看眼病比大夫還準



A self-driving Waymo vehicle at the company's test city on the former Castle Air Force Base

Alexis Madrigal

Waymo Maintains Lead in Self-Driving Car Race

The California DMV just released hard numbers that confirm Google's lead in the race to develop self-driving cars.

ALEXIS C. MADRIGAL | JAN 31, 2018 | TECHNOLOGY

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ANALYZING EMOTIONS FROM VOCAL INTONATIONS

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WHY GO BEYOND THE VERBAL?

EMOTIONS DRIVE EVERYTHING WE DO, YET VOICE-

TECH INDUSTRY

AI beats humans in Stanford reading comprehension test

Alibaba and Microsoft put their AI to the test this month, literally. And their scores bested ours, but barely.

AI surpasses humans in comprehension test

By Tan Yingzi in Chongqing | chinadaily.com.cn | Updated: 2019-03-12 16:21

[Photo/IC]

JPMorgan Software Does in Seconds What Took Lawyers 360,000 Hours

By **Hugh Son**

February 28, 2017, 8:31 AM GMT+8 *Updated on* February 28, 2017, 8:24 PM GMT+8

- New software does in seconds what took staff 360,000 hours
- Bank seeking to streamline systems, avoid redundancies

Shrinking Banks

Front-office headcount has been falling amid pressures on costs

Artificially intelligent painters invent new styles of art

881

TECHNOLOGY 29 June 2017

Art for the AI generation

Art and Artificial Intelligence Laboratory, Rutgers University

AI-generated portrait sells for a whopping $432,000 at auction

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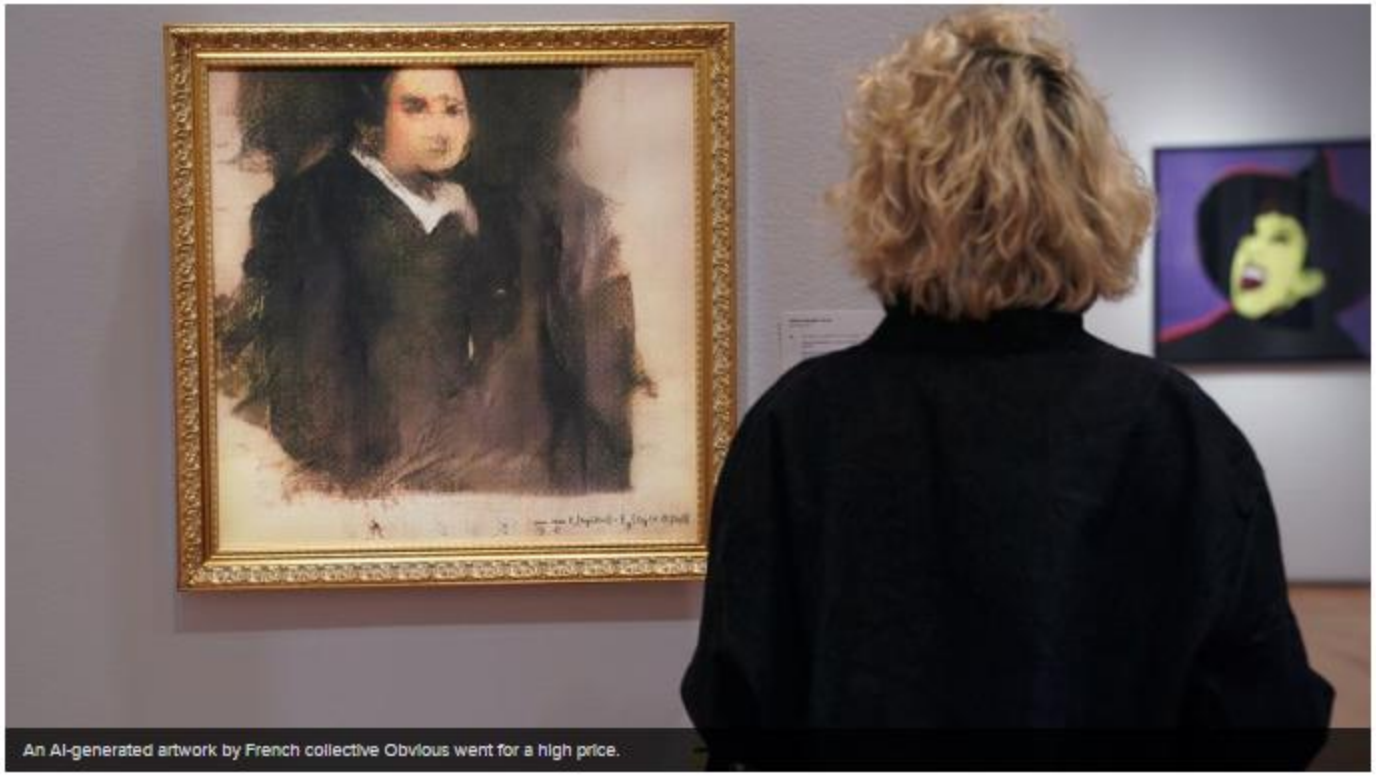

An AI-generated artwork by French collective Obvious went for a high price.

IMAGE: TIMOTHY A. CLARY / AFP/GETTY IMAGES

These Portraits Were Made by AI: None of These People Exist

DEC 17, 2018 MICHAEL ZHANG

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344 COMMENTS

《華西都市報》指，小冰的現代詩創作能力，師承1920年以來的519位中國現代詩人，包括胡適、李金發、林徽因、徐志摩、聞一多、余光中等，學習他們的上千首詩。經過6,000分鐘（約4天）、約1萬次反覆學

Could a lullaby written by an AI help you fall asleep? Robot-created tune claims to help cure insomnia

- **AI-created music was trained using sheet music in a computer-readable format**
- **It was created using deep learning based on layers of artificial neural networks**
- **Like the brain, if you show these networks complex data it can find patterns**

By PHOEBE WESTON FOR MAILONLINE
PUBLISHED: 15:17 GMT, 28 November 2017 | **UPDATED:** 15:22 GMT, 28 November 2017

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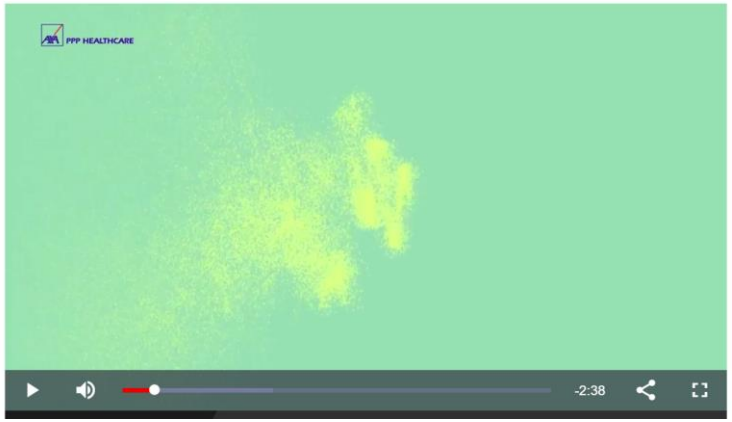
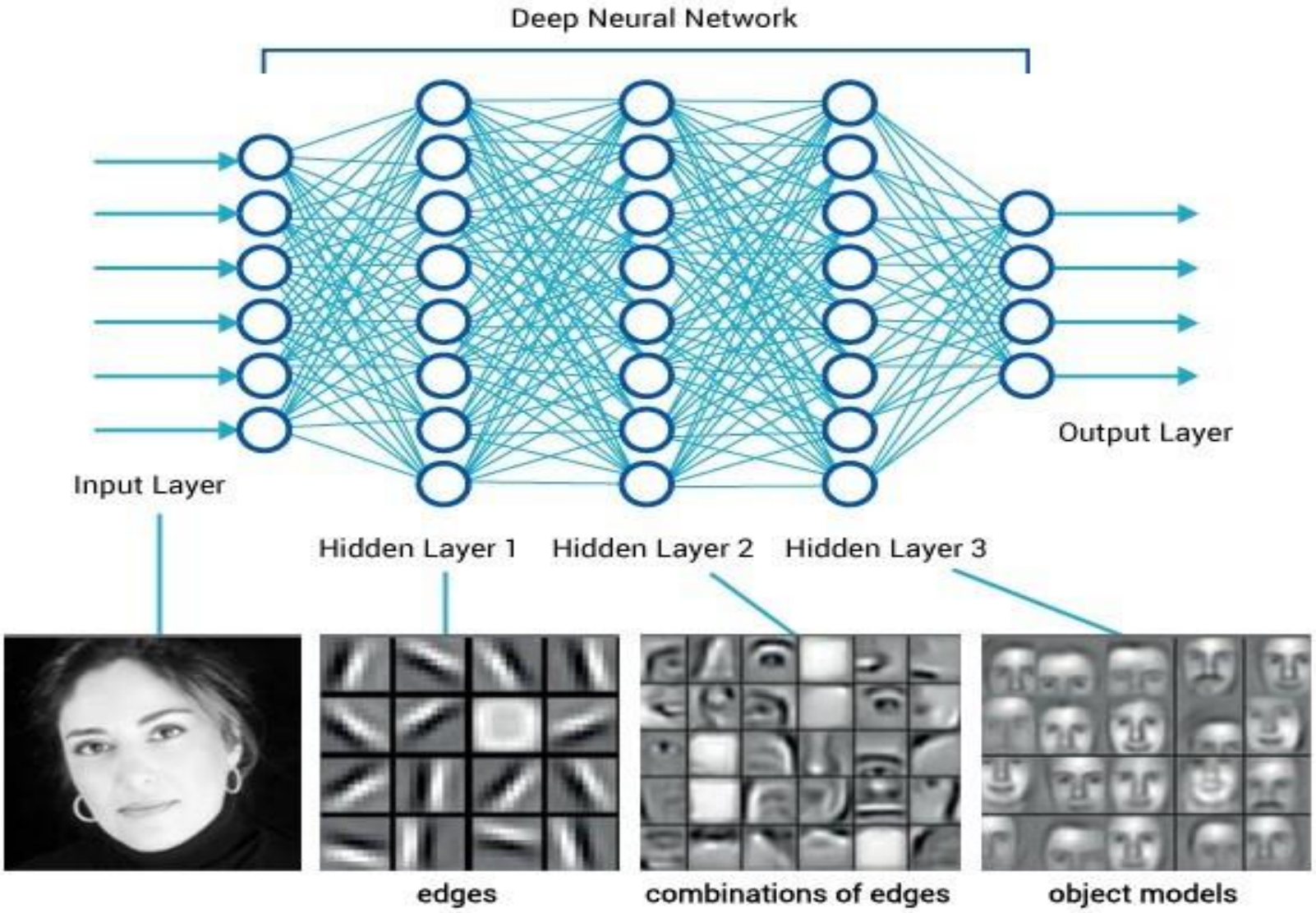
Lullabies have been helping people drift off to sleep since 2,000 BC - and now, more than 4,000 years latera an AI machine has made its own



Deep Learning when even more neurons connected



Interactive Map of Storm Damage by Mangkhut

山竹(1822)在香港造成的破壞 - 大嶼山2, Damages brought by Mangkhut (1822) in Hong Kon...
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SCHOOL PRIVATE LIGHT BUS

Tsing Yi (S)
青衣（南）
Kowloon
九龍

【智能城市】觀塘區安裝智慧燈柱　設監控攝影機　收集城市數據

18區新聞

讚好 1,794

撰文：鄧佩茹　2019-01-13 12:30　最後更新日期：2019-01-13 14:42

街燈除可用作環境照明，更可成為Wi-Fi和5G發射裝置的據點、監察交通情況、收集空氣質素及社區氣象等數據。政府為推動香港成為智慧城市，計畫今年率先在觀塘區安裝「多功能智慧燈柱」，預計相關安裝工程於2019年內完成。但署方

How Drones are being used in Disaster Management?

By **Lia Reich** - January 26, 2016

5

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1.2 million deaths. 2.9 billion people affected. $1.7 trillion in damages. According to data from the United Nations Office for Disaster Risk Reduction, these staggering figures are the total economic and human impact of global disasters from 2002 to 2012. With a steady growth in annual disasters, especially climate-related ones, emergency management strategies are being put under the microscope. Disaster management technologies, on the other hand, have seen some remarkable breakthroughs in the past decade.

930 views | Mar 15, 2019, 07:37am

How AI Can And Will Predict Disasters

Naveen Joshi Contributor
COGNITIVE WORLD Contributor Group ⓘ
AI & Big Data

DEPOSITPHOTOS.COM

Recently, the regions around the Dead Sea in Jordan were flooded, causing the death of 21 children who were on a school trip, and injuring 35 more. Such disasters affect millions of people every year

Social Media Analytics

How businesses are using social media?

72% 69% 68% 67% 31%

Plan to increase use of these social media channels in 2016

Top reason why B2B and B2C brands will be using Social Media

for business exposure and product awareness

to increase traffic to e-commerce / websites

for marketplace insights

Information Systems 69C (2017) 81–92

Contents lists available at ScienceDirect

Information Systems

journal homepage: www.elsevier.com/locate/is

Discovering public sentiment in social media for predicting stock movement of publicly listed companies

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Big data
SMeDA-SA
Parallel architecture

ABSTRACT

The popularity of many social n
possibility of mining social medi
public emotions shown through T
However, it remains unclear how
stock price movement of a parti
search void by proposing a techn
then predict the stock movemen
collected 200 million tweets that
or the New York Stock Exchange.
sages from these tweets to create
of a data mining algorithm to ex
sentiments in the tweets. With SI
be predicted rather accurately w
can be used to mine social media

IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS, VOL. 5, NO. 2, JUNE 2018 391

Corporate Communication Network and Stock Price Movements: Insights From Data Mining

Pei-Yuan Zhou, Keith C.C. Chan, *Member, IEEE,* and Carol Xiaojuan Ou

***Abstract*— Grounded on communication theories, we propose to use a data-mining algorithm to detect communication patterns within a company to determine if such patterns may reveal the performance of the company. Specifically, we would like to find out whether or not there exist any association relationships between the frequency of e-mail exchange of the key employees in a company and the performance of the company as reflected in its stock prices. If such relationships do exist, we would also like to know whether or not the company's stock price could be accurately predicted based on the detected relationships. To detect the association relationships, a data-mining algorithm is proposed here to mine e-mail communication records and historical stock prices so that based on the detected relationship, rules that can predict changes in stock prices can be constructed. Using the data-mining algorithm and a set of publicly available Enron e-mail corpus and Enron's stock prices recorded during the same period, we discovered the existence of interesting, statistically significant, association relationships in the data. In addition, we also discovered that these relationships can predict stock price movements with an average accuracy of around 80%. The results confirm the belief that corporate communication has identifiable patterns and such patterns can reveal meaningful information of corporate performance as reflected by such indicators as stock market performance. Given the increasing popularity of social networks, the mining of interesting communication patterns could provide insights into the development of many useful applications in many areas.**

***Index Terms*— Corporate communication, data mining, organizational performance, stock prediction.**

I. Introduction

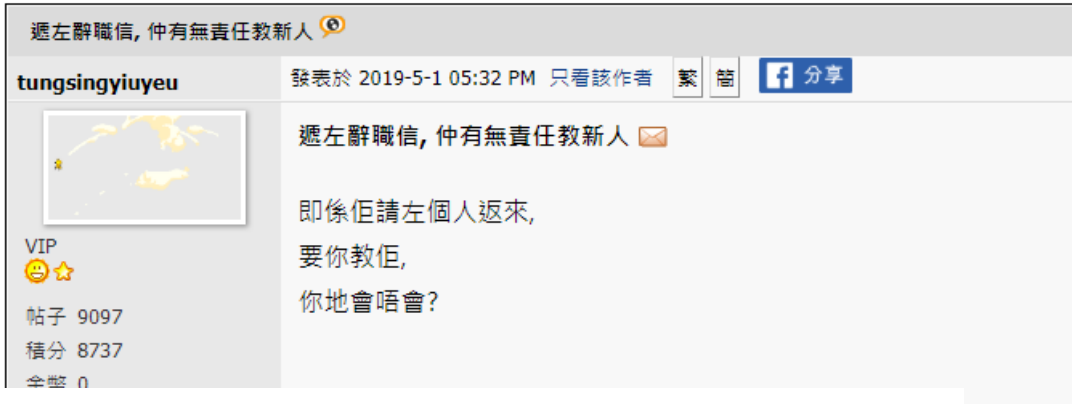
RECENT research reveals the existence of interesting communication patterns [1] among different participants of different social network platforms. These patterns have been shown to be useful in predicting product sales [2] and stock prices [3]. Compared to a social network, which can be considered as representing connections among people in the public, a corporate network connects only employees in a big corporation. While participants of a social network can express opinions on any issues of interest, members of a corporate sales or stock performance, one may wonder if such patterns also exist among members in corporate communication network to allow the same to be done.

Unlike social networks, in a corporate communication network, e-mails have long been used as a tool for interorganizational and intraorganizational information exchange. In the same way, a social network platform is able to capture participants' behavior and their opinions about various issues and events. Thus, we argue that a corporate communication network in the form of an e-mail ecosystem also contains insightful information, such as organizational stability and robustness [4], about a company's development.

We believe our argument is in line with corporate communication theory [5], which suggests that "employee communications can mean the success or failure of any major change program" resulting from a merger, acquisition, new venture, new process improvement approach, or other management issues. In other words, employee communication can serve a critical "business function that drives performance and contributes to a company's financial success" [6].

Based on these broad corporate communication theories, we hypothesize that every company has its own communication approach with identifiable patterns. We believe that these communication patterns can reflect how a company manages major corporate activities (such as mergers, acquisitions, new ventures, new process improvement approaches, going concerns, or bankruptcy) that may subsequently affect the company's performance in the stock market.

In this paper, we propose that a company's performance, in terms of its stock price movement, can be predicted by internal communication patterns. To obtain early warning signals, we believe that it is important for patterns in corporate communication networks to be detected earlier for the prediction of significant stock price movement to avoid possible adversities that a company may face in the stock market so that



1. 初步斷詞 → 先將句子拆成一個個詞
2. 未知詞偵測 → 找出哪些詞不存在於資料庫
3. 中國人名擷取 → 判斷這個未知詞是不是中文人名
4. 歐美譯名擷取 → 判斷這個未知詞是不是歐美人名翻譯
5. 複合詞擷取 → 分析未知詞的詞性結構
6. bottom-up merging algorithm → 運用統計方法找出專有詞彙
7. 重新斷詞 → 重新將句子拆成一個個詞

Q&A