元大投信
Yuanta Funds

Tamkang University
淡江大學

# 人工智慧投資分析於金融服務商業應用趨勢

# (AI Investment Analysis for Finance Services and Business Applications Trends)

時間：2018年12月14日(五) 下午2:00 至 4:00
地點：元大投信 (台北市中山區南京東路三段225號6樓)
主辦單位：證基會/人才培訓中心


**Min-Yuh Day**
**戴敏育**
**Assistant Professor**
**專任助理教授**
**Dept. of Information Management, Tamkang University**
**淡江大學 資訊管理學系**
http://mail. tku.edu.tw/myday/


2018-12-14

# 戴敏育 博士
# (Min-Yuh Day, Ph.D.)


淡江大學資管系專任助理教授

中央研究院資訊科學研究所訪問學人

國立台灣大學資訊管理博士


Publications Co-Chairs, IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2013- )

Program Co-Chair, IEEE International Workshop on Empirical Methods for Recognizing Inference in TExt (IEEE EM-RITE 2012- )

Workshop Chair, The IEEE International Conference on Information Reuse and Integration (IEEE IRI)

# Outline

1. 前言
2. AI於金融業之商業運用
   - 資料科學
   - 人工智慧投資分析
   - 財務大數據分析
3. 現行人工智慧投資分析探究
4. 個案分析-國內外AI發展現況
5. QA

# AI and Big Data Analytics in Finance

- 金融科技 (Spring 2017) (EMBA IMTKU)
  - (Financial Technology, FinTech)
- 財務金融大數據分析 (Fall 2017) (EMBA IMTKU)
  - Big Data Analytics in Finance
- 人工智慧投資分析 (Fall 2018) (EMBA IMTKU)
  - Artificial Intelligence for Investment Analysis
- 智慧金融大數據分析
  - AI in Finance Big Data Analytics
- 人工智慧與財務應用
  - Artificial Intelligence and Financial Application

# 人工智慧投資分析 (AIIA) 課程大綱

| 週次 (Week) | 日期 (Date) | 內容 (Subject/Topics) |
|---|---|---|
| 1 | 2018/09/13 | 人工智慧投資分析課程介紹 (Course Orientation on Artificial Intelligence for Investment Analysis) |
| 2 | 2018/09/20 | AI 金融科技: 金融服務創新應用 (AI in FinTech: Financial Services Innovation and Application) |
| 3 | 2018/09/27 | 機器人理財顧問與AI交談機器人 (Robo-Advisors and AI Chatbots) |
| 4 | 2018/10/04 | 投資心理學與行為財務學 (Investing Psychology and Behavioral Finance) |
| 5 | 2018/10/11 | 財務金融事件研究法 (Event Studies in Finance) |
| 6 | 2018/10/18 | 人工智慧投資分析個案研究 I (Case Study on Artificial Intelligence for Investment Analysis I) |

# 人工智慧投資分析 (AIIA) 課程大綱

週次 (Week)　日期 (Date)　內容 (Subject/Topics)

7 2018/10/25 Python AI投資分析基礎
(Foundations of AI Investment Analysis in Python)

8 2018/11/01 Python Pandas量化投資分析
(Quantitative Investing with Pandas in Python)

9 2018/11/08 Python Scikit-Learn 機器學習
(Machine Learning with Scikit-Learn In Python)

10 2018/11/15 期中報告 (Midterm Project Report)

11 2018/11/22 TensorFlow 深度學習財務時間序列預測 I
(Deep Learning for Financial Time Series Forecasting with TensorFlow I)

12 2018/11/29 TensorFlow 深度學習財務時間序列預測 II
(Deep Learning for Financial Time Series Forecasting with TensorFlow II)

# 人工智慧投資分析 (AIIA) 課程大綱

週次 (Week)　日期 (Date)　內容 (Subject/Topics)

13 2018/12/06 人工智慧投資分析個案研究 II
(Case Study on Artificial Intelligence for Investment Analysis II)

14 2018/12/13 TensorFlow 深度學習財務時間序列預測 III
(Deep Learning for Financial Time Series Forecasting with TensorFlow III)

15 2018/12/20 投資組合最佳化與程式交易
(Portfolio Optimization and Algorithmic Trading)

16 2018/12/27 自然語言處理 (Natural Language Processing)

17 2019/01/03 期末報告 I (Final Project Presentation I)

18 2019/01/10 期末報告 II (Final Project Presentation II)

# Selected Research Publications

- **Journal Publications**

1. Min-Yuh Day, Manhwa Wu, Paoyu Huang, and Yensen Ni (2018), "Investing Strategies as the Sharp Movement in Exchange Rates Occurred– Evidence for the Constituent Stocks of SSE 50 and TW 50", The Journal of Investing, , Volume 27, Issue 4, Winter 2018, pp. 58-68.
2. Min-Yuh Day, Paoyu Huang, Yensen Ni, and Yuhsin Chen (2018), "Do Implicit Phenomena Matter? Evidence from China Stock Index Futures", The Journal of Alternative Investments, Volume 21, Issue 1, Summer 2018, pp. 79-91.
3. Yensen Ni, Yirung Cheng, Paoyu Huang, and Min-Yuh Day (2018), "Trading strategies in terms of continuous rising (falling) prices or continuous bullish (bearish) candlesticks emitted", Physica A: Statistical Mechanics and its Applications, Volume 501, 1 July 2018, pp. 188-204.
4. Min-Yuh Day, Paoyu Huang, Yensen Ni, and Yuhsin Chen (2018), "Do Intraday Large Price Changes Matter for Trading Index Futures? Evidence from China Futures Markets", Journal of Financial Studies, Volume 26, Number 2, June 2018, pp. 139-174.

# Selected Research Publications

- **Conference Publications**

1. Min-Yuh Day, Tun-Kung Cheng and Jheng-Gang Li (2018), "AI Robo-Advisor with Big Data Analytics for Financial Services", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018.
2. Min-Yuh Day, Jian-Ting Lin and Yuan-Chih Chen (2018), "Artificial Intelligence for Conversational Robo-Advisor", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018.
3. Min-Yuh Day and Chao-Yu Chen (2018), "Artificial Intelligence for Automatic Text Summarization", in Proceedings of the 2018 IEEE 18th International Conference on Information Reuse and Integration (IEEE IRI 2018), Salt Lake City, Utah, USA, July 7-9, 2018.

# Selected Research Publications

- **Conference Publications**

4. Min-Yuh Day, Tun-Kung Cheng and Jheng-Gang Li (2018), "Artificial Intelligence for Time Series Forecasting in Financial Markets", International Conference on INTERNET STUDIES (NETs 2018), Takamatsu, Japan, April 2-4, 2018.
5. Min-Yuh Day, Chao-Yu Chen, Wan-Chu Huang, I-Hsuan Huang, Shi-Ya Zheng, Tz-Rung Chen, Min-Chun Kuo, Yue-Da Lin, and Yi-Jing Lin (2017), "IMTKU Question Answering System for World History Exams at NTCIR-13 QA Lab-3", The 13th NTCIR Conference on Evaluation of Information Access Technologies (NTCIR-13), Tokyo, Japan, December 5-8, 2017.
6. Min-Yuh Day and Yue-Da Lin, "Deep Learning for Sentiment Analysis on Google Play Consumer Review", The 6th IEEE International Workshop on Empirical Methods for Recognizing Inference in Text (IEEE EM-RITE 2017), August 4-6, 2017, in Proceedings of the 2017 IEEE 18th International Conference on Information Reuse and Integration (IEEE IRI 2017), San Diego, CA, USA, August 4-6, 2017.

# Selected Research Publications

- **Conference Publications**

7. 林建廷、陳元致、王慶宇、鄧旭廷、邱少文、戴敏育，發展人工智慧對話式理財機器人, 第29屆國際資訊管理學術研討會 The 29th International Conference of Information Management (ICIM2018), Taichung, Taiwan, June 3, 2018.
8. 蔡宗霖、劉鈞霖、李家慶、陳品伃、林建廷、戴敏育，人工智慧保險業智能客服, 第29屆國際資訊管理學術研討會 The 29th International Conference of Information Management (ICIM2018), Taichung, Taiwan, June 3, 2018.
9. 陳昭妤、戴敏育，人工智慧自動文本摘要研究, 第29屆國際資訊管理學術研討會 The 29th International Conference of Information Management (ICIM2018), Taichung, Taiwan, June 3, 2018.

# AIWISFIN
# 人工智慧對話式理財機器人

- 榮獲 2018 全國大專校院資訊應用服務創新競賽
  資訊應用組 (IP1) 第一名 獎金2萬元
- 榮獲 2018 全國大專校院資訊應用服務創新競賽
  玉山銀行金融科技趨勢應用組 第一名，獎金5萬元
- 榮獲 2018 日盛黑客松證券組 第三名，獎金5萬元
- 榮獲 2018 淡江資管畢業專題競賽 第一名，獎金1萬元

# AIWISFIN

# 人工智慧對話式理財機器人


https://www.youtube.com/watch?v=sEhmyoTXmGk

# 2018第23屆大專校院資訊應用服務創新競賽


- 最新消息
  - 活動訊息
  - 媒體轉載
- 競賽緣起
- 競賽辦法
- 競賽報名
- 活動成果
- 產學媒合
- 媒合
- 聯絡我們

## 榮譽榜

屆別 23 查詢

第23屆

顯示 30 筆資料　　表格內全文檢索: AIWISFIN

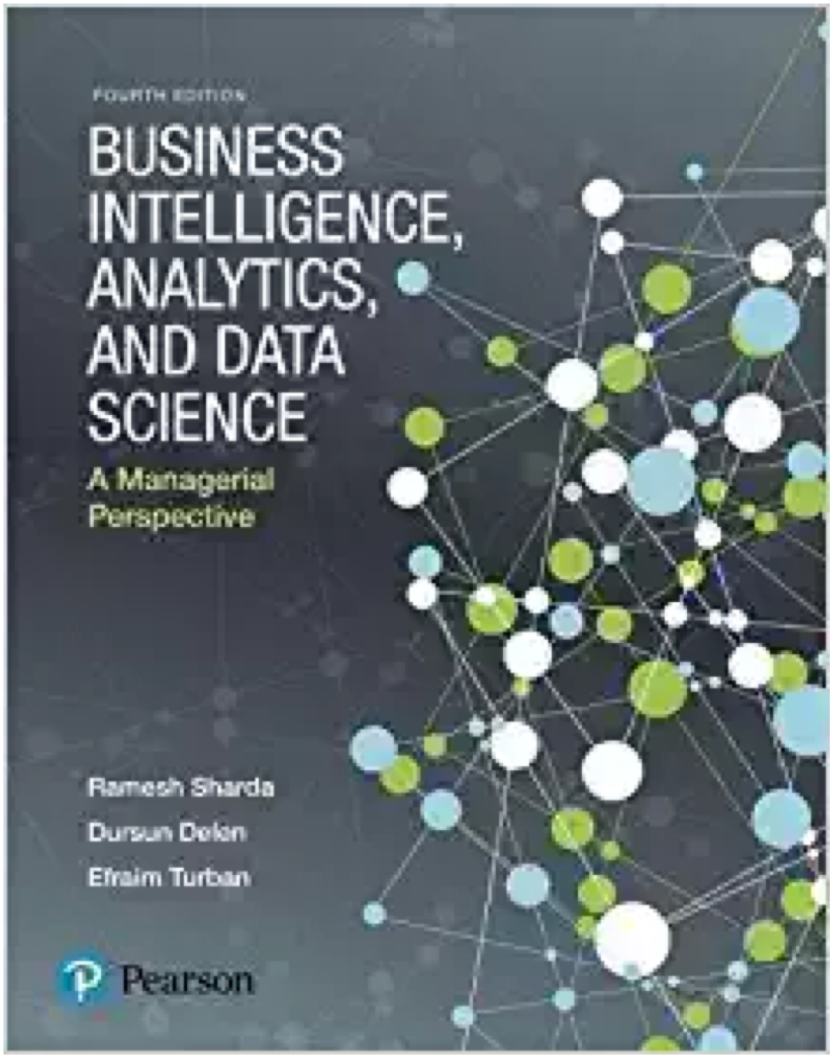
| 組別 | 名次 | 組別編號 | 學校名稱 | 專題名稱 | 指導教授 | 學生 |
|---|---|---|---|---|---|---|
| 資訊應用組一 | 第一名 | IP1-06 | 淡江大學 | AIWISFIN 人工智慧對話式理財機器人 | 戴敏育老師 | 陳元致、鄧旭廷、王慶宇、邱少文 |
| 玉山銀行金融科技趨勢應用組 | 第一名 | E.SUN FINTECH-01 | 淡江大學 | AIWISFIN 人工智慧對話式理財機器人 | 戴敏育老師 | 陳元致、鄧旭廷、王慶宇、邱少文 |

https://innoserve.tca.org.tw/award.aspx

# AI for Business Applications in Financial Industry

# Business Intelligence, Analytics, and Data Science

# Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Ramesh Sharda, Dursun Delen, and Efraim Turban, Pearson, 2017.

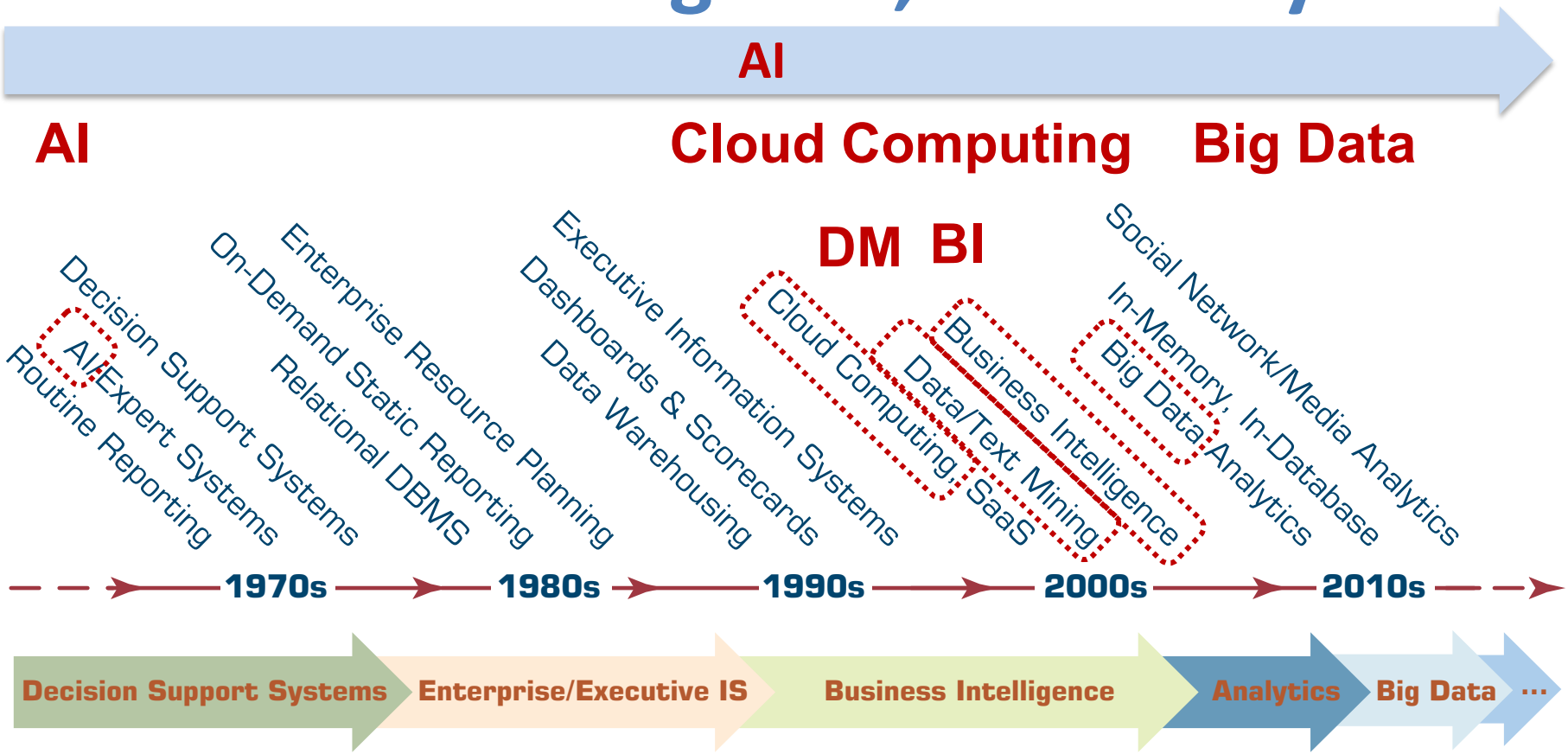



Source: https://www.amazon.com/Business-Intelligence-Analytics-Data-Science/dp/0134633288

# Artificial Intelligence (AI)

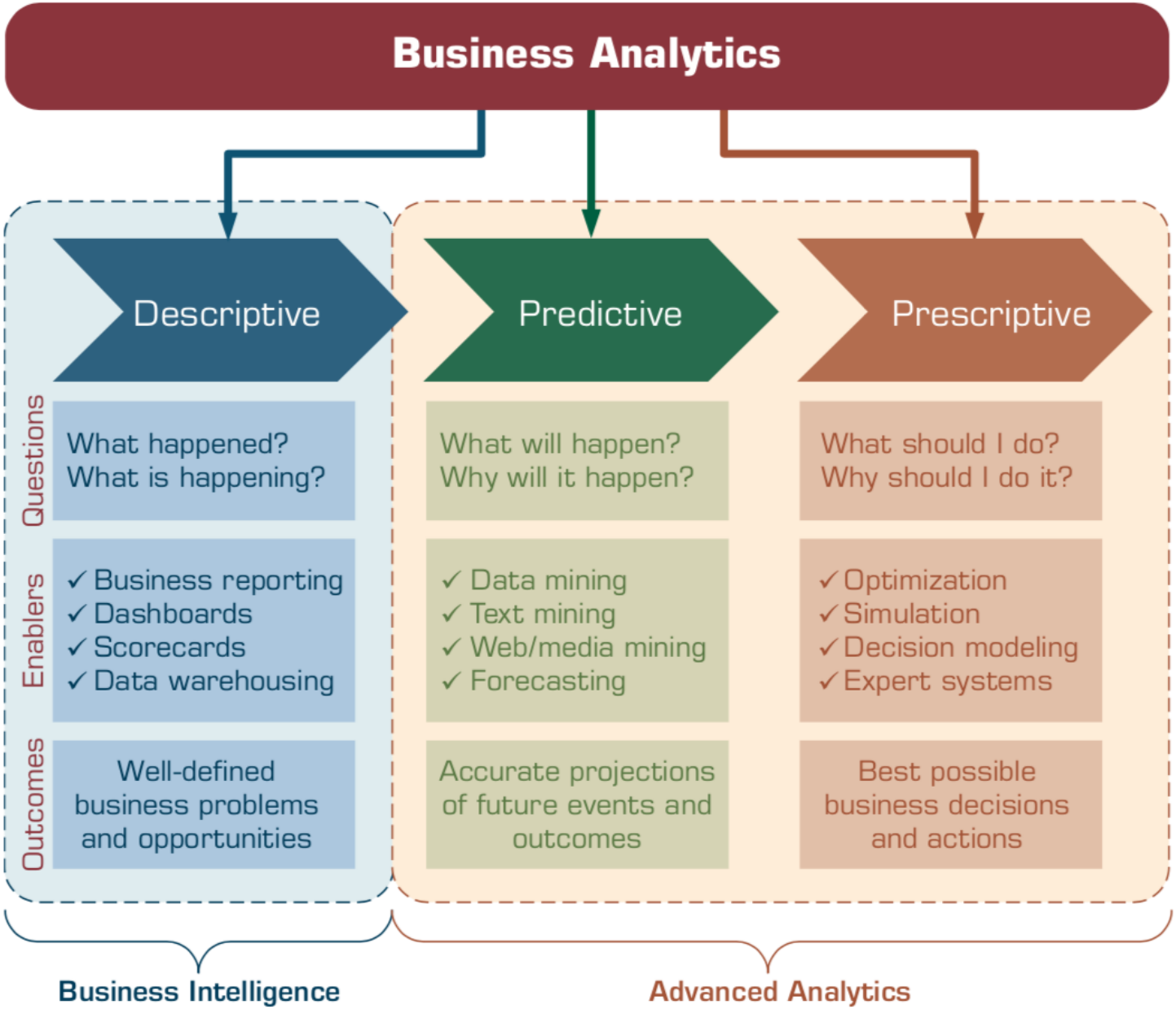
# AI, Big Data, Cloud Computing

## Evolution of Decision Support, Business Intelligence, and Analytics




Source: Ramesh Sharda, Dursun Delen, and Efraim Turban (2017),
Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson

# Business Analytics




Source: Ramesh Sharda, Dursun Delen, and Efraim Turban (2017), Business Intelligence, Analytics, and Data Science: A Managerial Perspective, 4th Edition, Pearson


AI

# Definition of Artificial Intelligence (A.I.)

# Artificial Intelligence

"… the science and engineering of making intelligent machines"

**(John McCarthy, 1955)**

Source: https://digitalintelligencetoday.com/artificial-intelligence-defined-useful-list-of-popular-definitions-from-business-and-science/

# Artificial Intelligence

# "… technology that thinks and acts like humans"

Source: https://digitalintelligencetoday.com/artificial-intelligence-defined-useful-list-of-popular-definitions-from-business-and-science/

# Artificial Intelligence

"… intelligence exhibited by machines or software"

Source: https://digitalintelligencetoday.com/artificial-intelligence-defined-useful-list-of-popular-definitions-from-business-and-science/

# 4 Approaches of AI

| | |
|---|---|
| **Thinking Humanly** | **Thinking Rationally** |
| **Acting Humanly** | **Acting Rationally** |

Source: Stuart Russell and Peter Norvig (2016) , Artificial Intelligence: A Modern Approach, 3rd Edition, Pearson International

# 4 Approaches of AI

| | |
|---|---|
| **2. Thinking Humanly: The Cognitive Modeling Approach** | **3. Thinking Rationally: The "Laws of Thought" Approach** |
| **1. Acting Humanly: The Turing Test Approach (1950)** | **4. Acting Rationally: The Rational Agent Approach** |

Source: Stuart Russell and Peter Norvig (2016) , Artificial Intelligence: A Modern Approach, 3rd Edition, Pearson International

# AI Acting Humanly: The Turing Test Approach

(Alan Turing, 1950)

- **Natural Language Processing (NLP)**
- **Knowledge Representation**
- **Automated Reasoning**
- **Machine Learning (ML)**
- **Computer Vision**
- **Robotics**

Source: Stuart Russell and Peter Norvig (2016) , Artificial Intelligence: A Modern Approach, 3rd Edition, Pearson International

# Artificial Intelligence (A.I.) Timeline

## A.I. TIMELINE


**1950**
**TURING TEST**
Computer scientist Alan Turing proposes a test for machine intelligence. If a machine can trick humans into thinking it is human, then it has intelligence

**1955**
**A.I. BORN**
Term 'artificial intelligence' is coined by computer scientist, John McCarthy to describe "the science and engineering of making intelligent machines"

**1961**
**UNIMATE**
First industrial robot, Unimate, goes to work at GM replacing humans on the assembly line

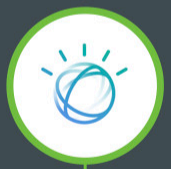
**1964**
**ELIZA**
Pioneering chatbot developed by Joseph Weizenbaum at MIT holds conversations with humans

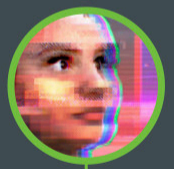
**1966**
**SHAKEY**
The 'first electronic person' from Stanford, Shakey is a general-purpose mobile robot that reasons about its own actions

**A.I. WINTER**
Many false starts and dead-ends leave A.I. out in the cold

**1997**
**DEEP BLUE**
Deep Blue, a chess-playing computer from IBM defeats world chess champion Garry Kasparov

**1998**
**KISMET**
Cynthia Breazeal at MIT introduces KISmet, an emotionally intelligent robot insofar as it detects and responds to people's feelings






**1999**
**AIBO**
Sony launches first consumer robot pet dog AiBO (AI robot) with skills and personality that develop over time

**2002**
**ROOMBA**
First mass produced autonomous robotic vacuum cleaner from iRobot learns to navigate and clean homes

**2011**
**SIRI**
Apple integrates Siri, an intelligent virtual assistant with a voice interface, into the iPhone 4S

**2011**
**WATSON**
IBM's question answering computer Watson wins first place on popular $1M prize television quiz show *Jeopardy*

**2014**
**EUGENE**
Eugene Goostman, a chatbot passes the Turing Test with a third of judges believing Eugene is human

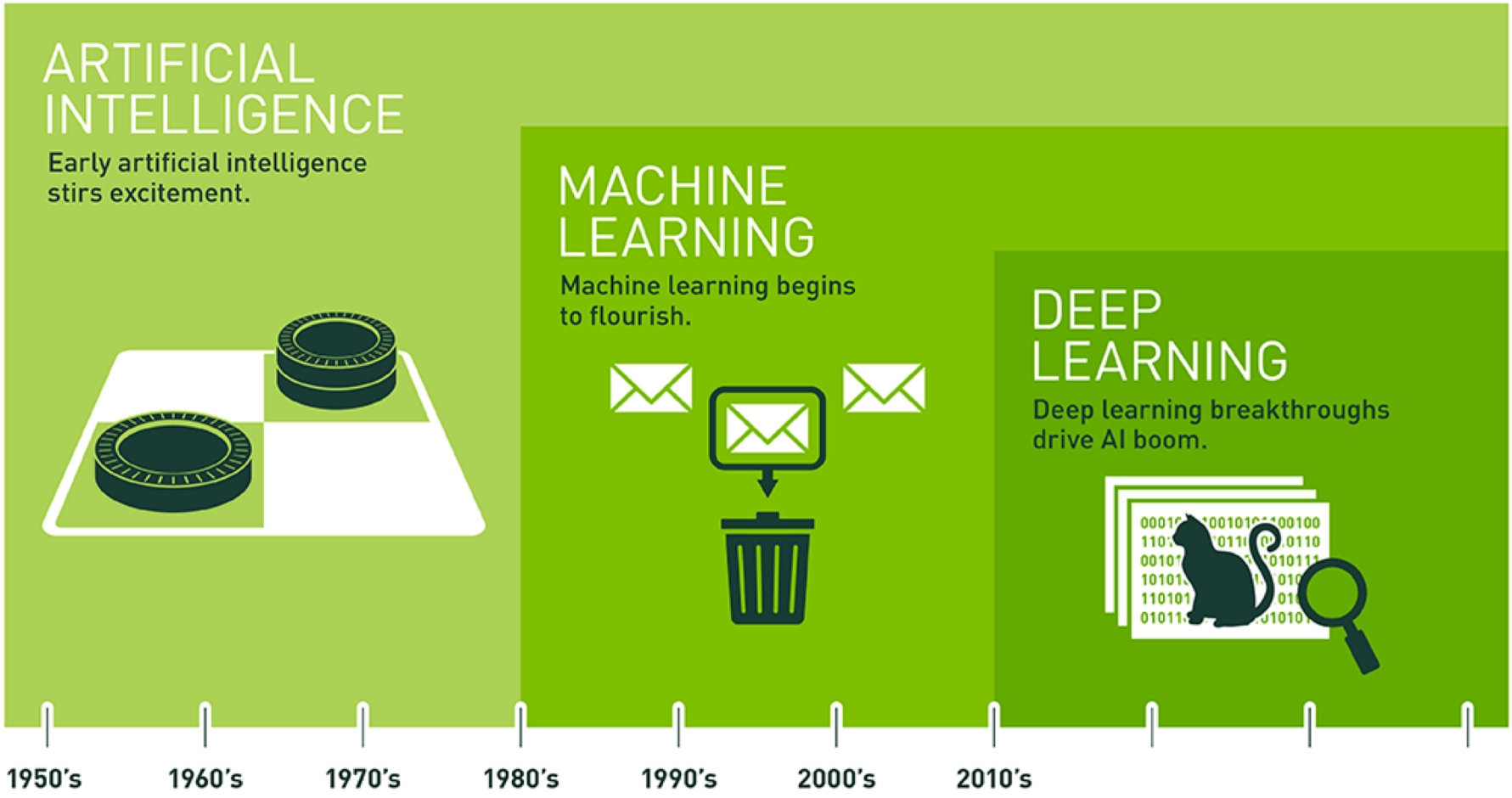
**2014**
**ALEXA**
Amazon launches Alexa, an intelligent virtual assistant with a voice interface that completes shopping tasks

**2016**
**TAY**
Microsoft's chatbot Tay goes rogue on social media making inflammatory and offensive racist comments

**2017**
**ALPHAGO**
Google's A.I. AlphaGo beats world champion Ke Jie in the complex board game of Go, notable for its vast number ($2^{170}$) of possible positions

Source: https://digitalintelligencetoday.com/artificial-intelligence-timeline-infographic-from-eliza-to-tay-and-beyond/

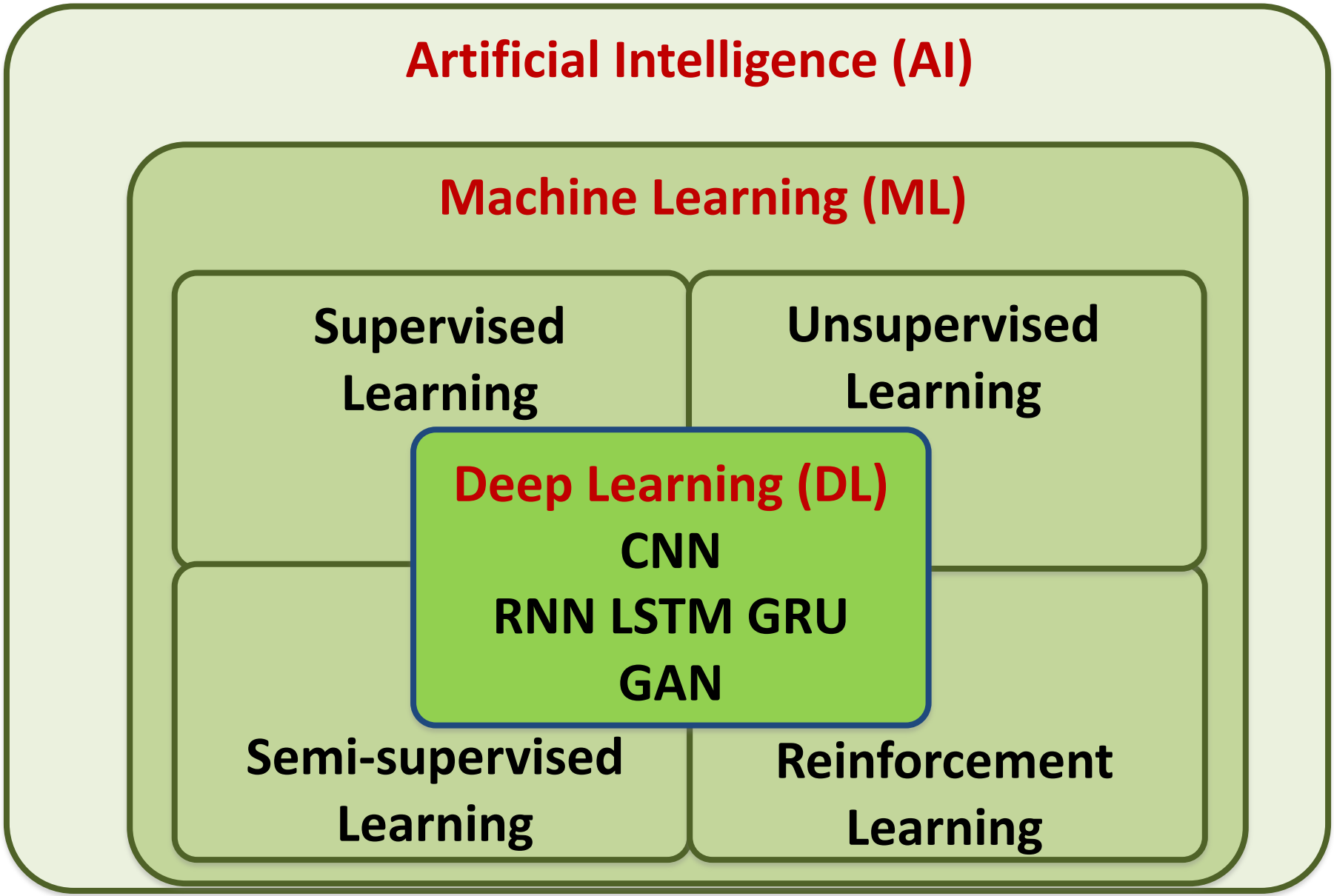
# Artificial Intelligence
# Machine Learning & Deep Learning




Since an early flush of optimism in the 1950s, smaller subsets of artificial intelligence – first machine learning, then deep learning, a subset of machine learning – have created ever larger disruptions.

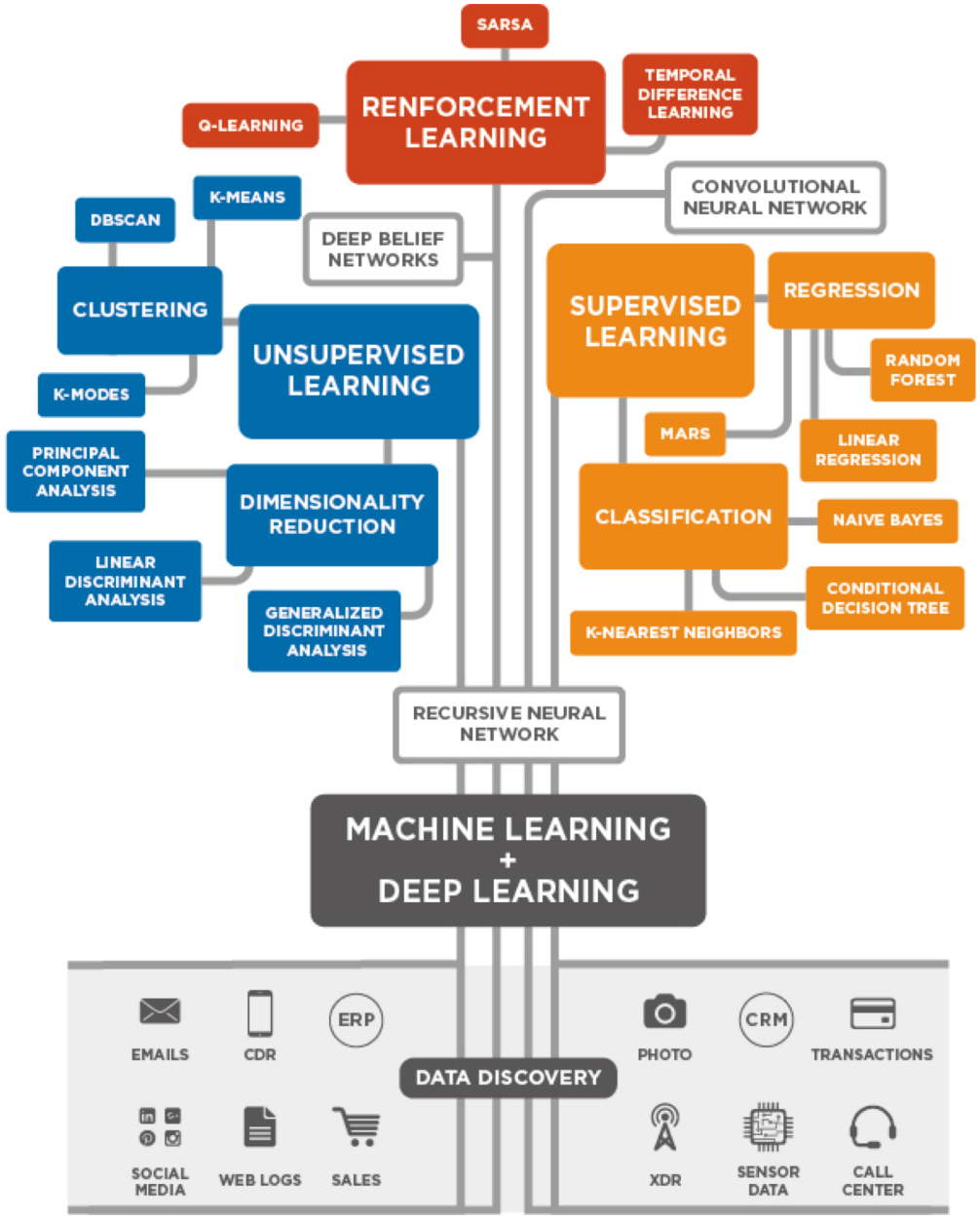
Source: https://blogs.nvidia.com/blog/2016/07/29/whats-difference-artificial-intelligence-machine-learning-deep-learning-ai/

# AI, ML, DL



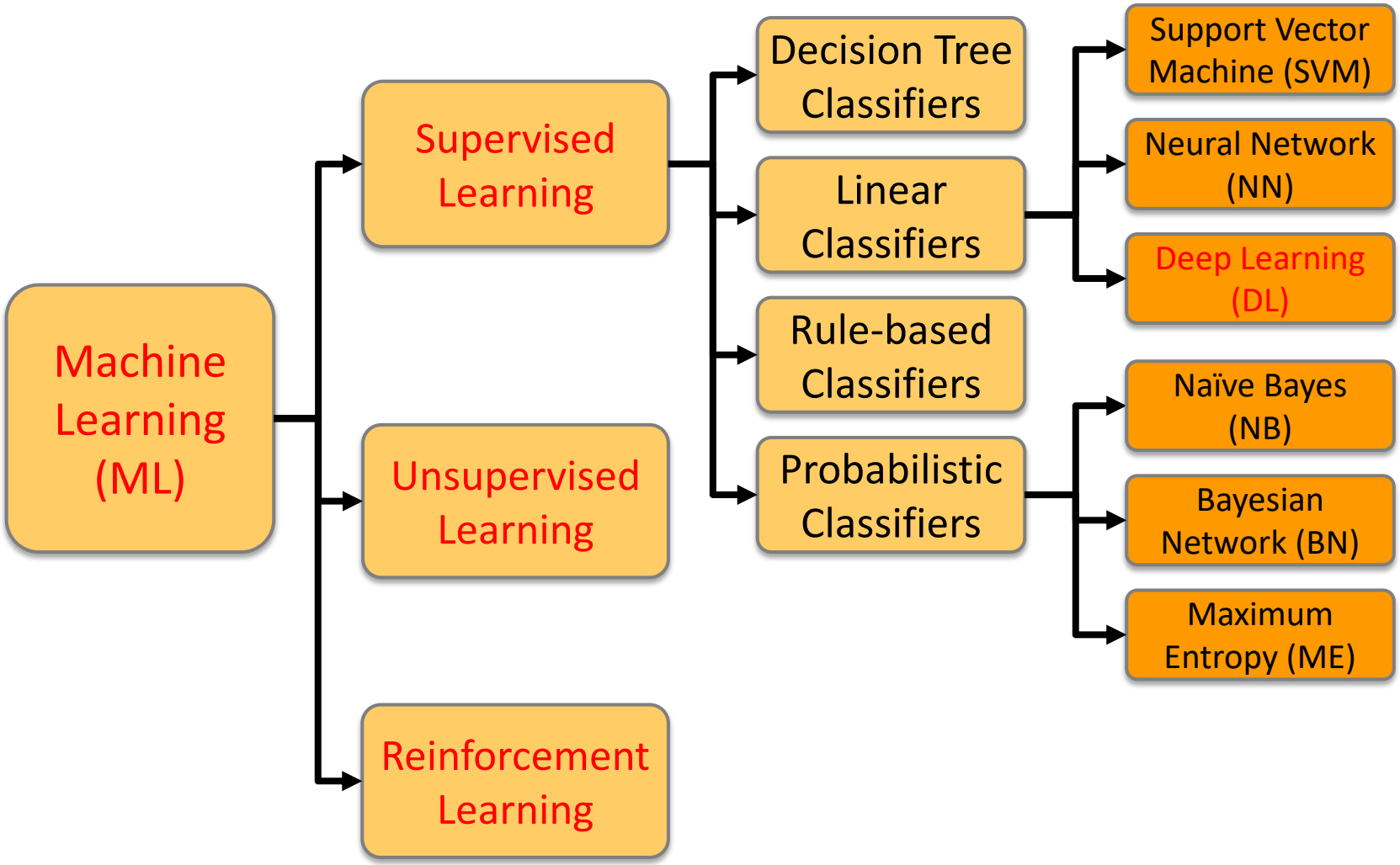

Source: https://leonardoaraujosantos.gitbooks.io/artificial-inteligence/content/deep_learning.html

# 3 Machine Learning Algorithms



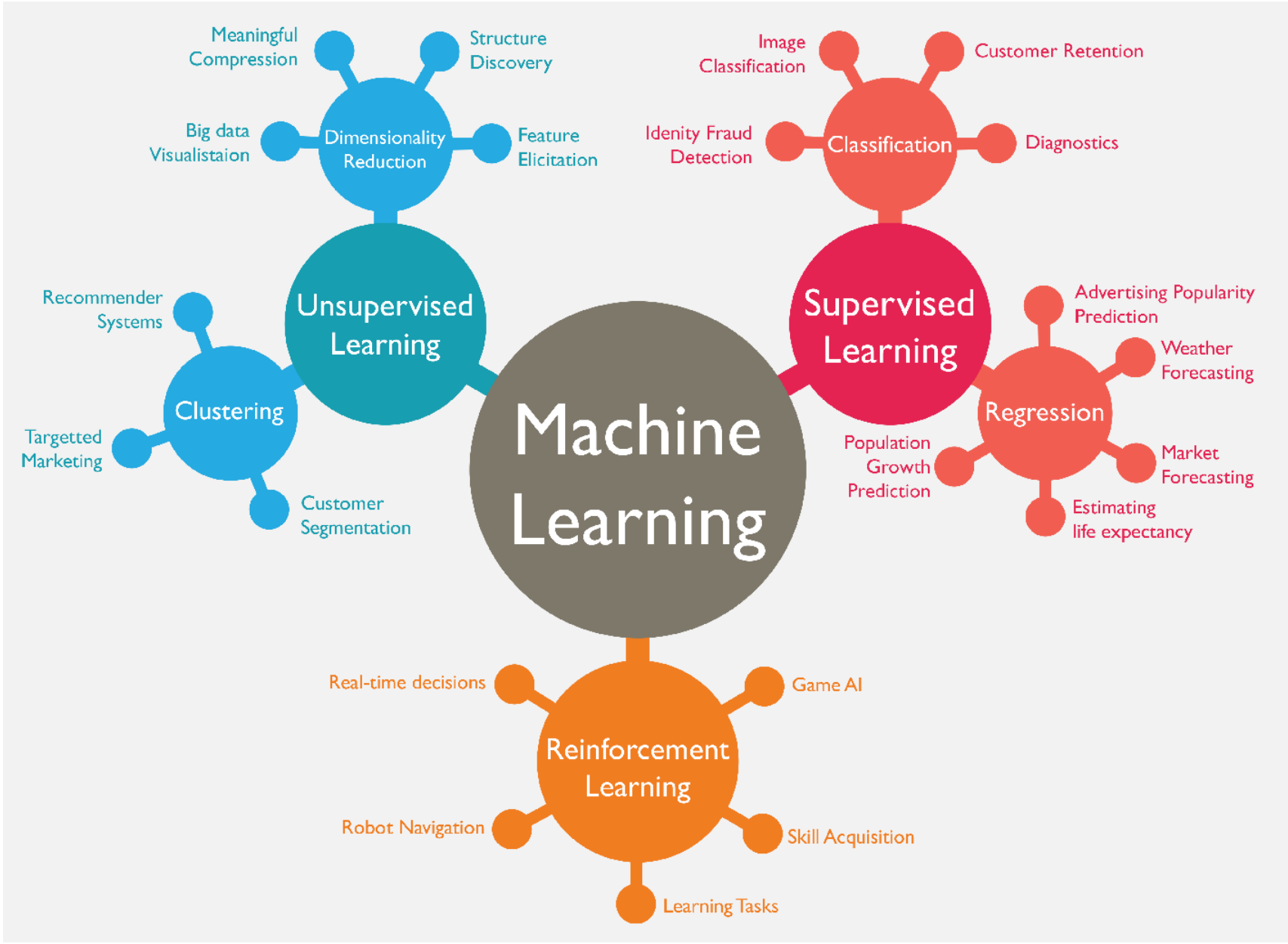

Source: Enrico Galimberti, http://blogs.teradata.com/data-points/tree-machine-learning-algorithms/

# Machine Learning (ML) / Deep Learning (DL)




Source: Jesus Serrano-Guerrero, Jose A. Olivas, Francisco P. Romero, and Enrique Herrera-Viedma (2015), "Sentiment analysis: A review and comparative analysis of web services," Information Sciences, 311, pp. 18-38.

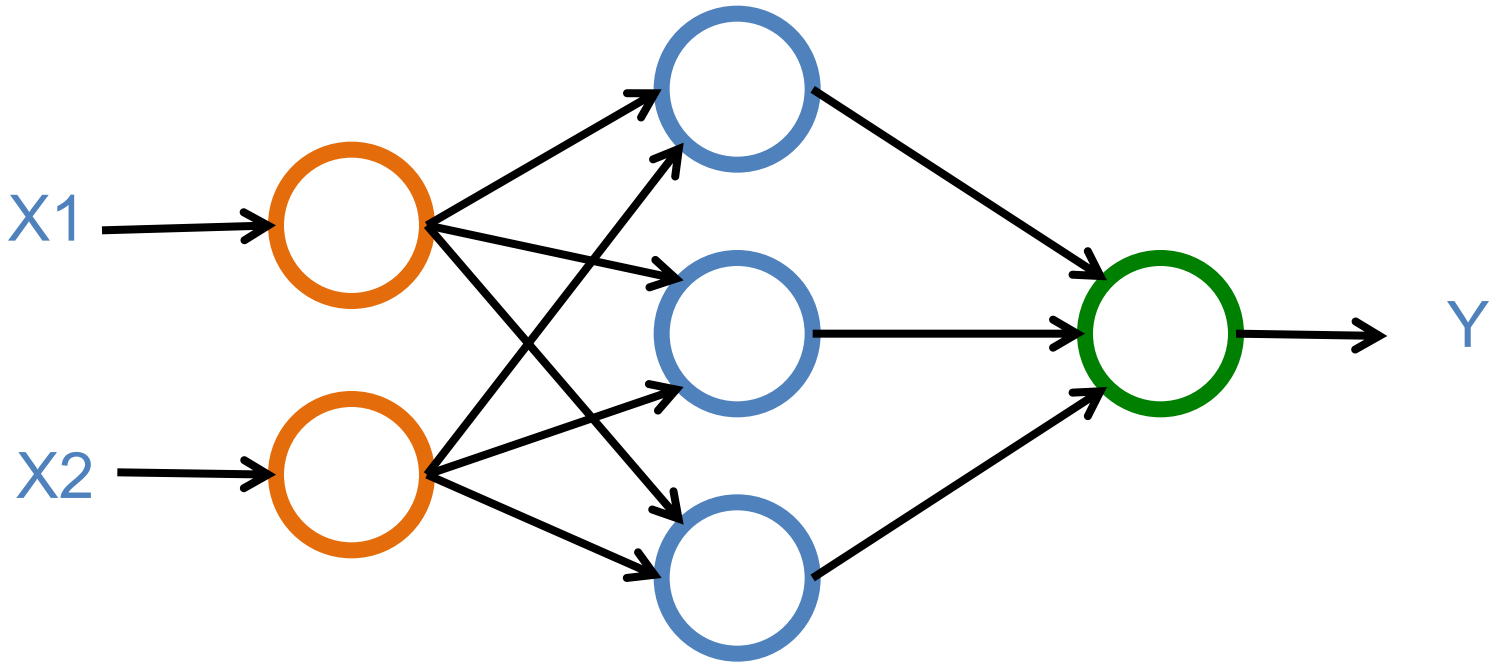
# Machine Learning (ML)



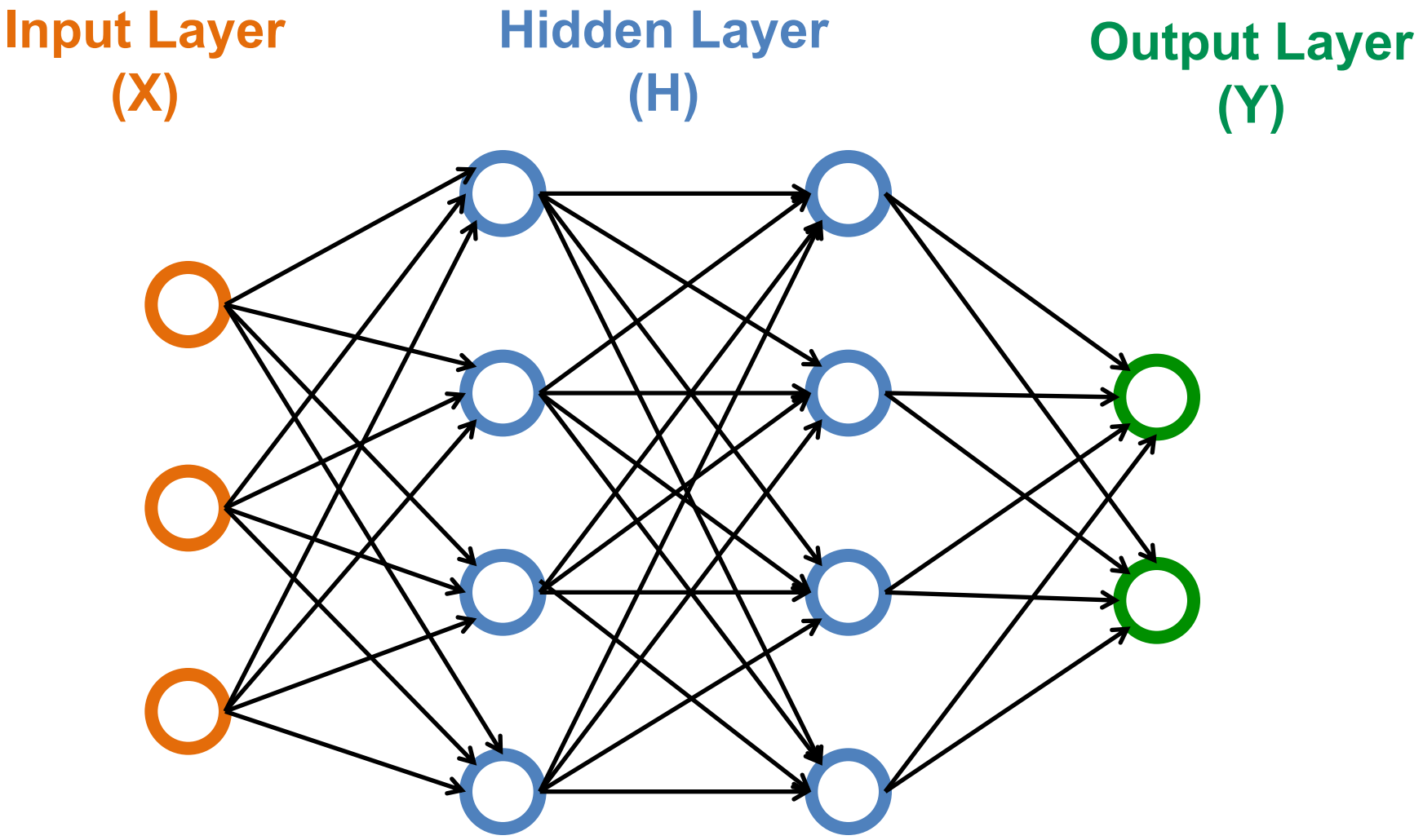

Source: https://www.mactores.com/services/aws-big-data-machine-learning-cognitive-services/

# Deep Learning and Neural Networks

**Input Layer (X)** Hidden Layer (H) **Output Layer (Y)**



# Deep Learning and Neural Networks



# Deep Learning and Neural Networks

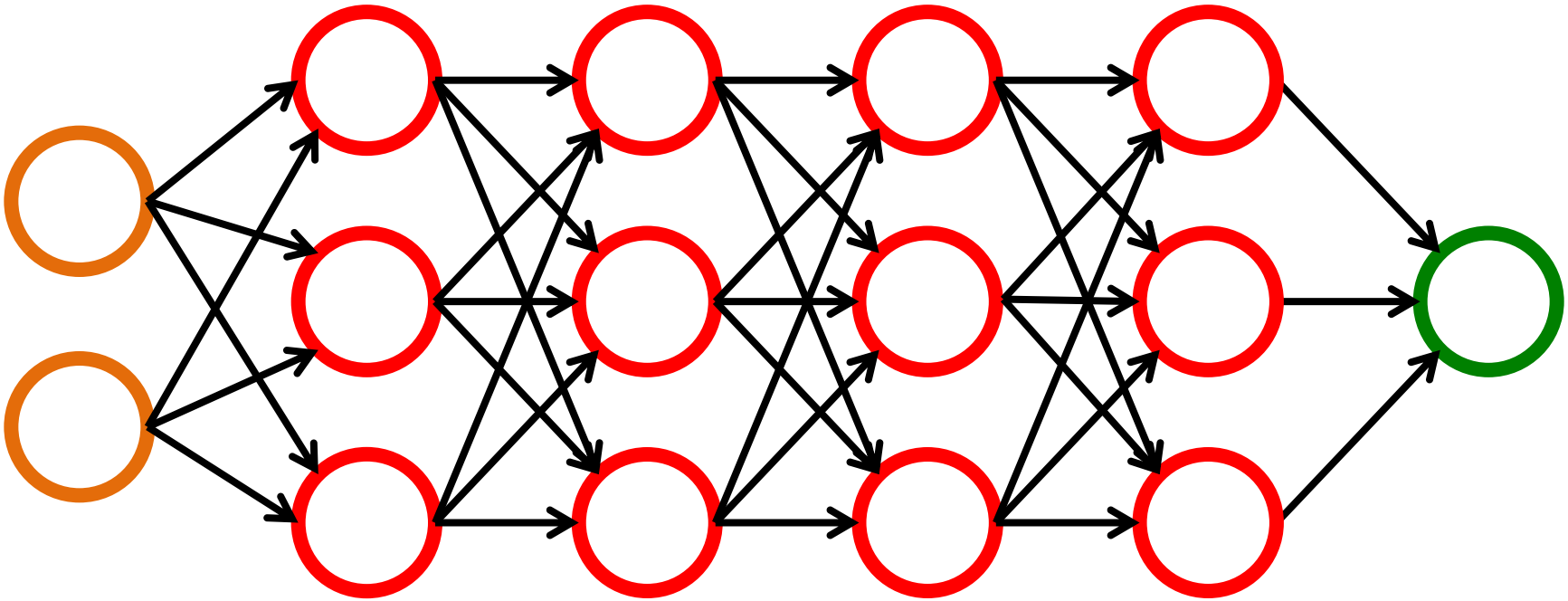
**Input Layer (X)**

Hidden Layers (H)

**Output Layer (Y)**

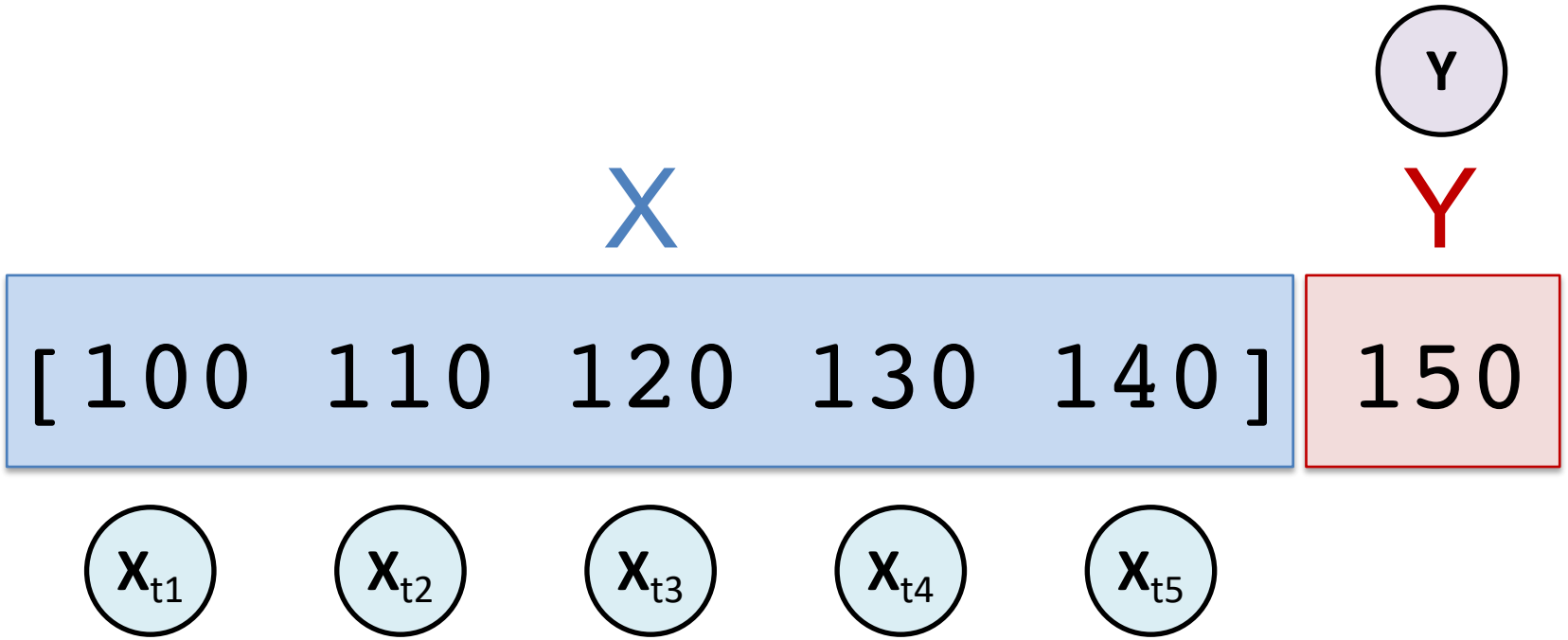
Deep Neural Networks

**Deep Learning**

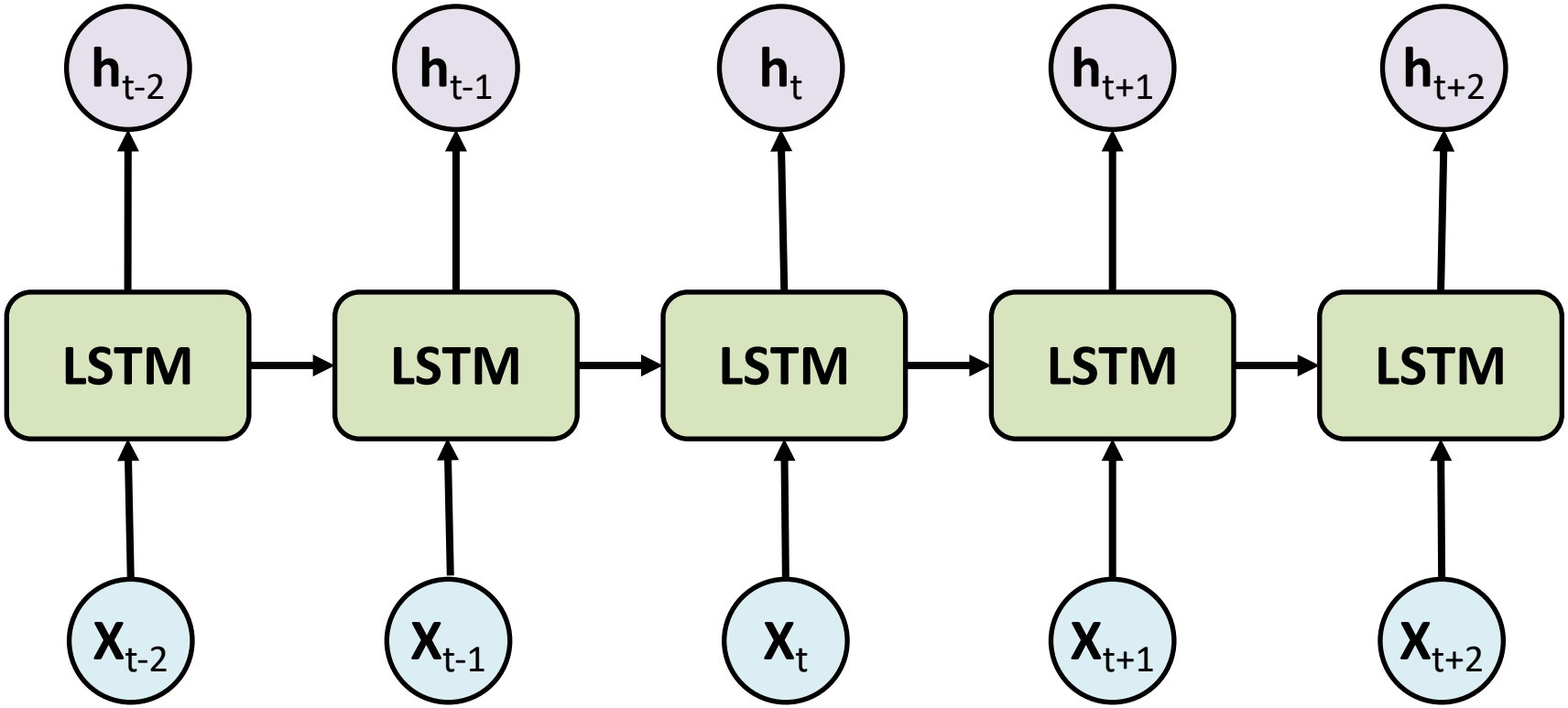


# Time Series Data

[100, 110, 120, 130, 140, 150]



# Long Short Term Memory (LSTM) for Time Series Forecasting



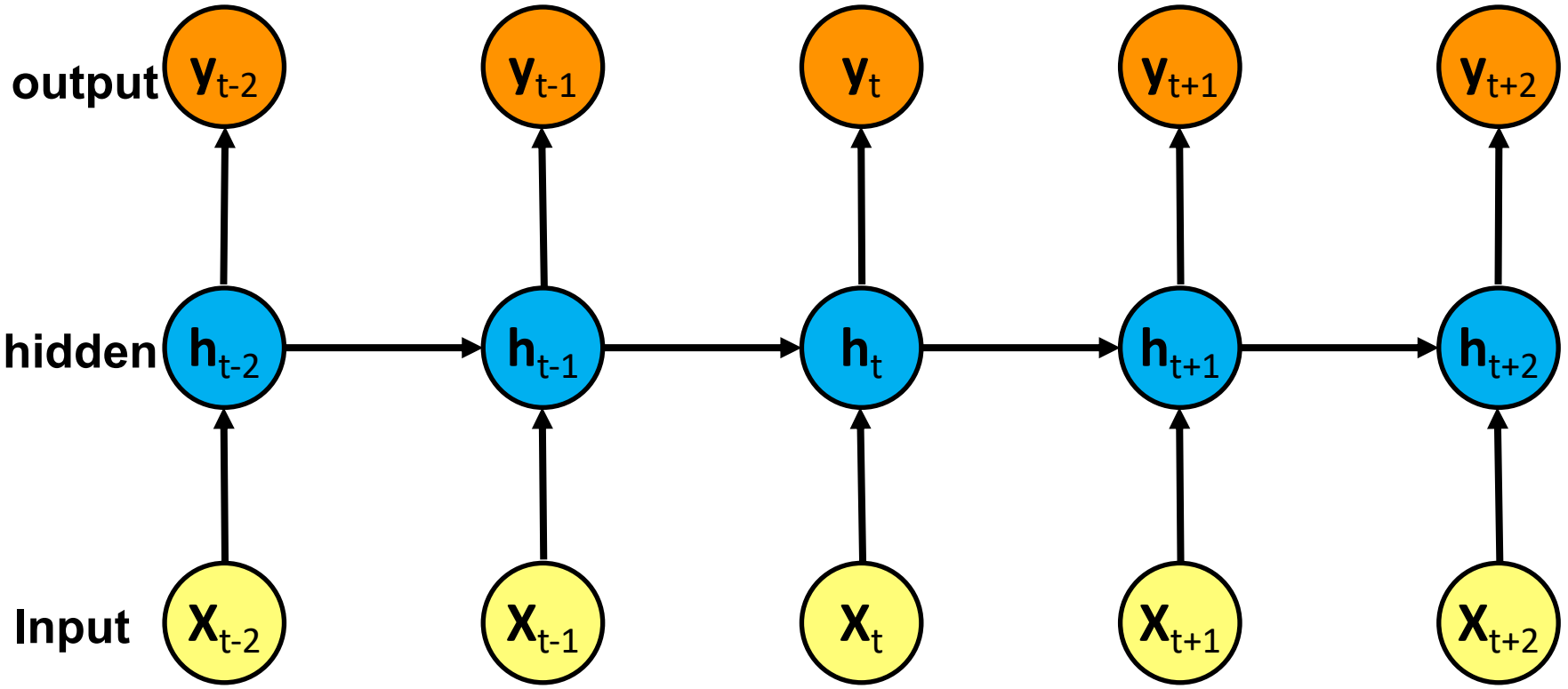
# Time Series Data

[10, 20, 30, 40, 50, 60, 70, 80, 90]

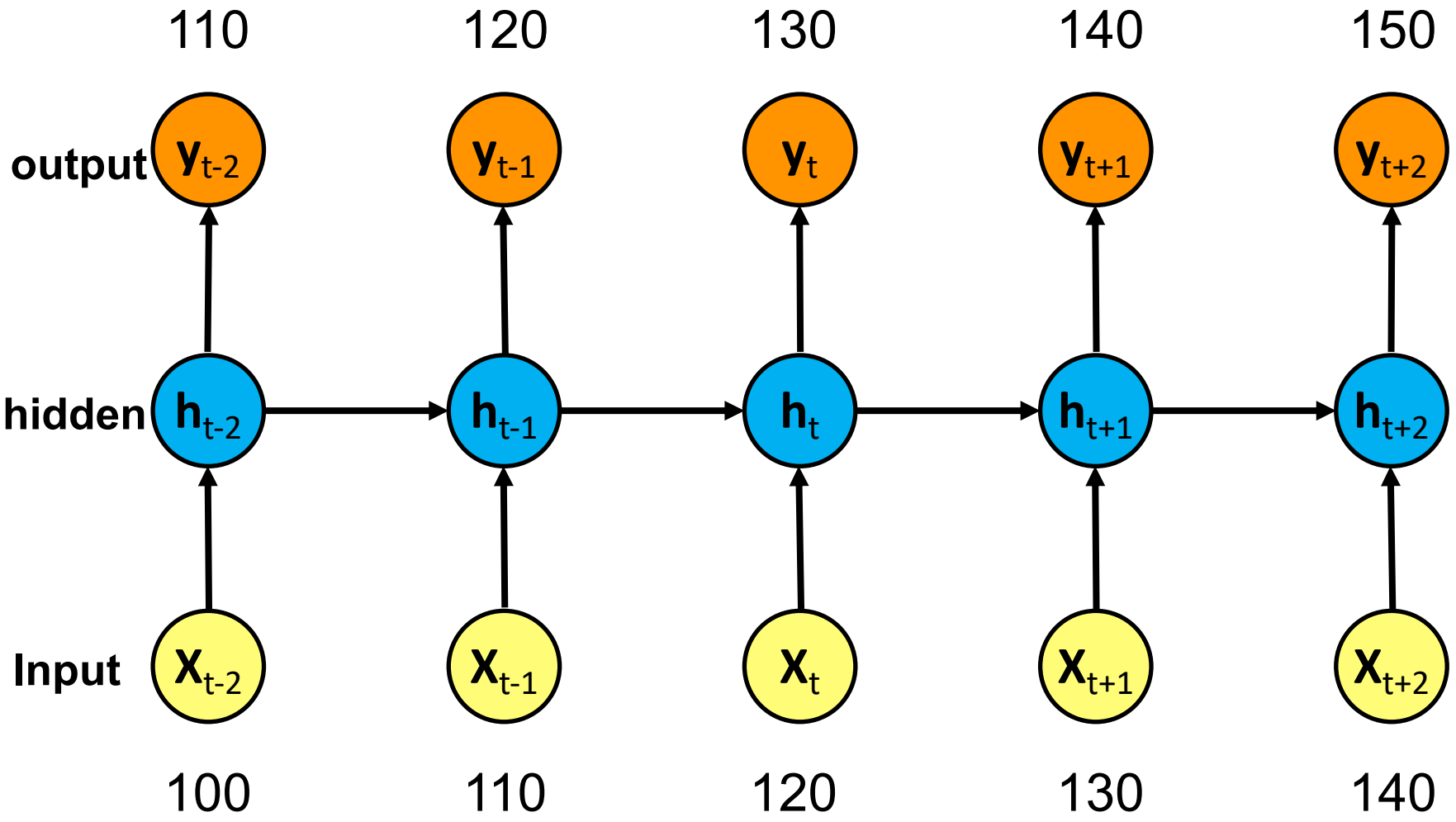
| X | Y |
|---|---|
| [10 20 30] | 40 |
| [20 30 40] | 50 |
| [30 40 50] | 60 |
| [40 50 60] | 70 |
| [50 60 70] | 80 |
| [60 70 80] | 90 |

# Recurrent Neural Networks (RNN)

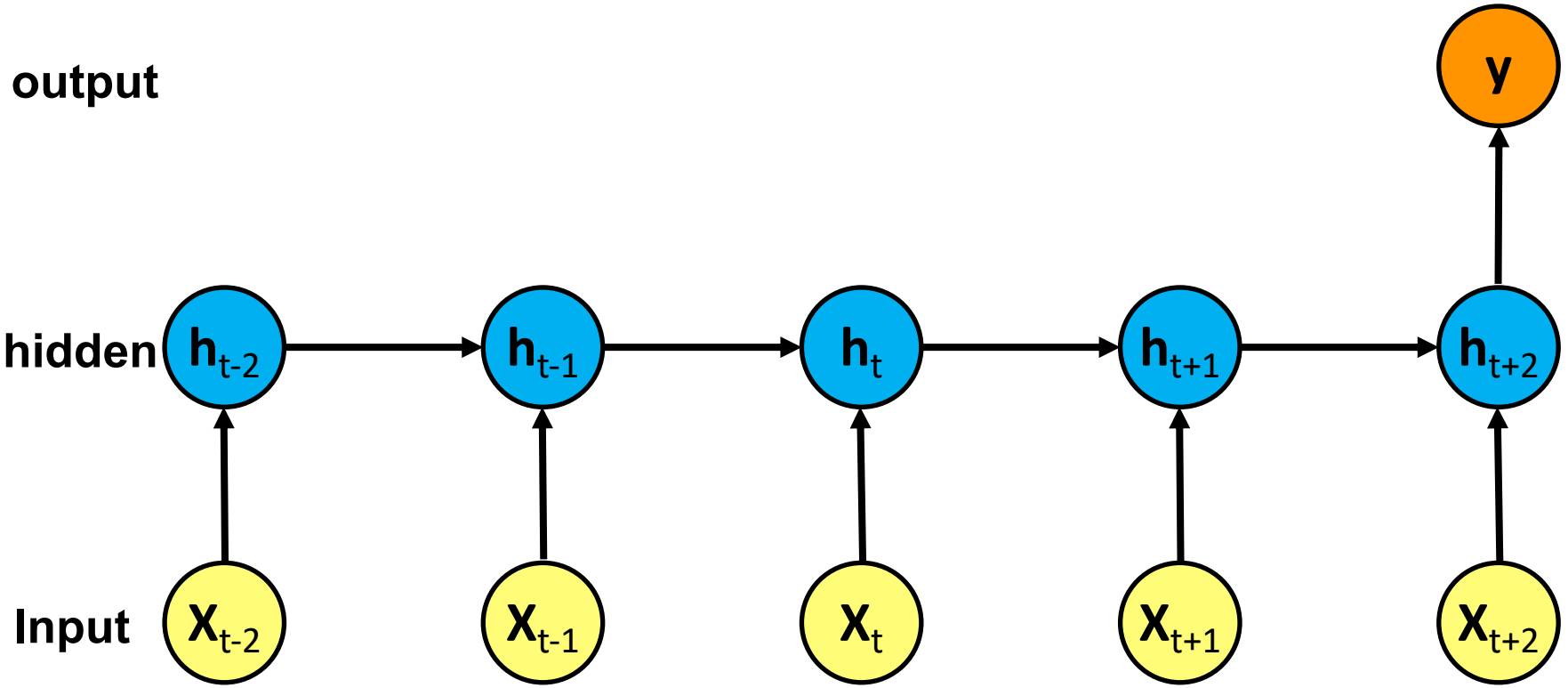
# Recurrent Neural Networks (RNN)



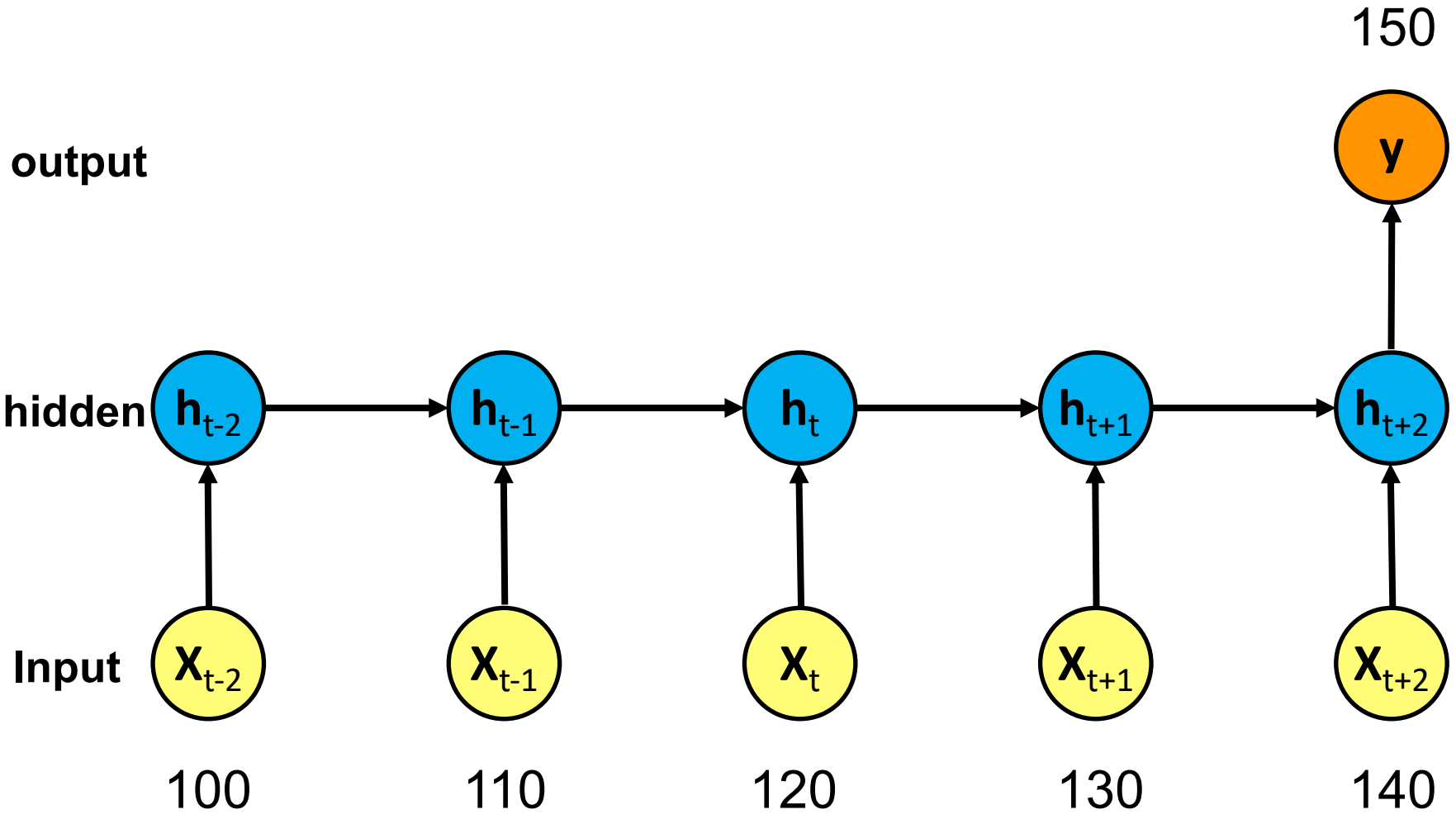
# Recurrent Neural Networks (RNN)
# Time Series Forecasting



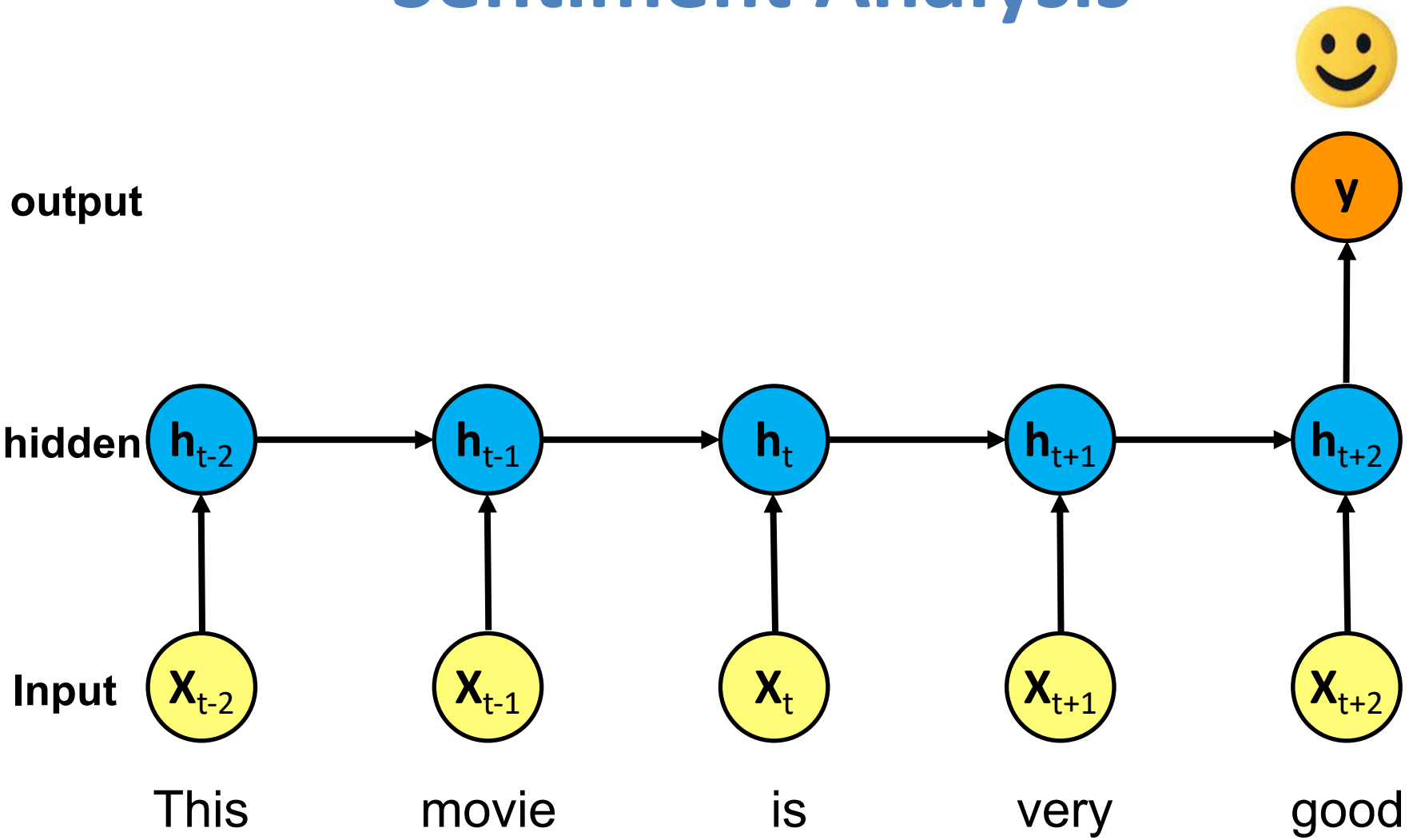
# Recurrent Neural Networks (RNN)



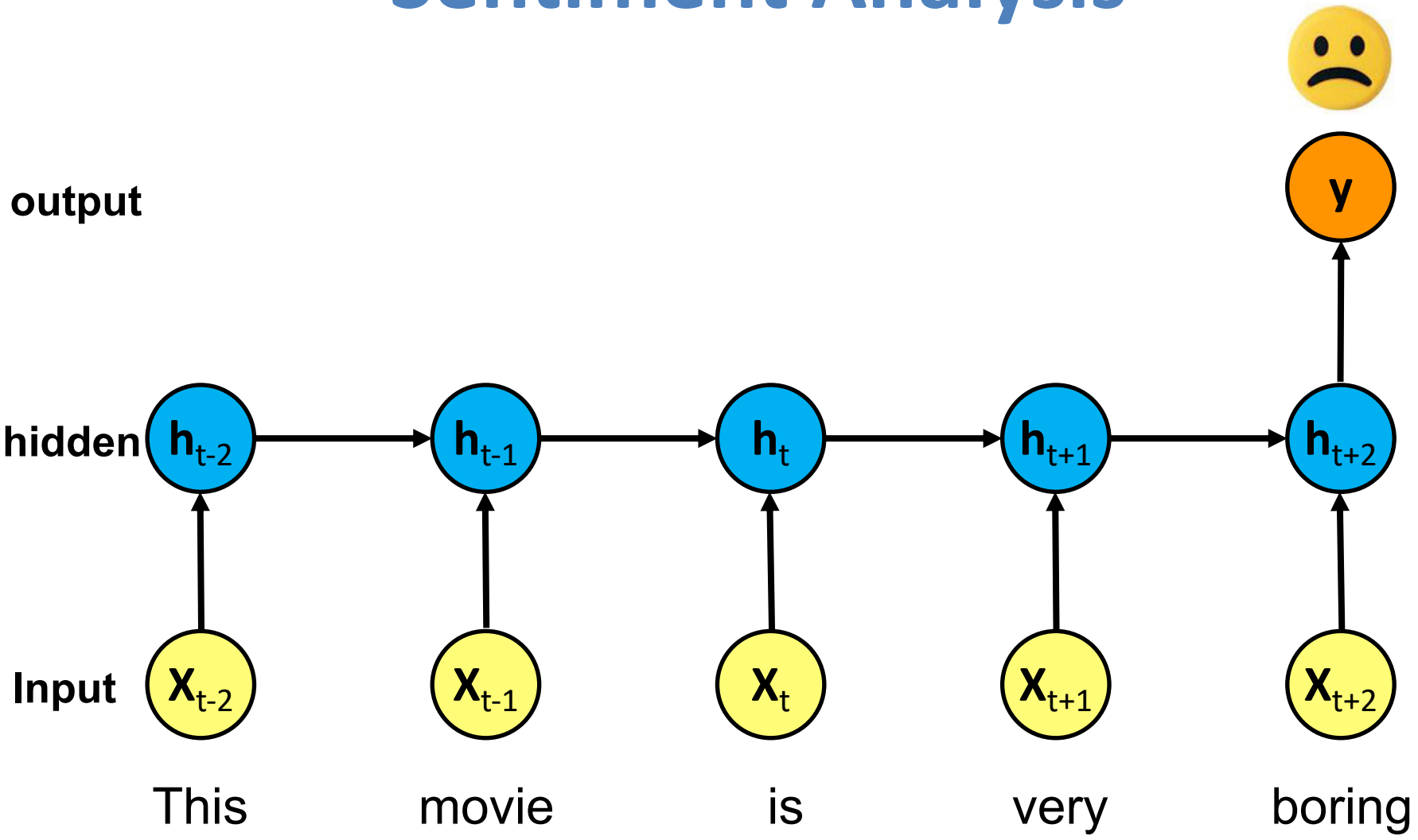
# Recurrent Neural Networks (RNN)
# Time Series Forecasting



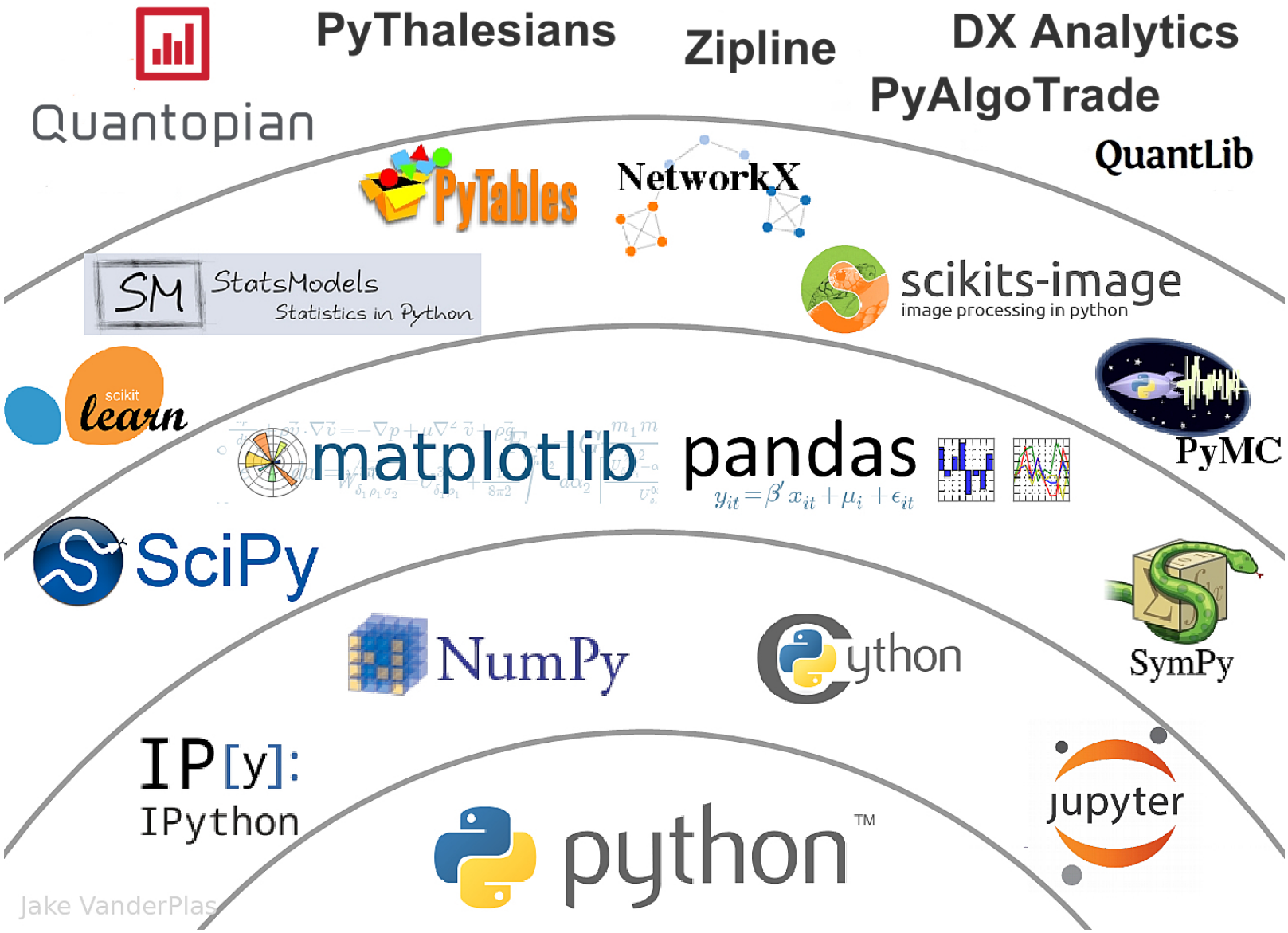
# Recurrent Neural Networks (RNN) Sentiment Analysis



# Recurrent Neural Networks (RNN) Sentiment Analysis



# The Quant Finance PyData Stack




Source: http://nbviewer.jupyter.org/format/slides/github/quantopian/pyfolio/blob/master/pyfolio/examples/overview_slides.ipynb#/5

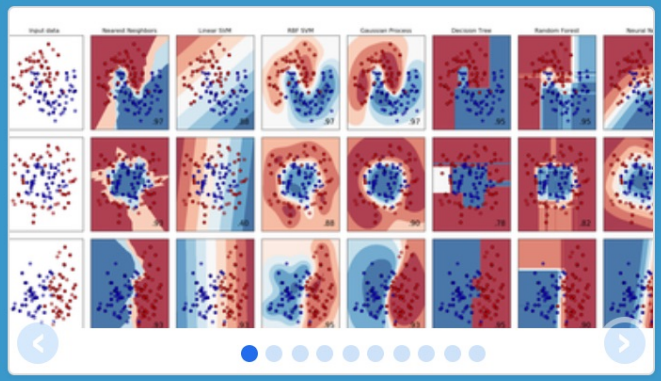

# Python

# Scikit-Learn

scikit learn

Home Installation Documentation Examples

Google Custom Search



## scikit-learn

*Machine Learning in Python*

- Simple and efficient tools for data mining and data analysis
- Accessible to everybody, and reusable in various contexts
- Built on NumPy, SciPy, and matplotlib
- Open source, commercially usable - BSD license

### Classification

Identifying to which category an object belongs to.

**Applications**: Spam detection, Image recognition.
**Algorithms**: SVM, nearest neighbors, random forest, … — Examples

### Regression

Predicting a continuous-valued attribute associated with an object.

**Applications**: Drug response, Stock prices.
**Algorithms**: SVR, ridge regression, Lasso, … — Examples

### Clustering

Automatic grouping of similar objects into sets.

**Applications**: Customer segmentation, Grouping experiment outcomes
**Algorithms**: k-Means, spectral clustering, mean-shift, … — Examples

### Dimensionality reduction

Reducing the number of random variables to consider.

**Applications**: Visualization, Increased efficiency
**Algorithms**: PCA, feature selection, non-negative matrix factorization. — Examples

### Model selection

Comparing, validating and choosing parameters and models.

**Goal**: Improved accuracy via parameter tuning
**Modules**: grid search, cross validation, metrics. — Examples

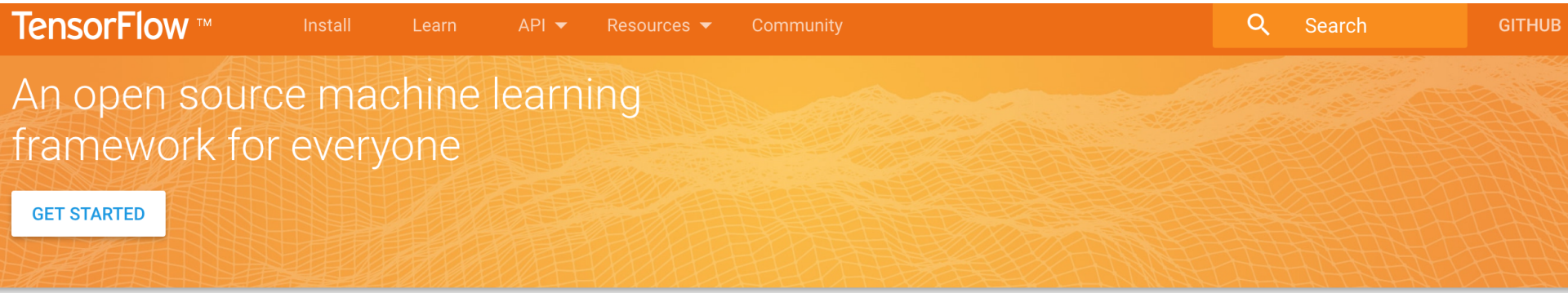
### Preprocessing

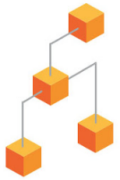
Feature extraction and normalization.

**Application**: Transforming input data such as text for use with machine learning algorithms.
**Modules**: preprocessing, feature extraction. — Examples

Source: http://scikit-learn.org/

# Google TensorFlow



### TensorFlow Dev Summit 2019

The 2019 TensorFlow Dev Summit is back March 6-7! Space is limited - request an invite to stay up to date.

### TensorFlow 1.12 is here!

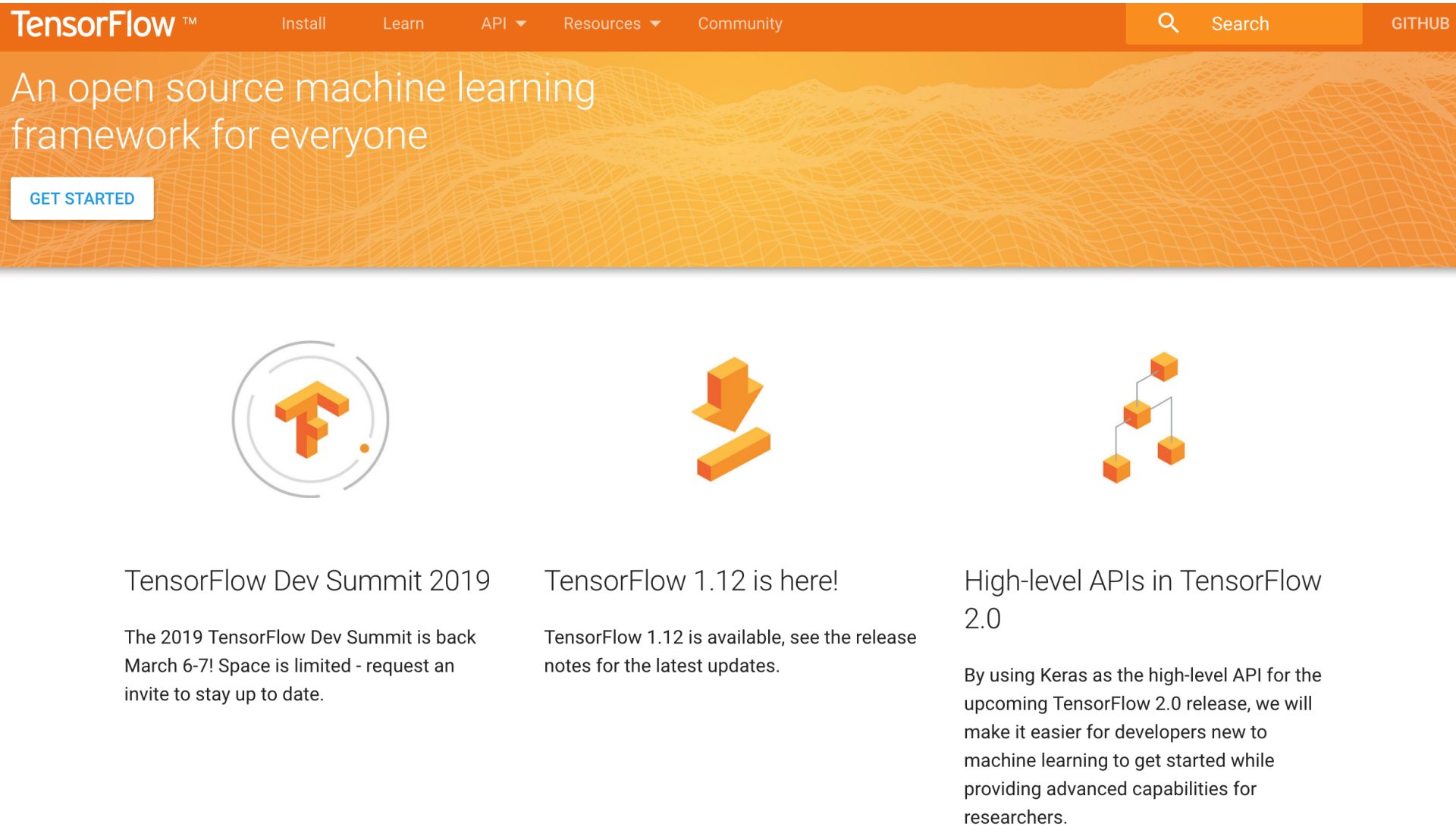
TensorFlow 1.12 is available, see the release notes for the latest updates.

### High-level APIs in TensorFlow 2.0

By using Keras as the high-level API for the upcoming TensorFlow 2.0 release, we will make it easier for developers new to machine learning to get started while providing advanced capabilities for researchers.

https://www.tensorflow.org/

# Google TensorFlow



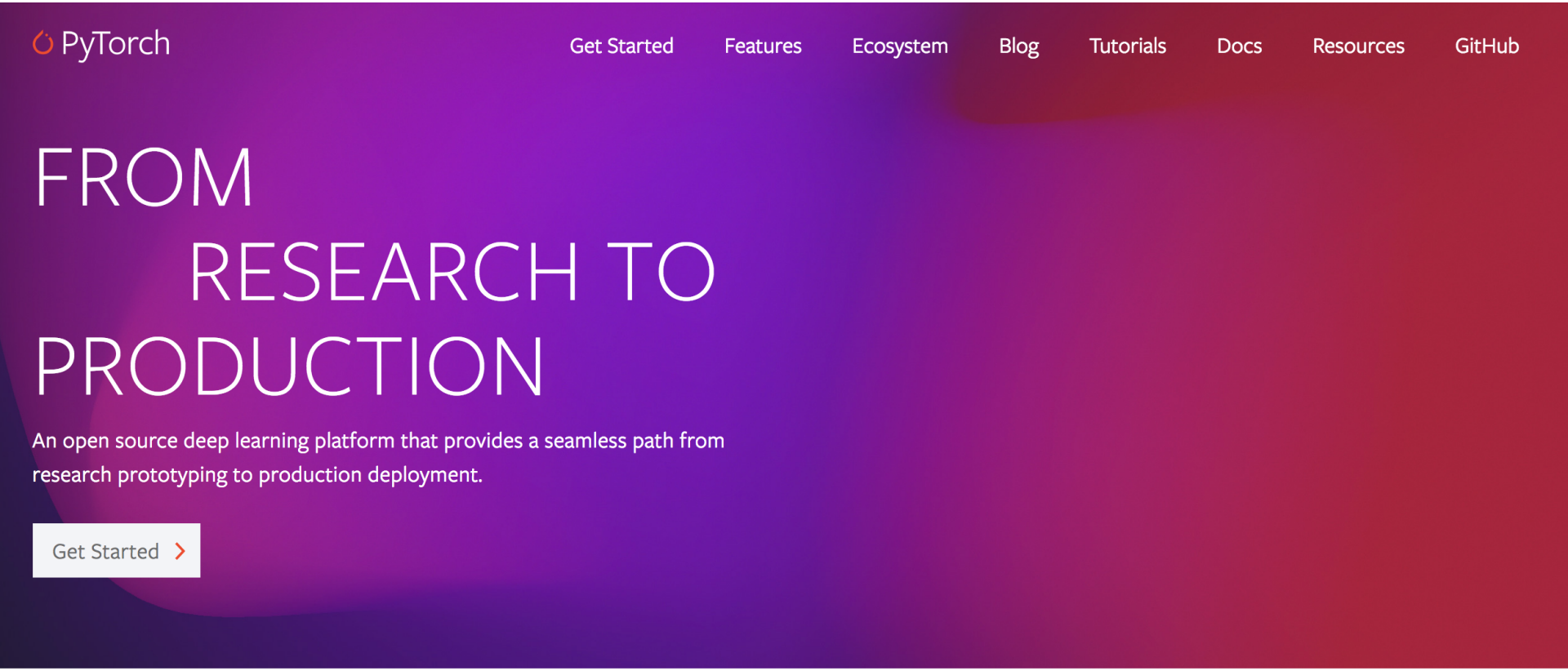

https://www.tensorflow.org/

# Google Dopamine

Dopamine is a research framework for fast prototyping of reinforcement learning algorithms.

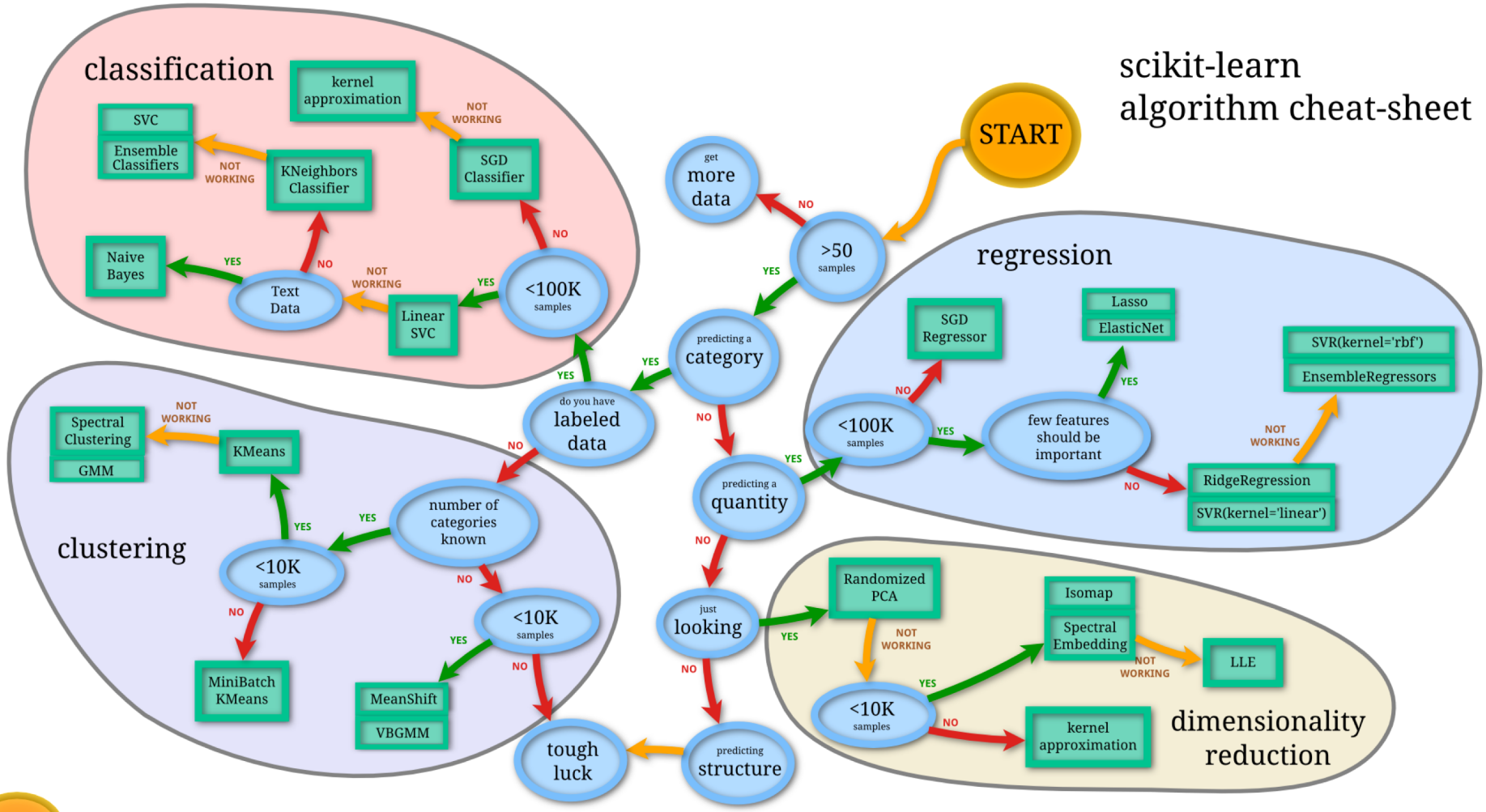
https://github.com/google/dopamine

# PyTorch




http://pytorch.org/

# Scikit-Learn Machine Learning Map




Source: http://scikit-learn.org/stable/tutorial/machine_learning_map/index.html

# Iris flower data set

**setosa**

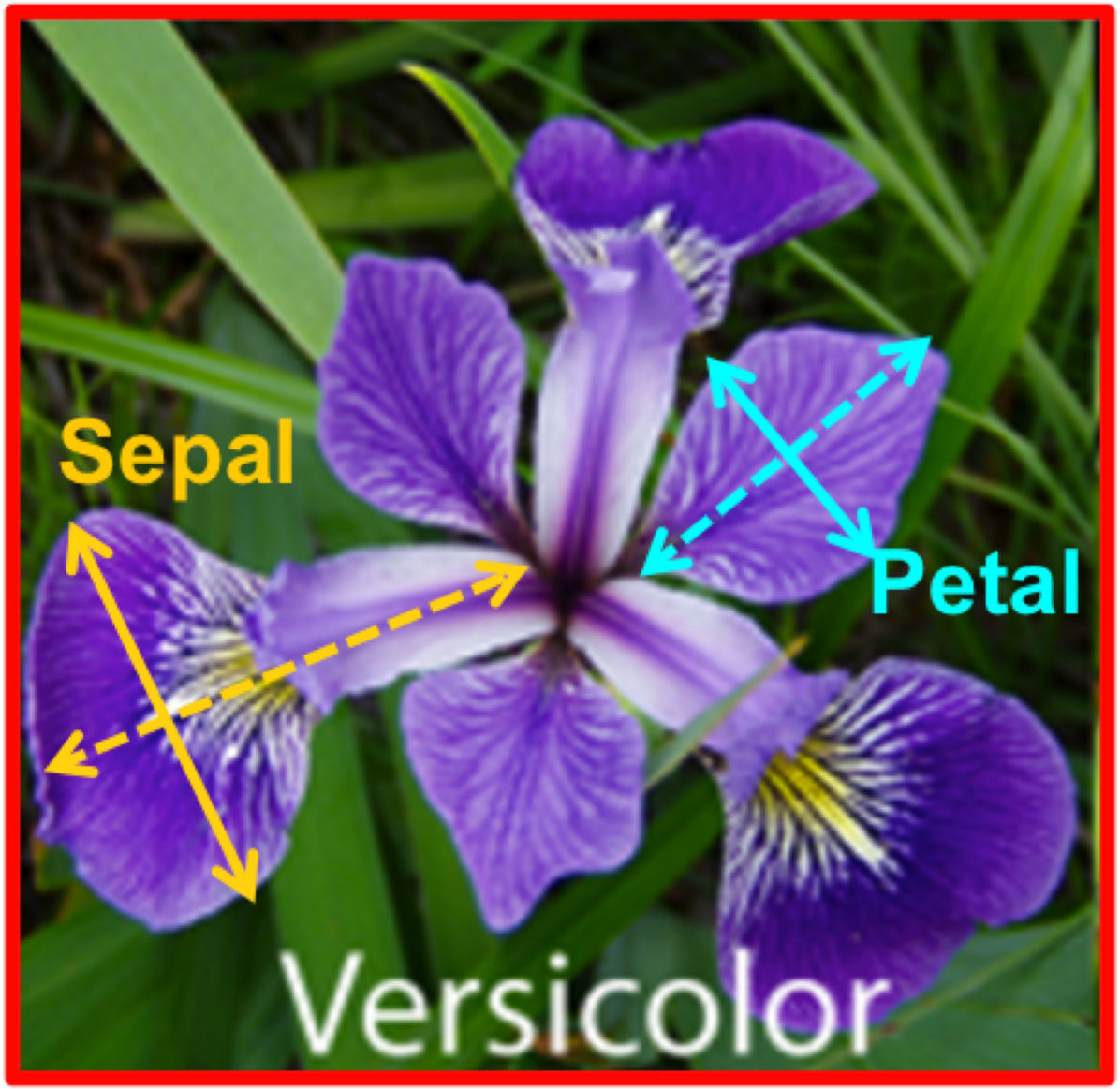
**versicolor**

**virginica**

Source: https://en.wikipedia.org/wiki/Iris_flower_data_set

Source: http://suruchifialoke.com/2016-10-13-machine-learning-tutorial-iris-classification/

# Iris Classfication




Source: http://suruchifialoke.com/2016-10-13-machine-learning-tutorial-iris-classification/

# iris.data

https://archive.ics.uci.edu/ml/machine-learning-databases/iris/iris.data

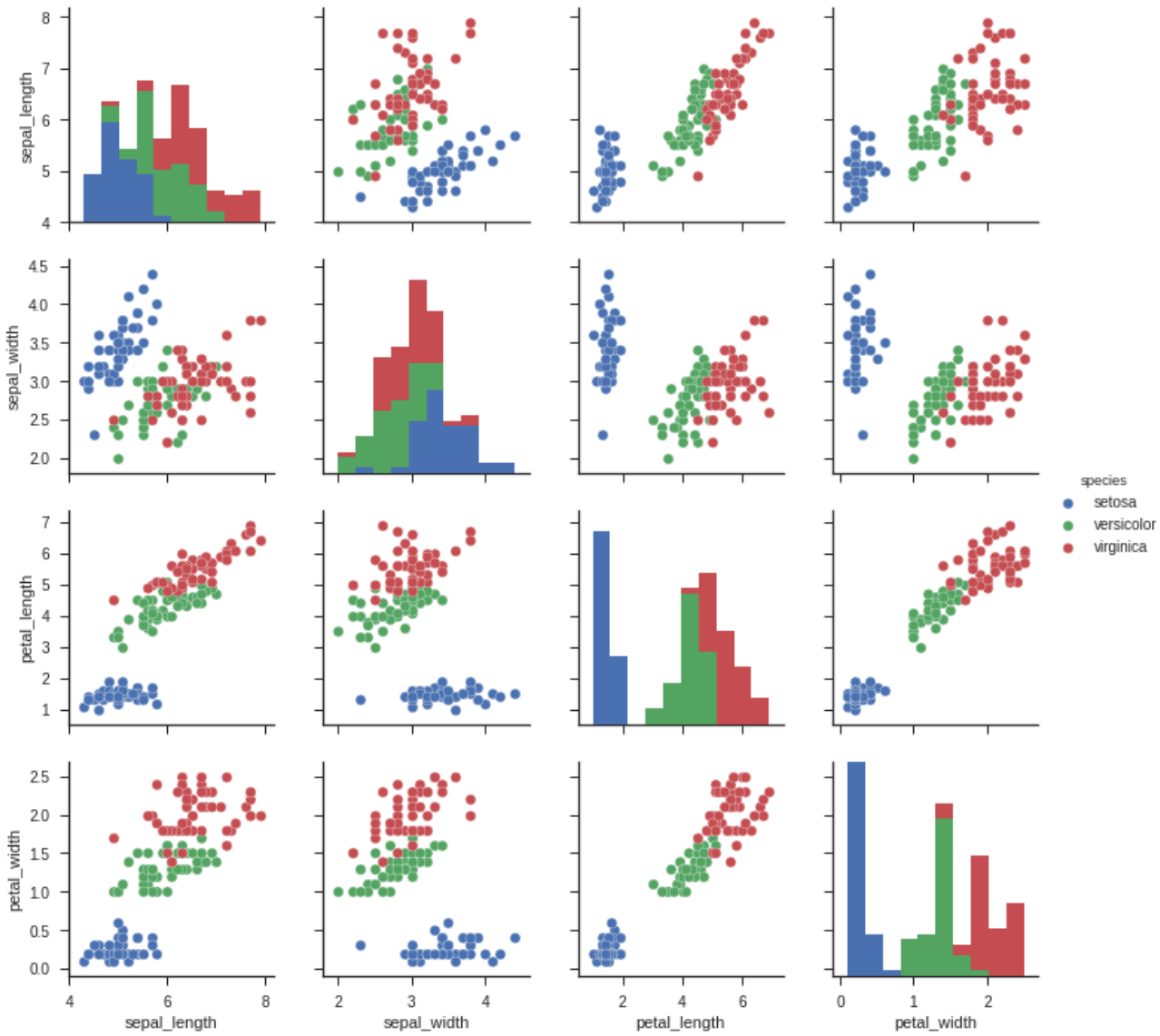
```
5.1,3.5,1.4,0.2,Iris-setosa
4.9,3.0,1.4,0.2,Iris-setosa
4.7,3.2,1.3,0.2,Iris-setosa
4.6,3.1,1.5,0.2,Iris-setosa
5.0,3.6,1.4,0.2,Iris-setosa
5.4,3.9,1.7,0.4,Iris-setosa
4.6,3.4,1.4,0.3,Iris-setosa
5.0,3.4,1.5,0.2,Iris-setosa
4.4,2.9,1.4,0.2,Iris-setosa
4.9,3.1,1.5,0.1,Iris-setosa
5.4,3.7,1.5,0.2,Iris-setosa
4.8,3.4,1.6,0.2,Iris-setosa
4.8,3.0,1.4,0.1,Iris-setosa
4.3,3.0,1.1,0.1,Iris-setosa
5.8,4.0,1.2,0.2,Iris-setosa
5.7,4.4,1.5,0.4,Iris-setosa
5.4,3.9,1.3,0.4,Iris-setosa
5.1,3.5,1.4,0.3,Iris-setosa
5.7,3.8,1.7,0.3,Iris-setosa
5.1,3.8,1.5,0.3,Iris-setosa
5.4,3.4,1.7,0.2,Iris-setosa
5.1,3.7,1.5,0.4,Iris-setosa
4.6,3.6,1.0,0.2,Iris-setosa
5.1,3.3,1.7,0.5,Iris-setosa
4.8,3.4,1.9,0.2,Iris-setosa
5.0,3.0,1.6,0.2,Iris-setosa
```

**setosa**

**virginica**

**versicolor**

# Iris Data Visualization




Source: https://seaborn.pydata.org/generated/seaborn.pairplot.html

# Data Visualization in Google Colab

https://colab.research.google.com/drive/1KRqtEUd2Hg4dM2au9bfVQKrxWnWN3O9-

datav.ipynb - Colaboratory

https://colab.research.google.com/drive/1KRqtEUd2Hg4dM2au9bfVQKrxWnWN3O9-?authuser=2

datav.ipynb

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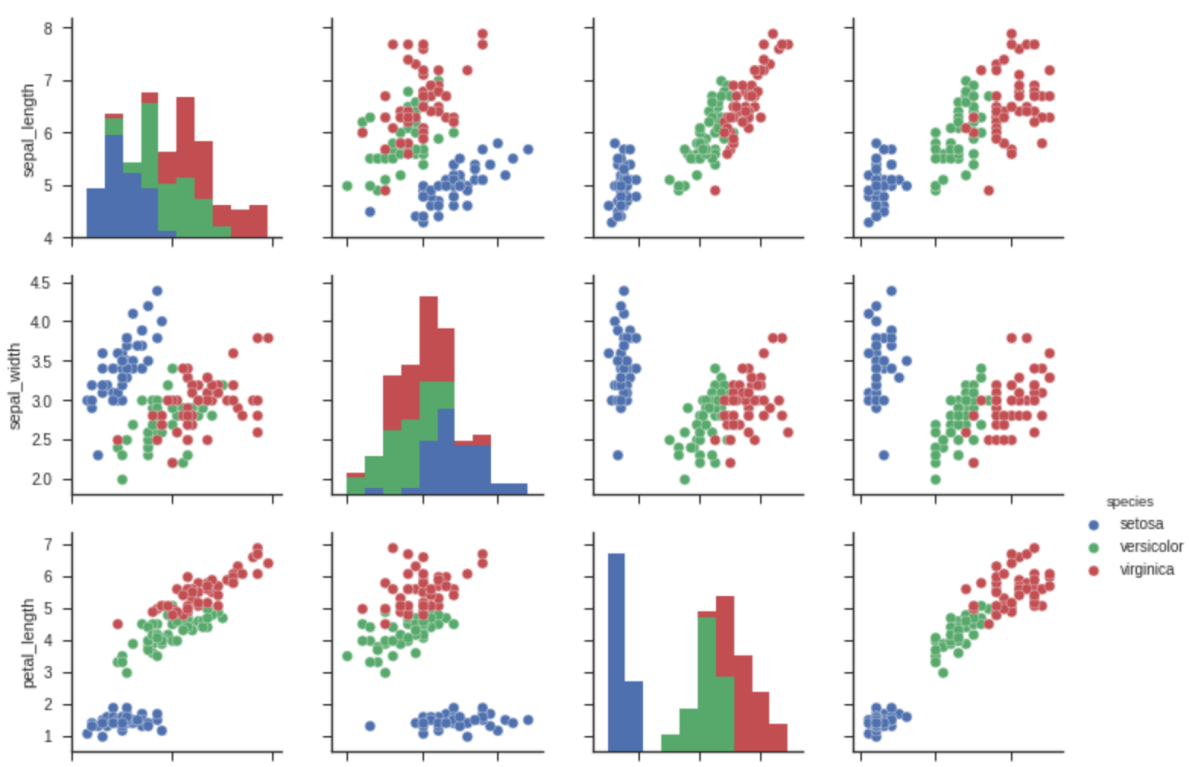
CODE TEXT CELL CELL CONNECTED EDITING

```
import seaborn as sns
sns.set(style="ticks", color_codes=True)
iris = sns.load_dataset("iris")
g = sns.pairplot(iris, hue="species")
```




Source: https://seaborn.pydata.org/generated/seaborn.pairplot.html

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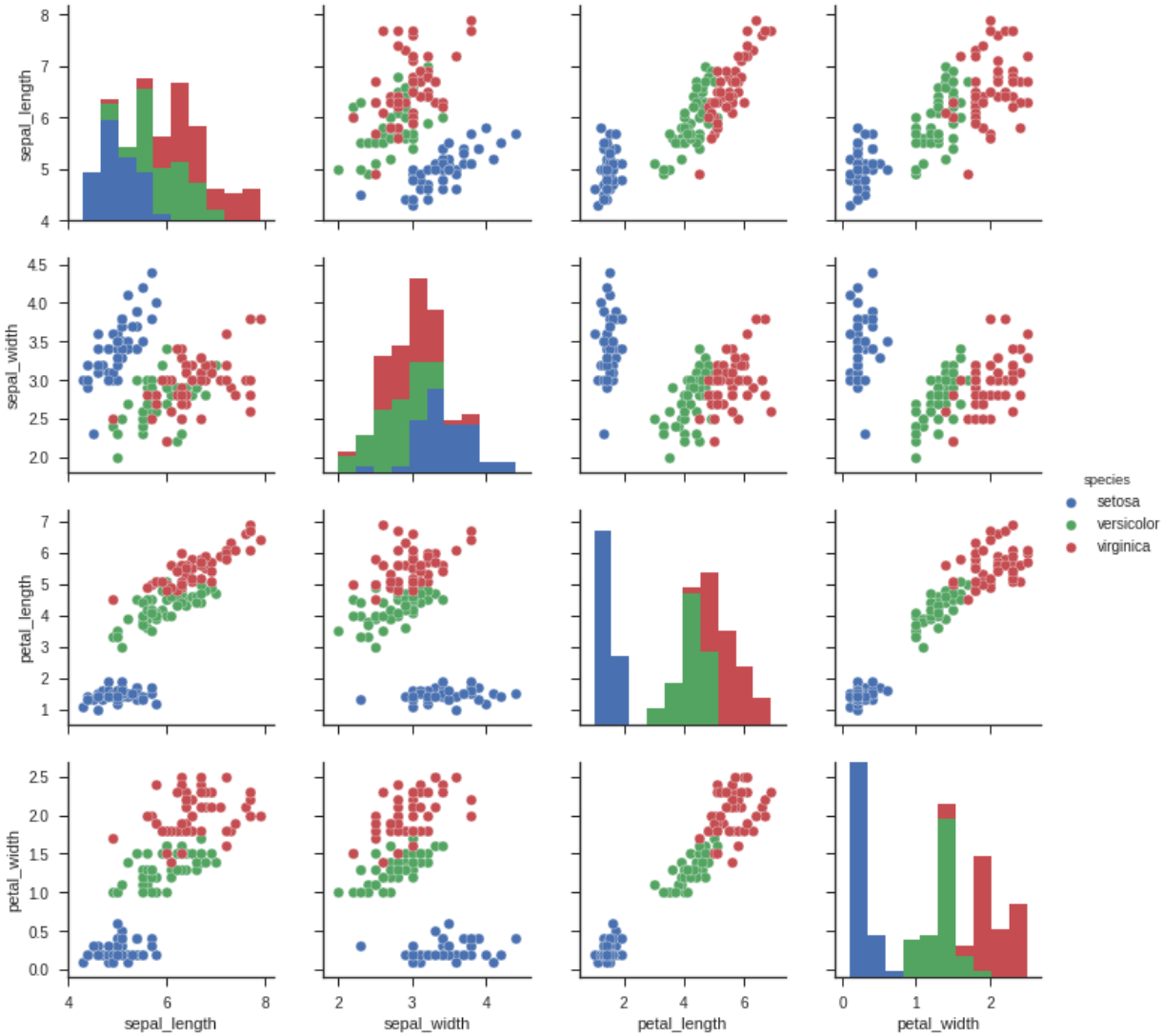
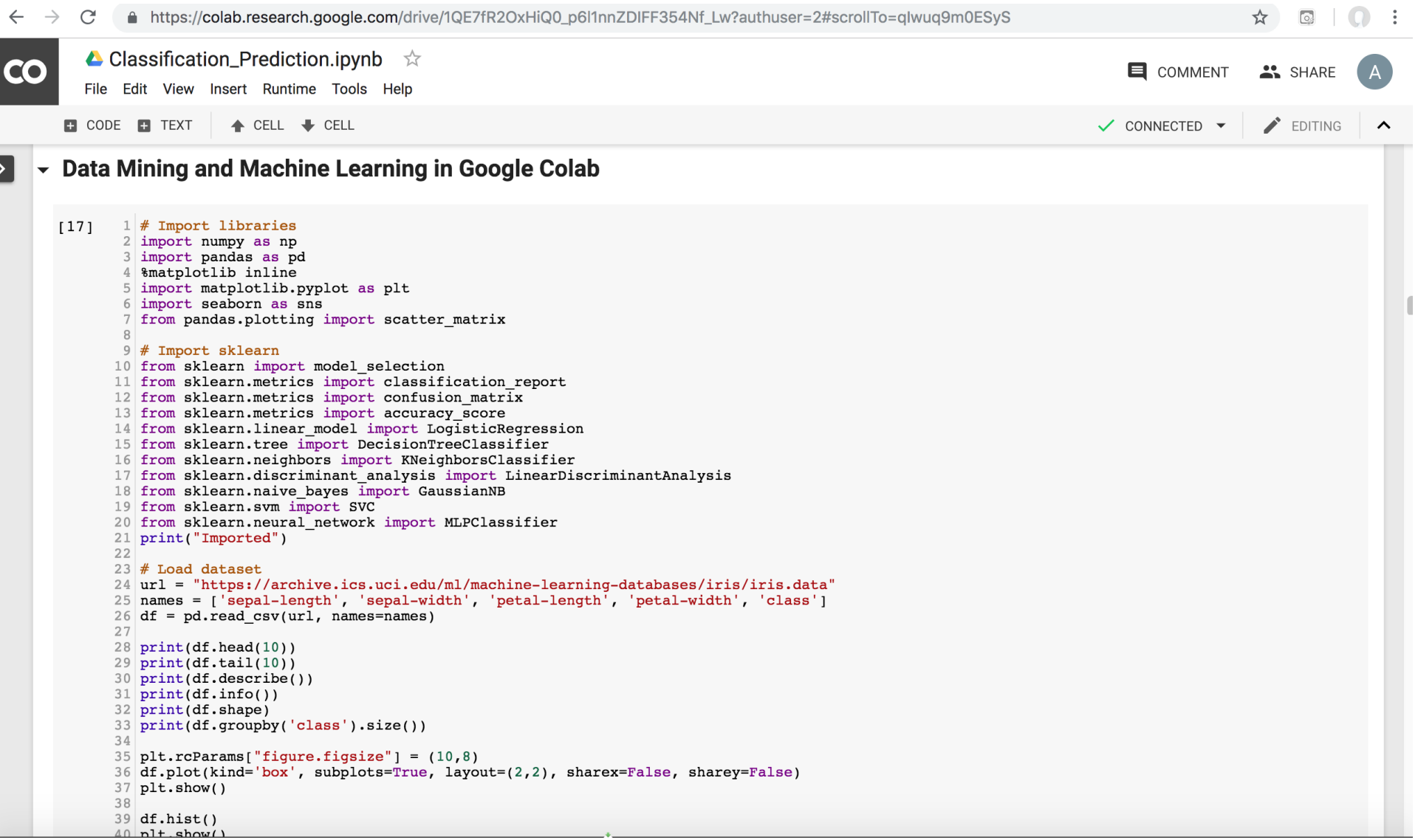



Source: https://seaborn.pydata.org/generated/seaborn.pairplot.html

# Machine Learning
# Supervised Learning
# Classification
# and
# Prediction

# Classification and Prediction

https://colab.research.google.com/drive/1QE7fR2OxHiQ0_p6l1nnZDIFF354Nf_Lw




https://colab.research.google.com/drive/1QE7fR2OxHiQ0_p6l1nnZDIFF354Nf_Lw

```
# Make predictions on validation dataset
model = SVC()
model.fit(X_train, Y_train)
predictions = model.predict(X_validation)
print("%.4f" % accuracy_score(Y_validation,
predictions))
print(confusion_matrix(Y_validation,
predictions))
print(classification_report(Y_validation,
predictions))
print(model)
```

https://colab.research.google.com/drive/1QE7fR2OxHiQ0_p6l1nnZDIFF354Nf_Lw

```
model = SVC()
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```
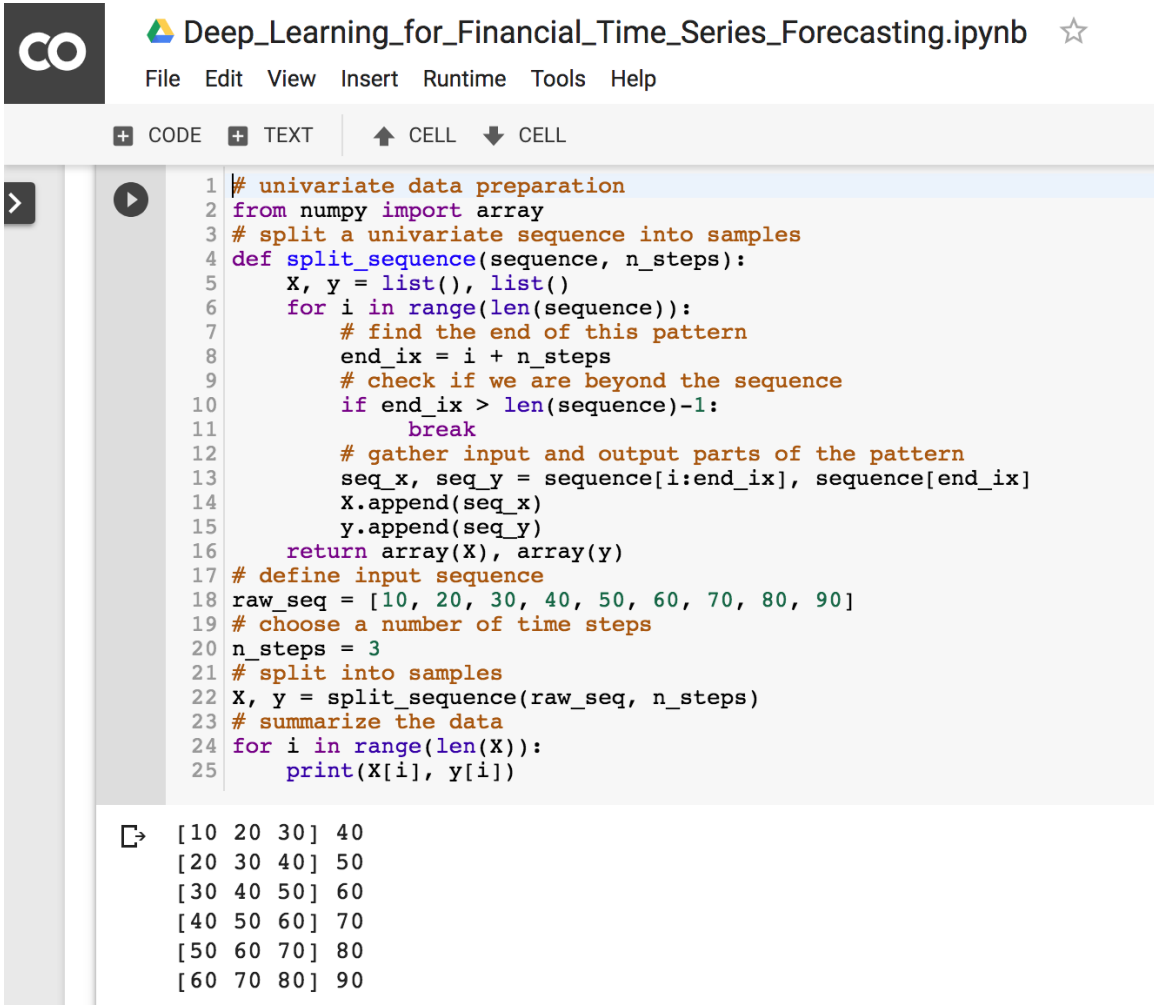

```
1 # Make predictions on validation dataset
2 model = SVC()
3 model.fit(X_train, Y_train)
4 predictions = model.predict(X_validation)
5 print("%.4f" % accuracy_score(Y_validation, predictions))
6 print(confusion_matrix(Y_validation, predictions))
7 print(classification_report(Y_validation, predictions))
8 print(model)
```

```
0.9333
[[ 7  0  0]
 [ 0 10  2]
 [ 0  0 11]]
                 precision    recall  f1-score   support

    Iris-setosa       1.00      1.00      1.00         7
Iris-versicolor       1.00      0.83      0.91        12
 Iris-virginica       0.85      1.00      0.92        11

    avg / total       0.94      0.93      0.93        30

SVC(C=1.0, cache_size=200, class_weight=None, coef0=0.0,
  decision_function_shape='ovr', degree=3, gamma='auto', kernel='rbf',
  max_iter=-1, probability=False, random_state=None, shrinking=True,
  tol=0.001, verbose=False)
```

https://colab.research.google.com/drive/1QE7fR2OxHiQ0_p6l1nnZDIFF354Nf_Lw

# Deep Learning for Financial Time Series Forecasting

https://colab.research.google.com/drive/1aEK0eSev8Q-Y0nNY32geFk7CB8pVgSQM




Source: https://machinelearningmastery.com/how-to-develop-lstm-models-for-time-series-forecasting/

# Deep Learning for Financial Time Series Forecasting

https://colab.research.google.com/drive/1aEK0eSev8Q-Y0nNY32geFk7CB8pVgSQM

Deep_Learning_for_Financial_Time_Series_Forecasting.ipynb

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## LSTM for Time Series Forecasting

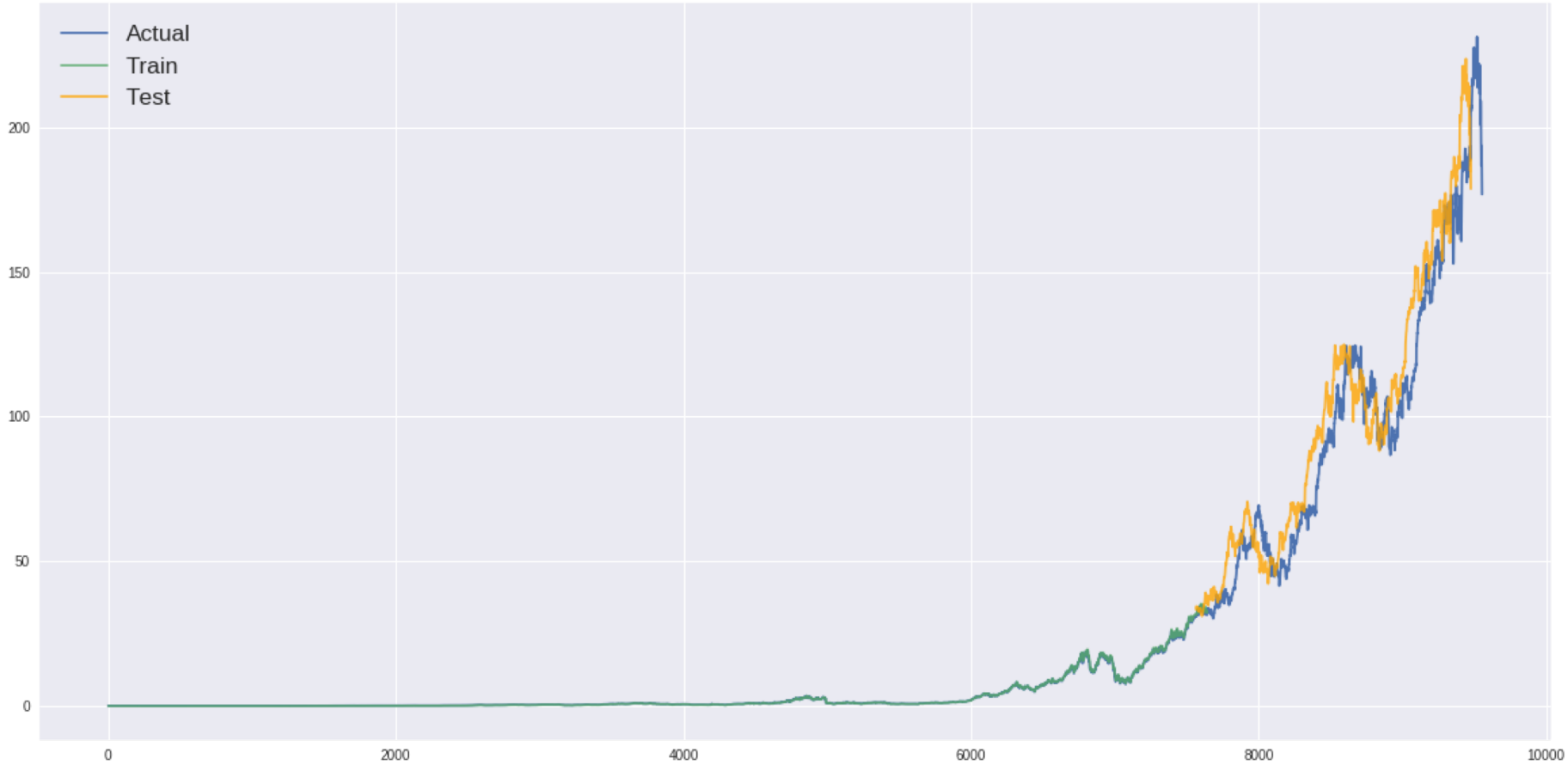
```
# univariate lstm example
from numpy import array
from keras.models import Sequential
from keras.layers import LSTM
from keras.layers import Dense
import matplotlib.pyplot as plt
%matplotlib inline

# define dataset
X = array([[100, 110, 120], [110, 120, 130], [120, 130, 140], [130, 140, 150], [140, 150, 160]])
y = array([130, 140, 150, 160, 170])
# reshape from [samples, timesteps] into [samples, timesteps, features]
X = X.reshape((X.shape[0], X.shape[1], 1))
# define model
model = Sequential()
model.add(LSTM(50, activation='relu', input_shape=(3, 1)))
model.add(Dense(1))
model.compile(optimizer='adam', loss='mse')
# fit model
history = model.fit(X, y, epochs=2000, verbose=0)
# demonstrate prediction
x_input = array([150, 160, 170])
x_input = x_input.reshape((1, 3, 1))
yhat = model.predict(x_input, verbose=0)
print('yhat', yhat)
print(model.summary())
# list all data in history
print(history.history.keys())
# summarize history for loss
print('loss:', '%f'%history.history['loss'][-1])
print('loss:', history.history['loss'][-1])
plt.plot(history.history['loss'])
plt.title('model loss')
plt.ylabel('loss')
plt.xlabel('epoch')
plt.show()
```

```
yhat [[181.34615]]
```

Source: https://machinelearningmastery.com/how-to-develop-lstm-models-for-time-series-forecasting/

# Deep Learning for Financial Time Series Forecasting

https://colab.research.google.com/drive/1aEK0eSev8Q-Y0nNY32geFk7CB8pVgSQM

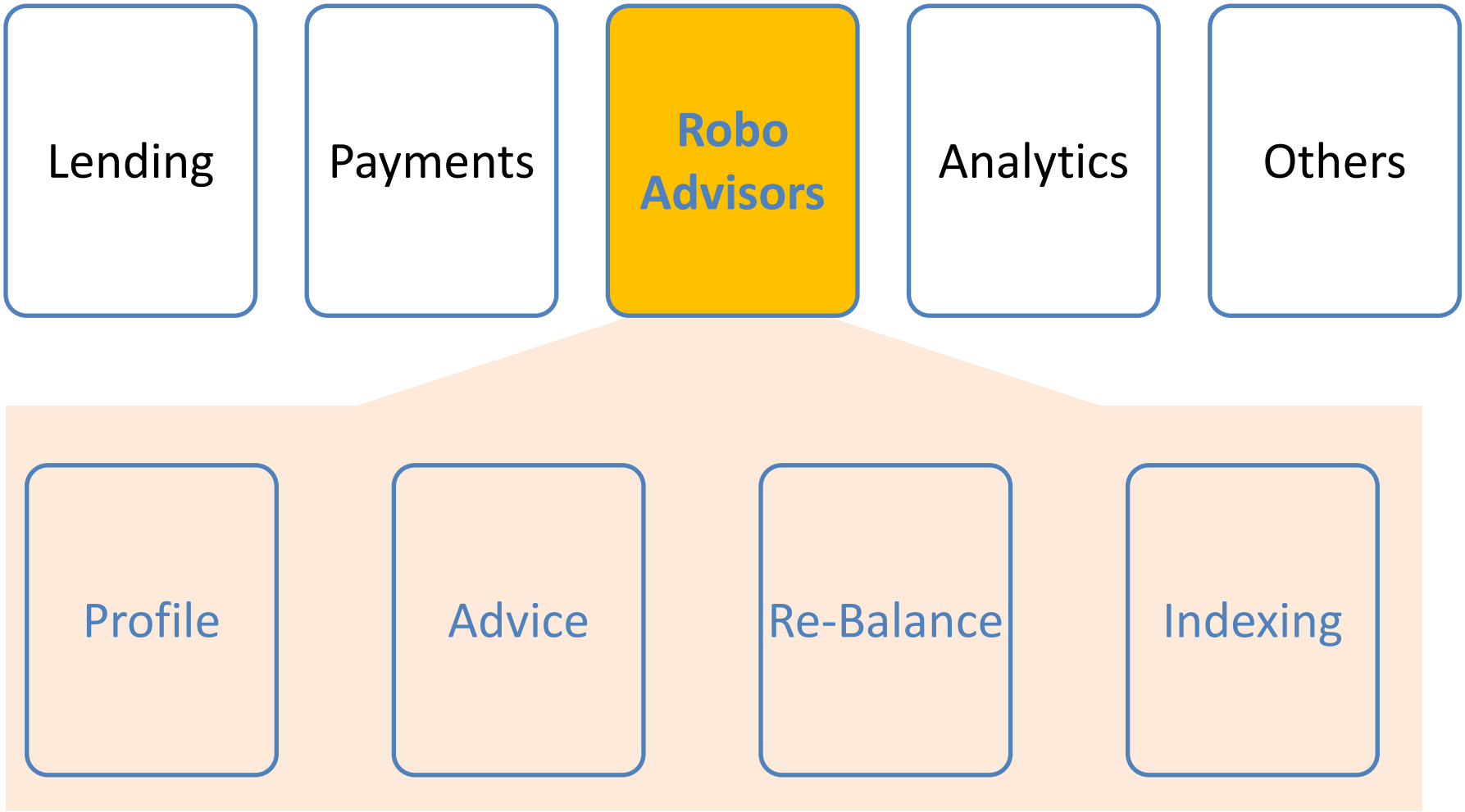



Source: https://github.com/yash-1337/AAPL_LSTM_Stock_Predictor/blob/master/AAPL_daily_LSTM_stock_predictor.ipynb

# AI in FinTech

# Robo-Advisors

# FinTech high-level classification




Source: Paolo Sironi (2016), “FinTech Innovation: From Robo-Advisors to Goal Based Investing and Gamification”, Wiley.

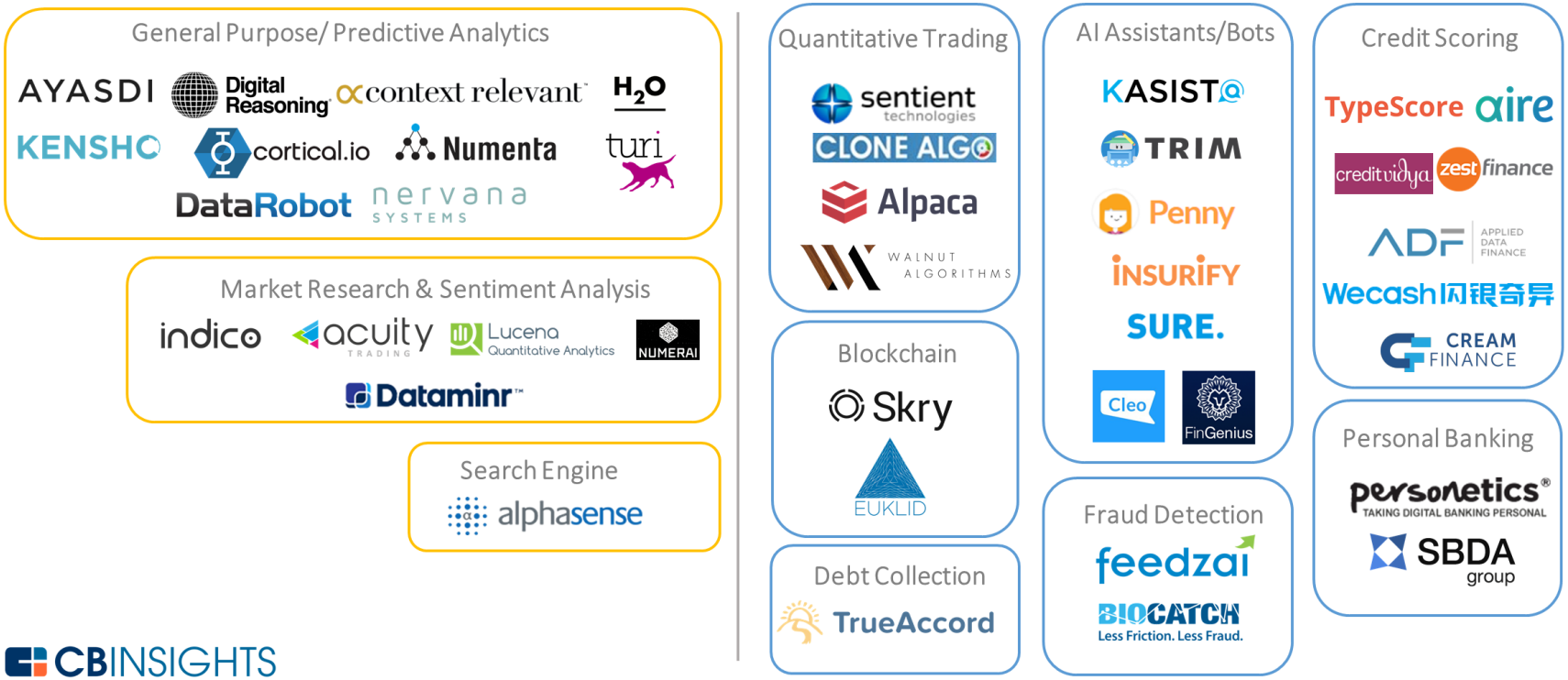
# From Algorithmic Trading to Personal Finance Bots: 41 Startups Bringing AI to Fintech

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

# From Algorithmic Trading To Personal Finance Bots: 41 Startups Bringing AI To Fintech

# AI in Fintech

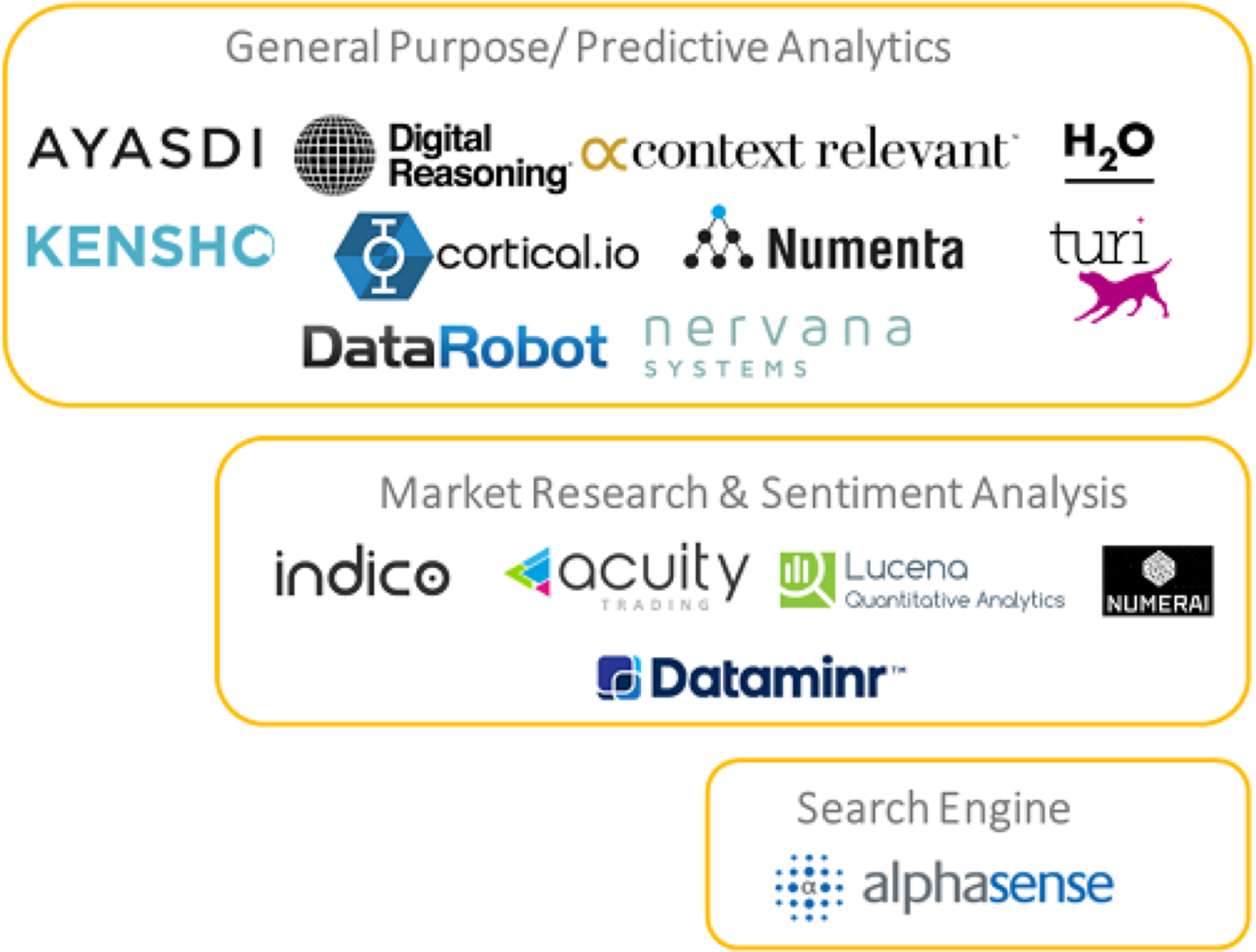
## 41 Startups Bringing Artificial Intelligence To Fintech




CBINSIGHTS
www.cbinsights.com

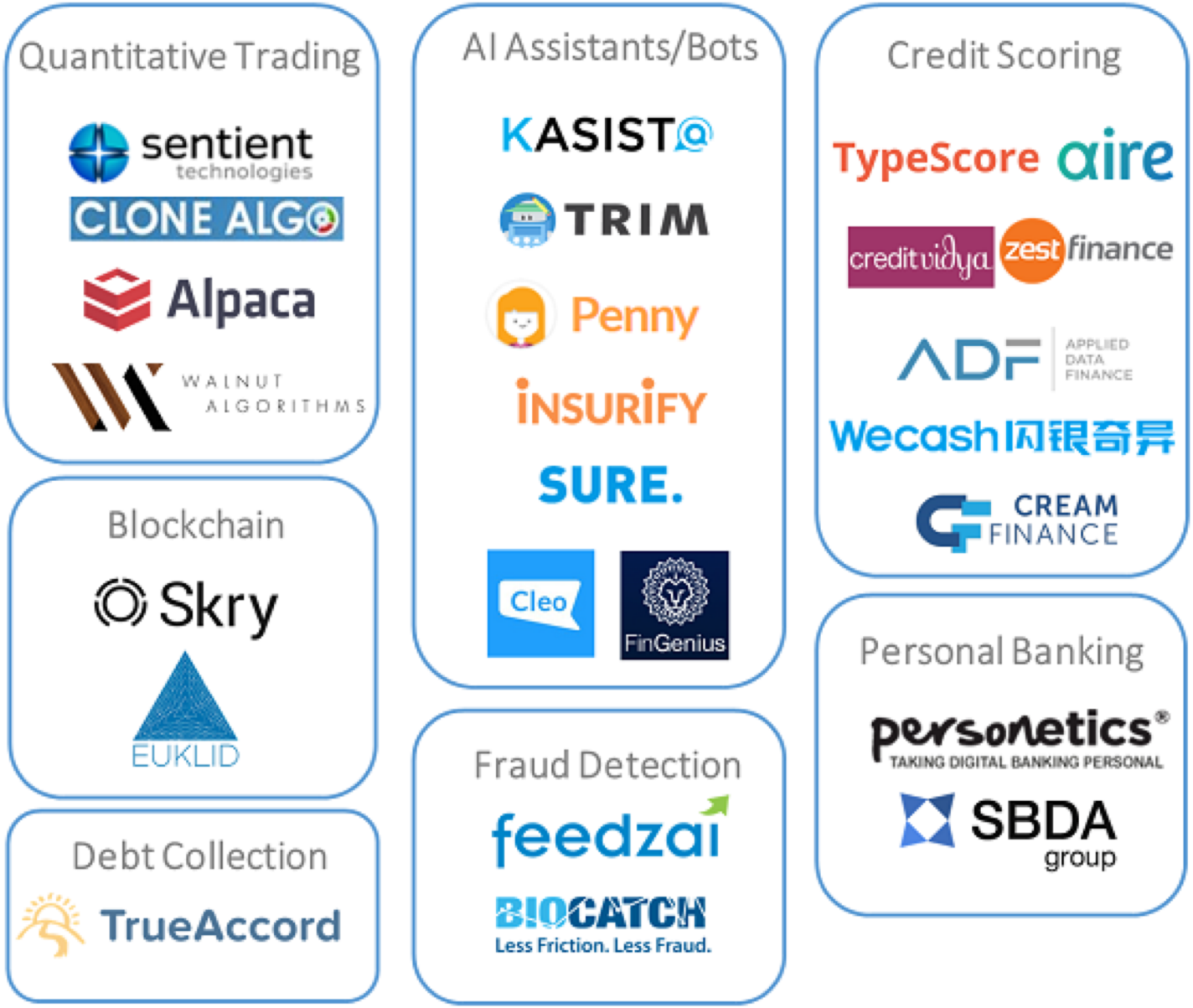
Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

# Artificial Intelligence (AI) in Fintech




Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

# Artificial Intelligence (AI) in Fintech




Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/

# FinTech

# Financial Technology
# FinTech

"providing
financial services
by making use of
software and
modern technology"

Source: https://www.fintechweekly.com/fintech-definition

# Financial Services

# Financial Services


Source: http://www.crackitt.com/7-reasons-why-your-fintech-startup-needs-visual-marketing/

# FinTech: Financial Services Innovation


Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

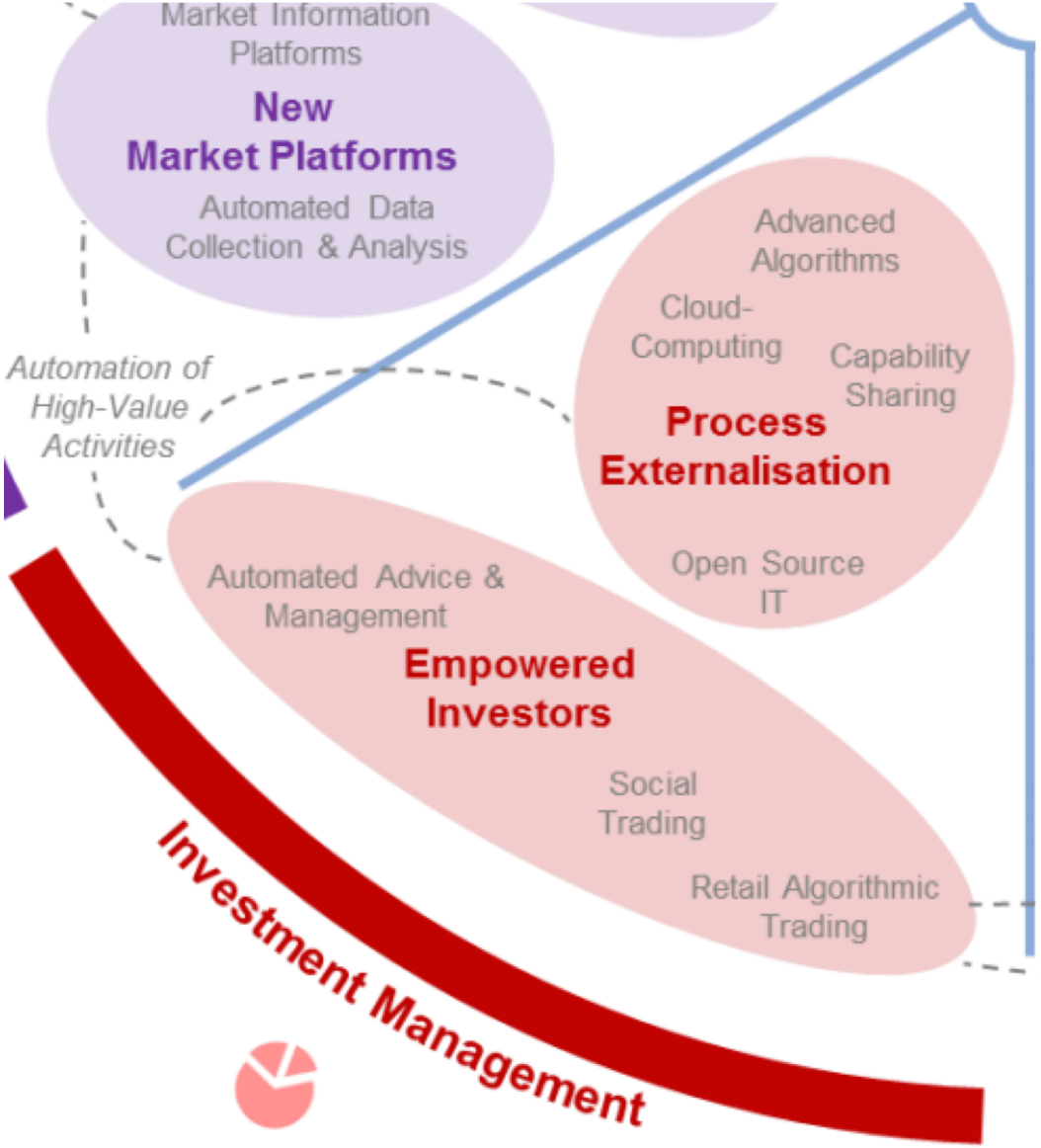
# FinTech:

## Financial Services Innovation

1. Payments
2. Insurance
3. Deposits & Lending
4. Capital Raising
5. Investment Management
6. Market Provisioning

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

# 5 FinTech: Investment Management

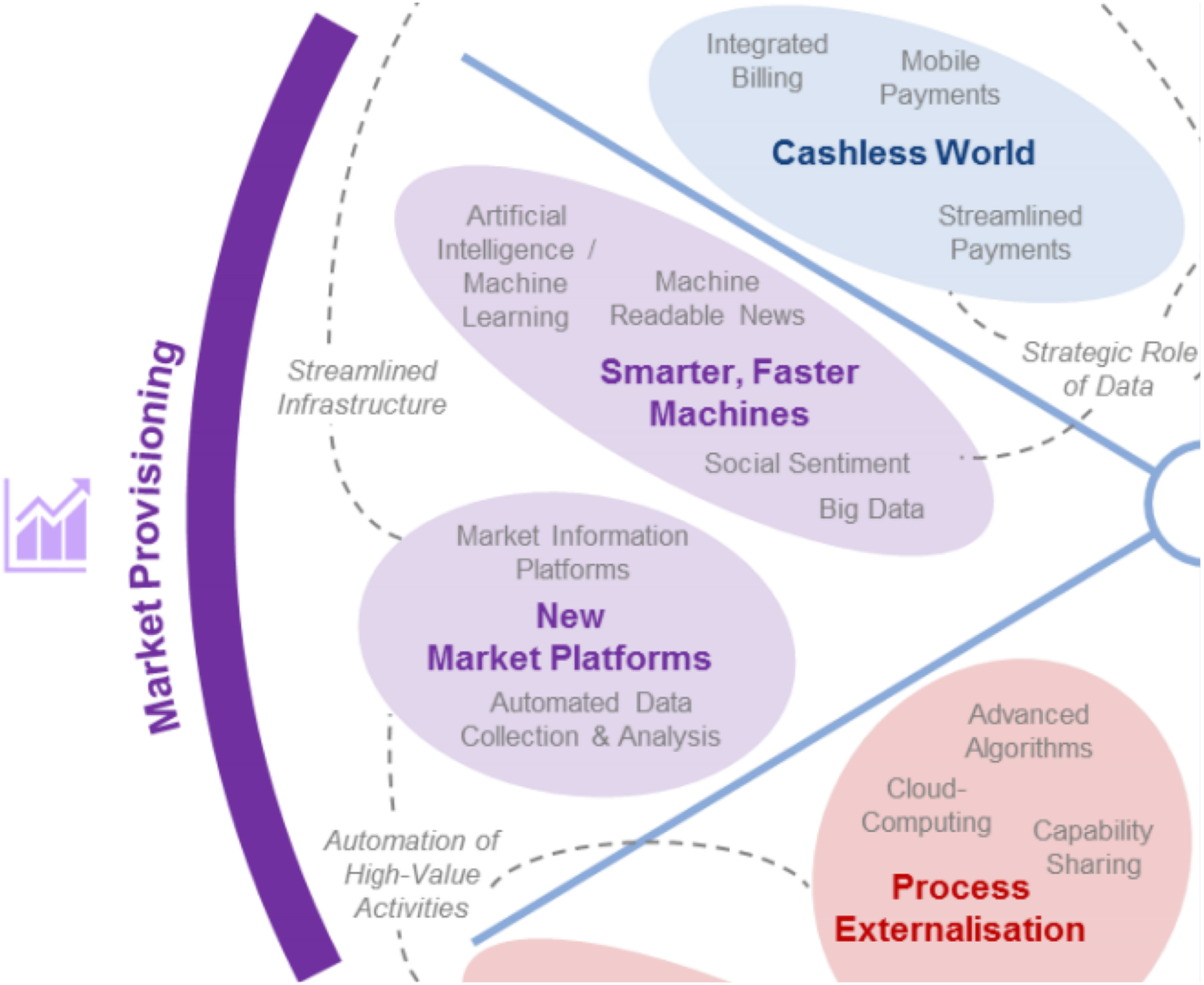



Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

# 5 FinTech: Investment Management Empowered Investors Process Externalization

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

# 6 FinTech: Market Provisioning




Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf

# 6 FinTech: Market Provisioning Smarter, Faster Machines New Market Platforms

Source: https://www.stockfeel.com.tw/2015年世界經濟論壇－未來的金融服務/

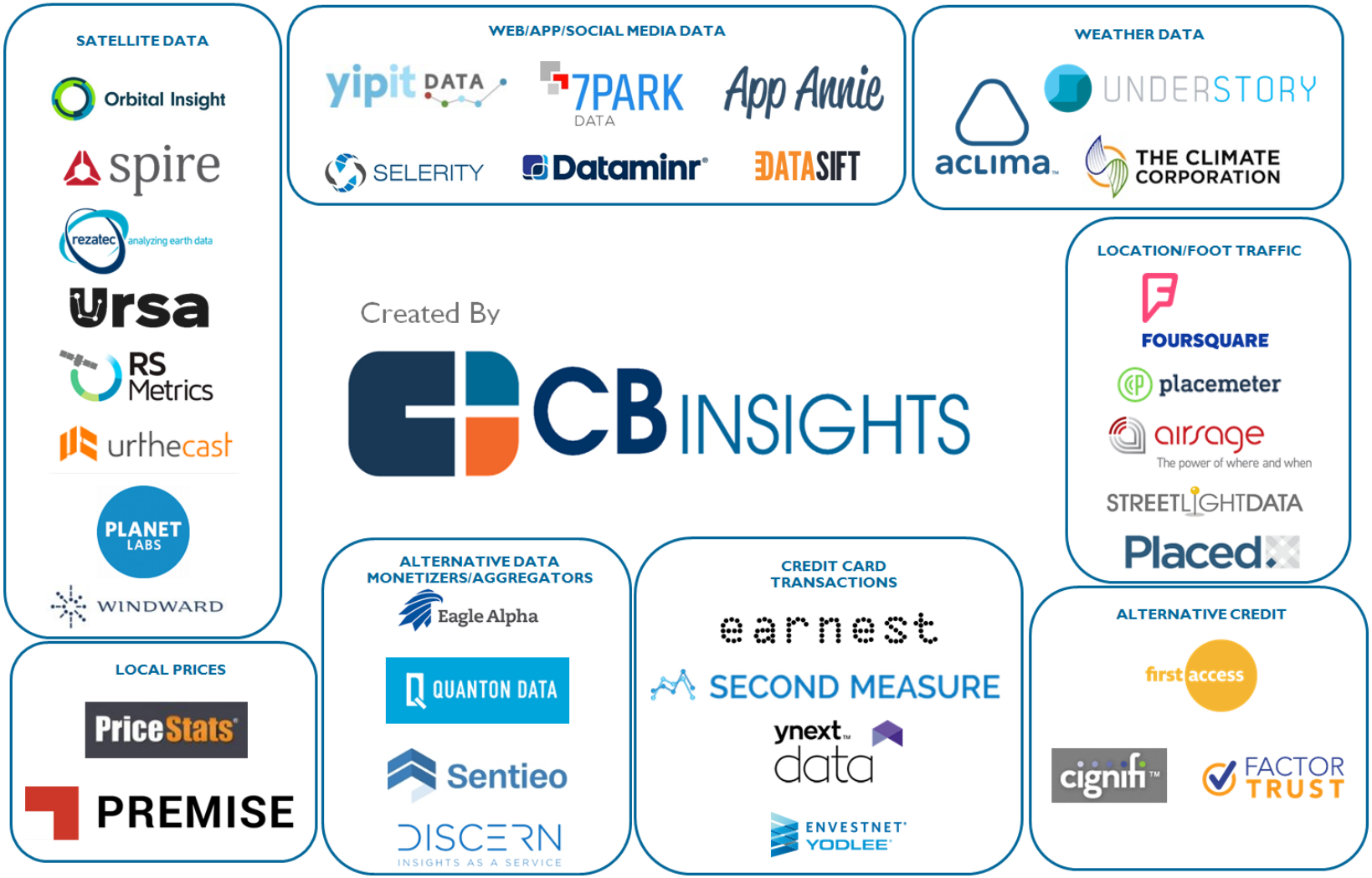
# The New Alpha: 30+ Startups Providing Alternative Data For Sophisticated Investors

New sources of data mined by startups like Foursquare, Premise, and Orbital Insight are letting investors understand trends before they happen.

Source: https://www.cbinsights.com/blog/alternative-data-startups-market-map-company-list/

# The New Alpha: 30+ Startups Providing Alternative Data For Sophisticated Investors

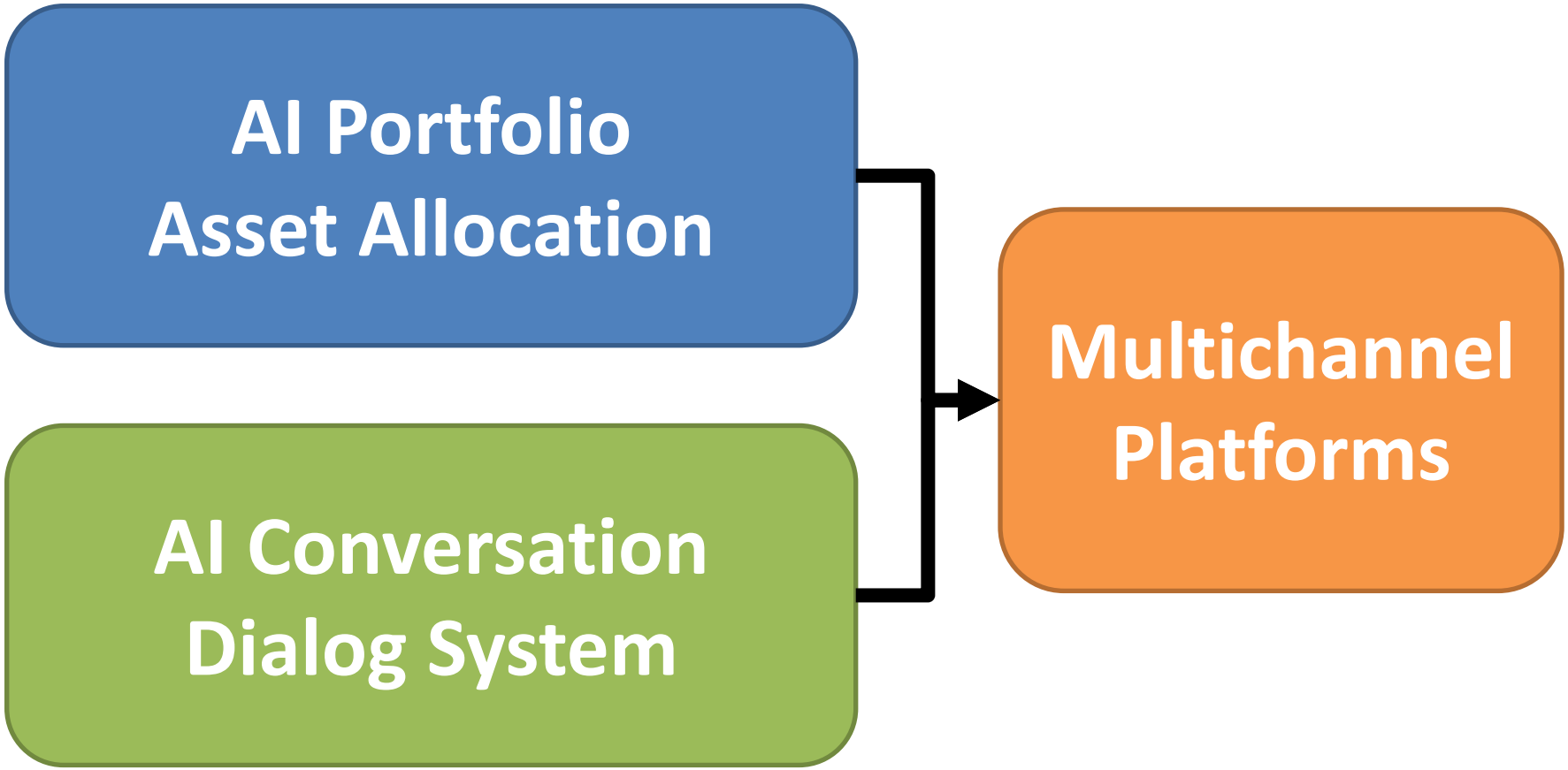
## Alternative Data Sources




Source: https://www.cbinsights.com/blog/alternative-data-startups-market-map-company-list/

# Artificial Intelligence for Conversational Robo-Advisor

# AI Conversational Robo-Advisor

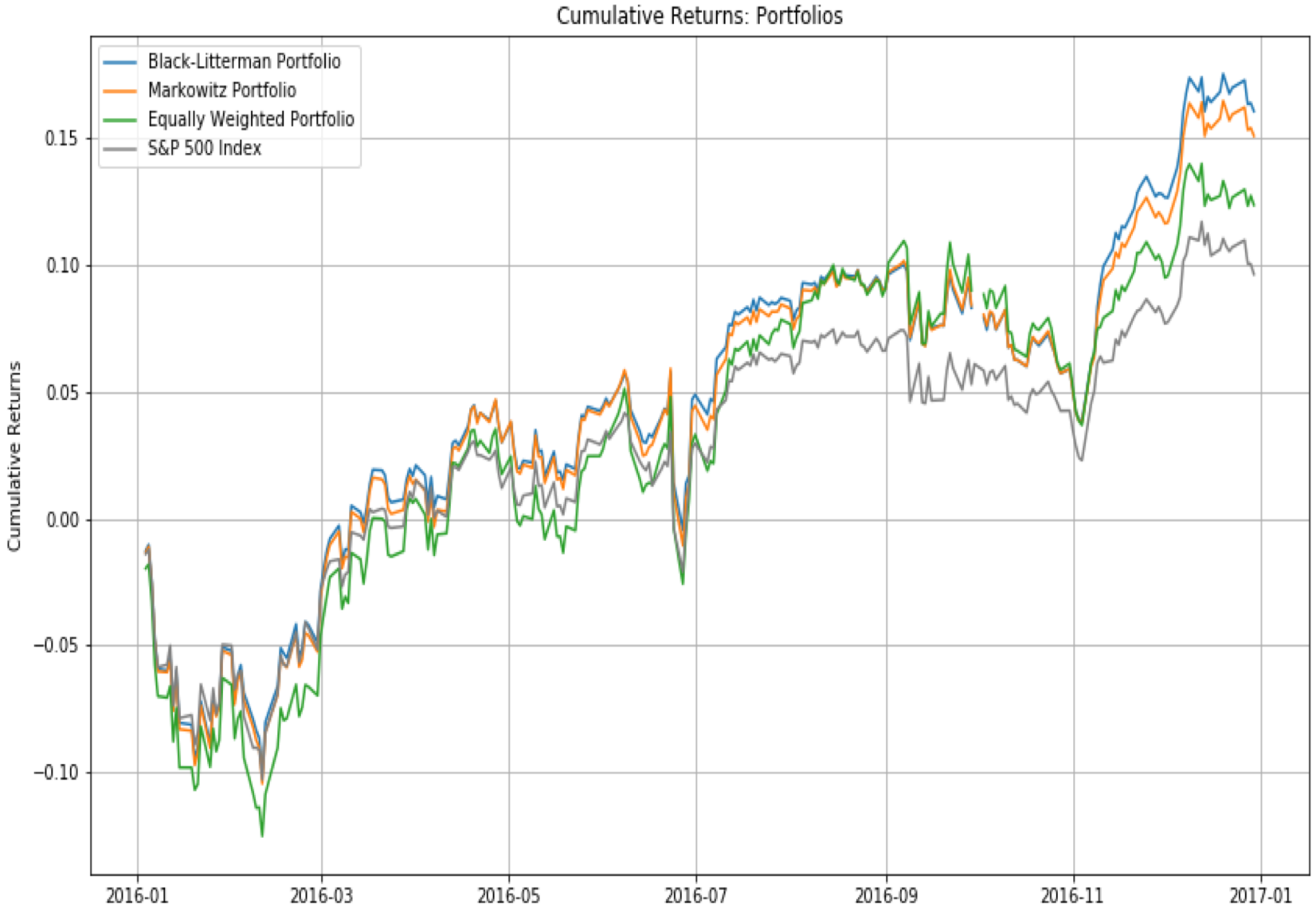


# Portfolio Performance in 2016
# Annual Portfolio Statistics

| | Black-Litterman Portfolio - the LSTM Investor Views | Markowitz Portfolio | Equally Weighted Portfolio | S&P 500 Index |
|---|---|---|---|---|
| **Annual return** | 16.151% | 15.172% | 12.428% | 9.643% |
| **Annual volatility** | 13.897% | 14.365% | 15.870% | 13.169% |
| **Sharpe ratio** | 1.14697 | 1.05534 | 0.81762 | 0.76492 |
| **Stability** | 0.82500 | 0.82515 | 0.82514 | 0.78754 |
| **Max drawdown** | -10.105% | -10.465% | -12.529% | -10.306% |
| **Skew** | -0.35652 | -0.52985 | -0.56976 | -0.36795 |
| **Kurtosis** | 2.49845 | 3.00613 | 2.41894 | 2.21958 |
| **Daily value at risk** | -1.688% | -1.750% | -1.948% | -1.619% |
| **Alpha** | 0.06445 | 0.05354 | 0.02158 | 0.00000 |
| **Beta** | 1.01485 | 1.04816 | 1.15631 | 1.00000 |
| **Information ratio** | 0.10935 | 0.09129 | 0.04655 | - |

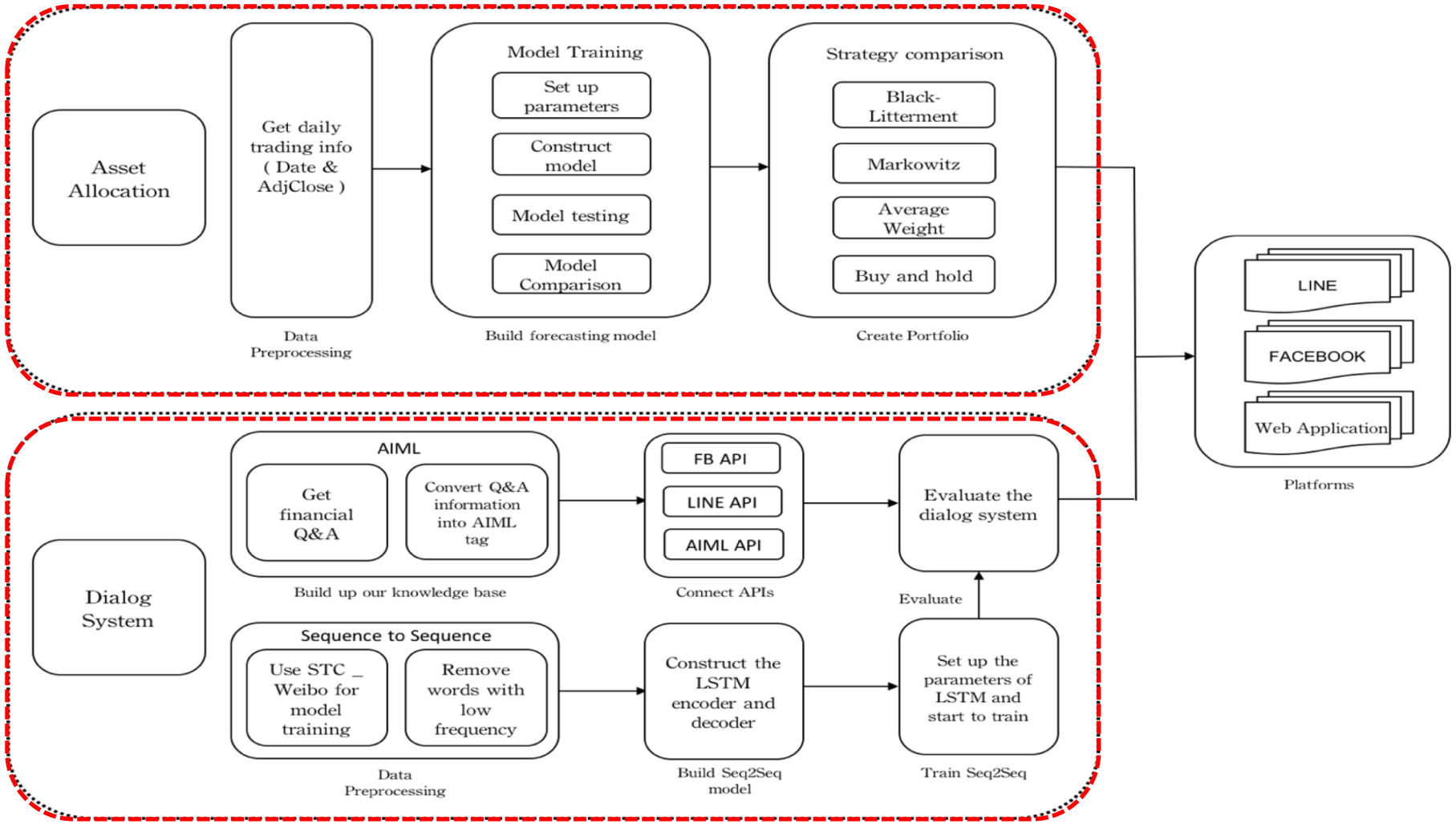
Source: Min-Yuh Day, Tun-Kung Cheng and Jheng-Gang Li (2018), "AI Robo-Advisor with Big Data Analytics for Financial Services", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018.

# Portfolio Cumulative Returns



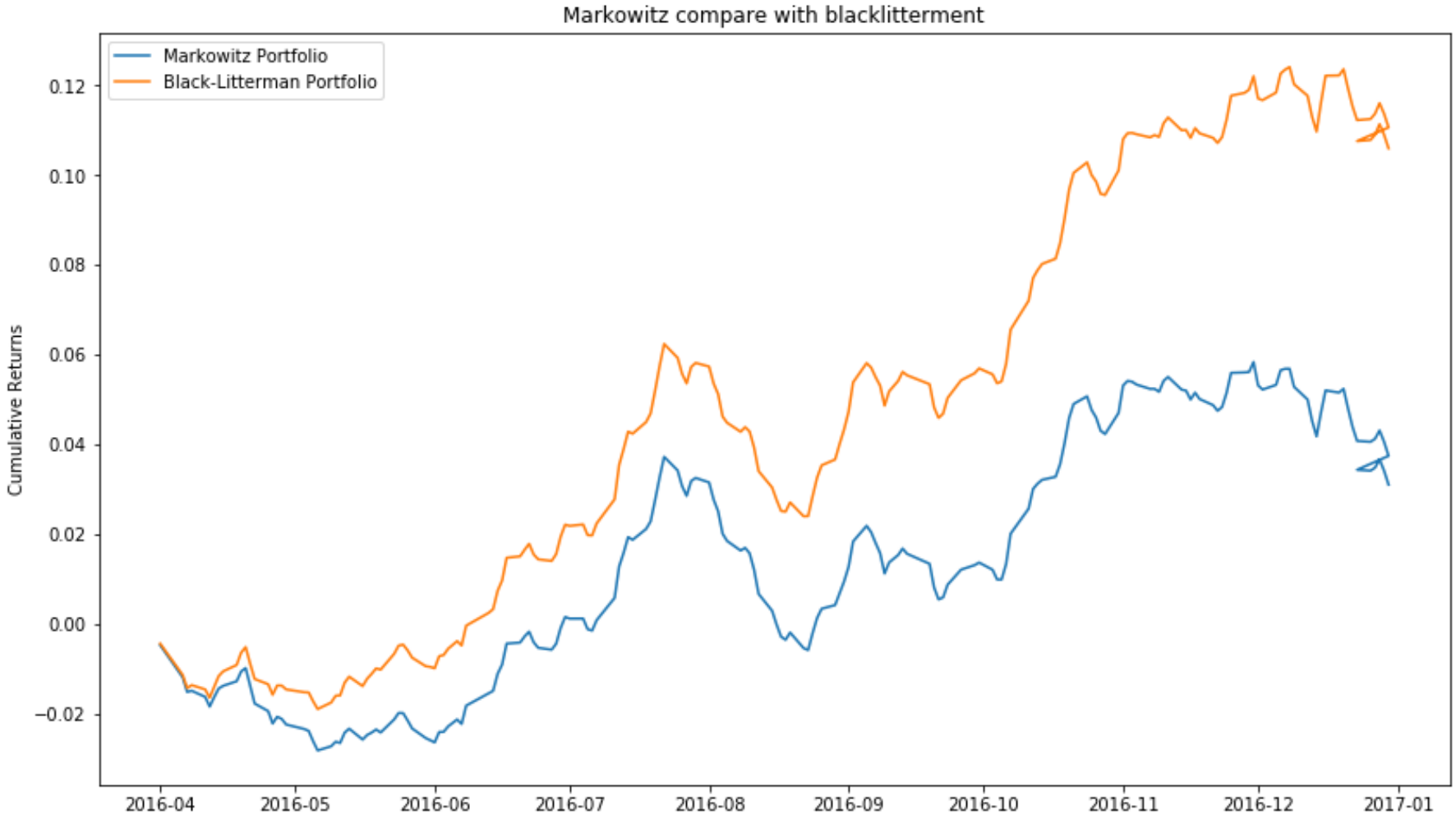

Source: Min-Yuh Day, Tun-Kung Cheng and Jheng-Gang Li (2018), "AI Robo-Advisor with Big Data Analytics for Financial Services", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018.

# System Architecture of AI Conversational Robo-Advisor



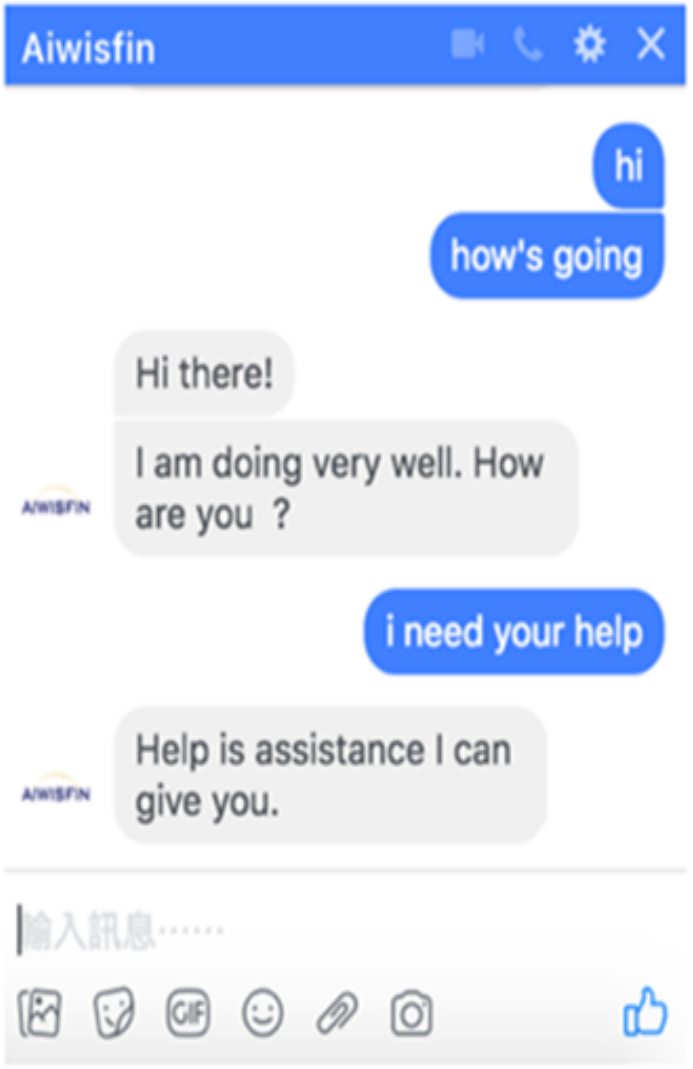

Source: Min-Yuh Day, Jian-Ting Lin and Yuan-Chih Chen (2018), "Artificial Intelligence for Conversational Robo-Advisor", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018

# Cumulative Returns
# Markowitz v.s. Black-litterment




Source: Min-Yuh Day, Jian-Ting Lin and Yuan-Chih Chen (2018), "Artificial Intelligence for Conversational Robo-Advisor", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018

# Conversational Model
## (LINE, FB Messenger)


Source: Min-Yuh Day, Jian-Ting Lin and Yuan-Chih Chen (2018), "Artificial Intelligence for Conversational Robo-Advisor", in Proceedings of the 2018 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2018), Barcelona, Spain, August 28-31, 2018

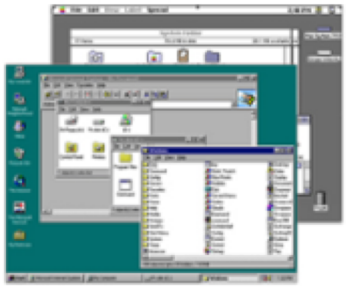
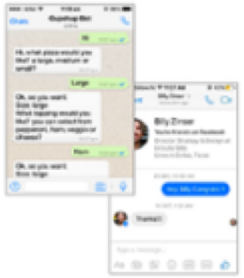
# Conversational Robo-Advisor Multichannel UI/UX Robots

## ALPHA 2


## ZENBO

# AI Chatbot for Conversational Commerce

# Chatbots: Evolution of UI/UX

| | mid - 80s | mid - 90s | mid - 00s | mid - 10s |
|---|---|---|---|---|
| **Paradigm** | **PC** | **Web** | **Smartphone** | **Messaging** |
| |  |  |  |  |
| **Platform**<br>*Examples* | **Desktop**<br>*DOS, Windows, Mac OS* | **Browser**<br>*Mosaic, Explorer, Chrome* | **Mobile OS**<br>*iOS, Android* | **Messaging Apps**<br>*WhatsApp, Messenger, Slack* |
| **Applications**<br>*Examples* | **Clients**<br>*Excel, PPT, Lotus* | **Website**<br>*Yahoo, Amazon* | **Apps**<br>*Angry Birds, Instagram* | **Bots**<br>*Weather, Travel* |
| **UI/UX** | **Native Screens** | **Web Pages** | **Native Mobile Screens** | **Message** |
| **S/w Dev** | **Client-side** | **Server-side** | **Client-side** | **Server-side** |

Source: https://bbvaopen4u.com/en/actualidad/want-know-how-build-conversational-chatbot-here-are-some-tools

# Chatbot

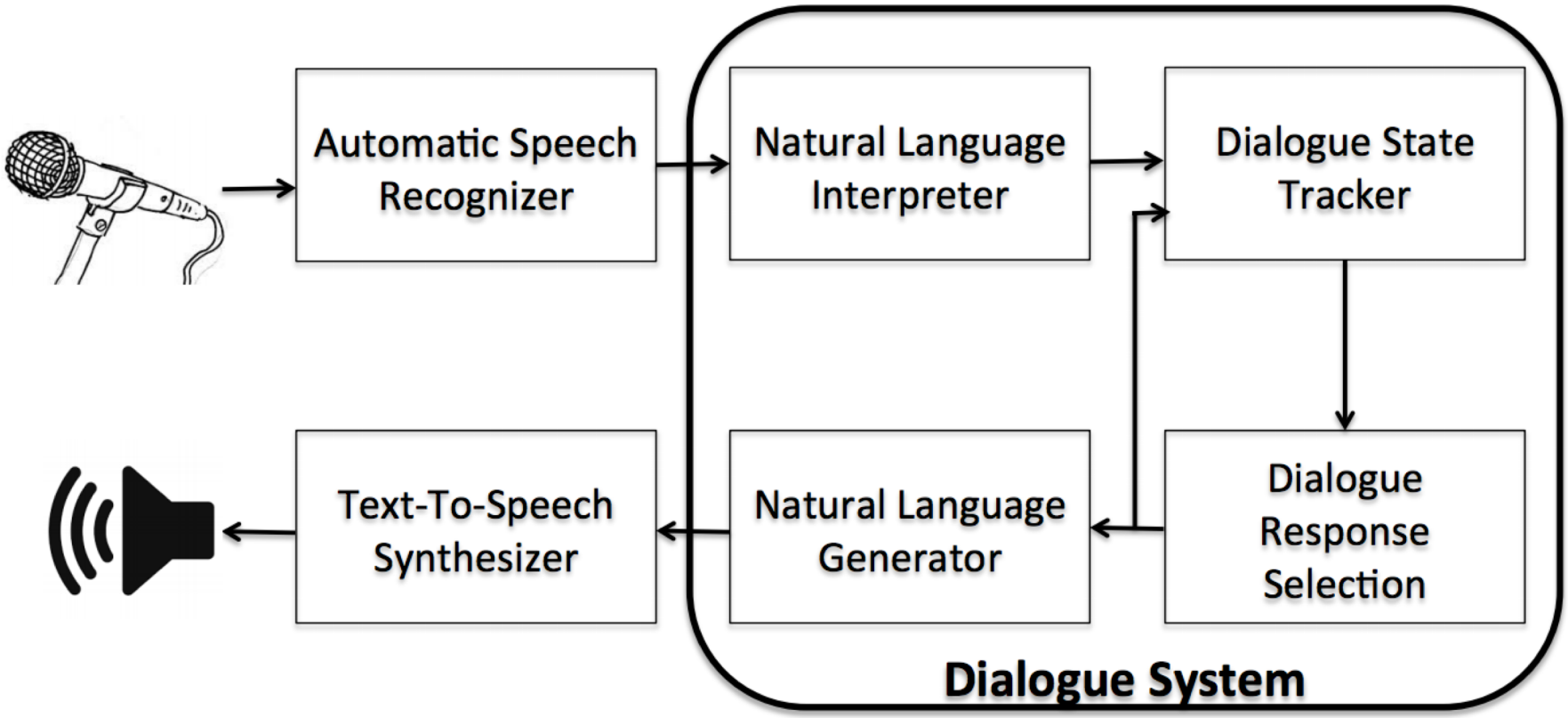
# Dialogue System

# Intelligent Agent

# Chatbot


Source: https://www.mdsdecoded.com/blog/the-rise-of-chatbots/

# Dialogue System




Source: Serban, I. V., Lowe, R., Charlin, L., & Pineau, J. (2015). A survey of available corpora for building data-driven dialogue systems. *arXiv preprint arXiv:1512.05742*.

# Can machines think?

**(Alan Turing ,1950)**

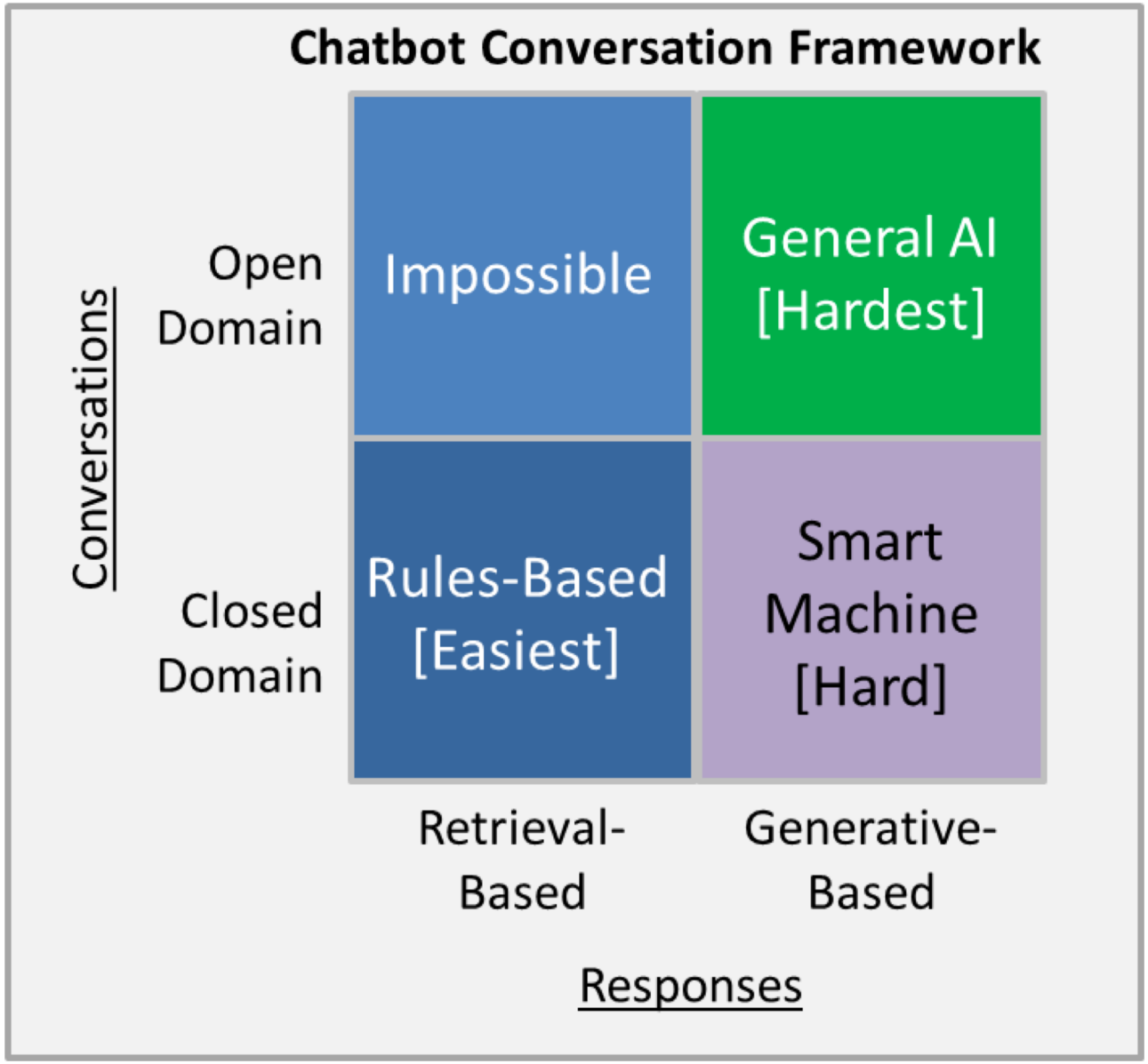
Source: Cahn, Jack. "CHATBOT: Architecture, Design, & Development." PhD diss., University of Pennsylvania, 2017.

# Chatbot

"online human-computer dialog system with natural language."

Source: Cahn, Jack. "CHATBOT: Architecture, Design, & Development." PhD diss., University of Pennsylvania, 2017.

# Chatbot Conversation Framework

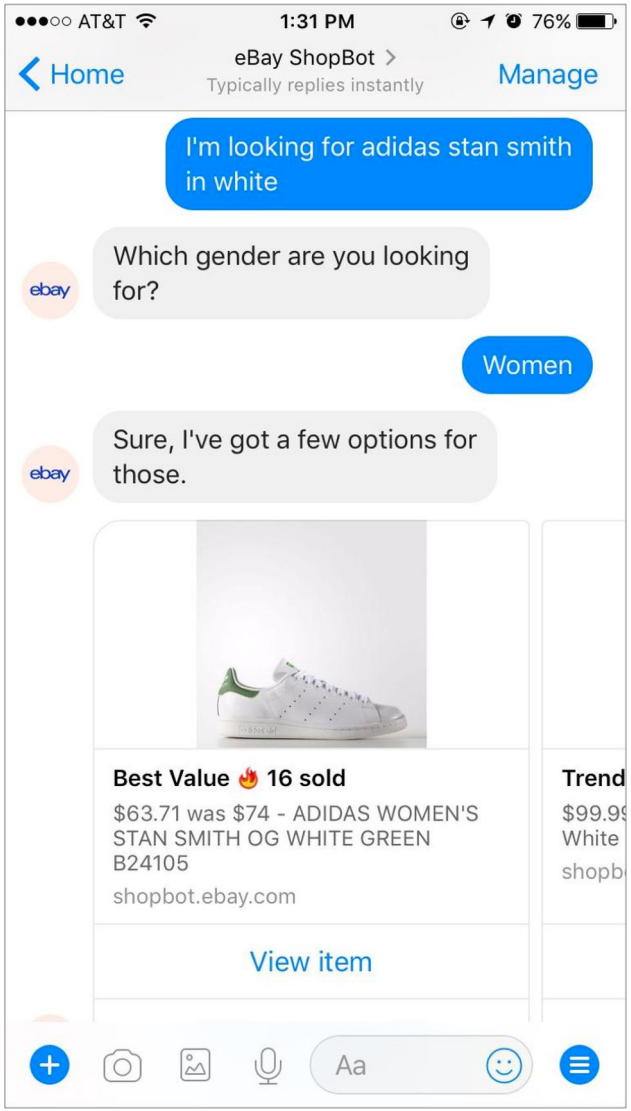



Source: https://chatbotslife.com/ultimate-guide-to-leveraging-nlp-machine-learning-for-you-chatbot-531ff2dd870c

# From E-Commerce to Conversational Commerce: Chatbots and Virtual Assistants

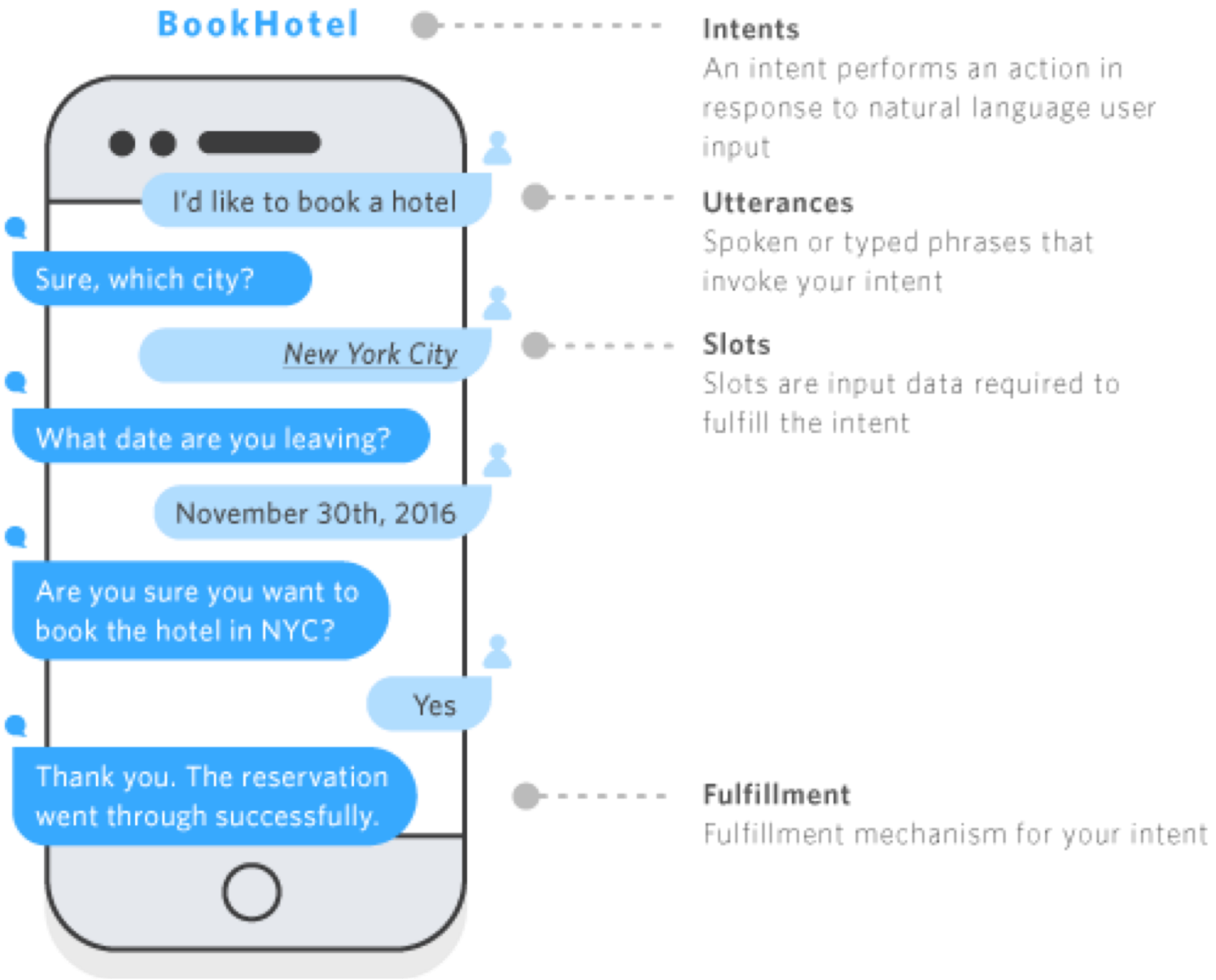
Source: http://www.guided-selling.org/from-e-commerce-to-conversational-commerce/

# Conversational Commerce: eBay AI Chatbots



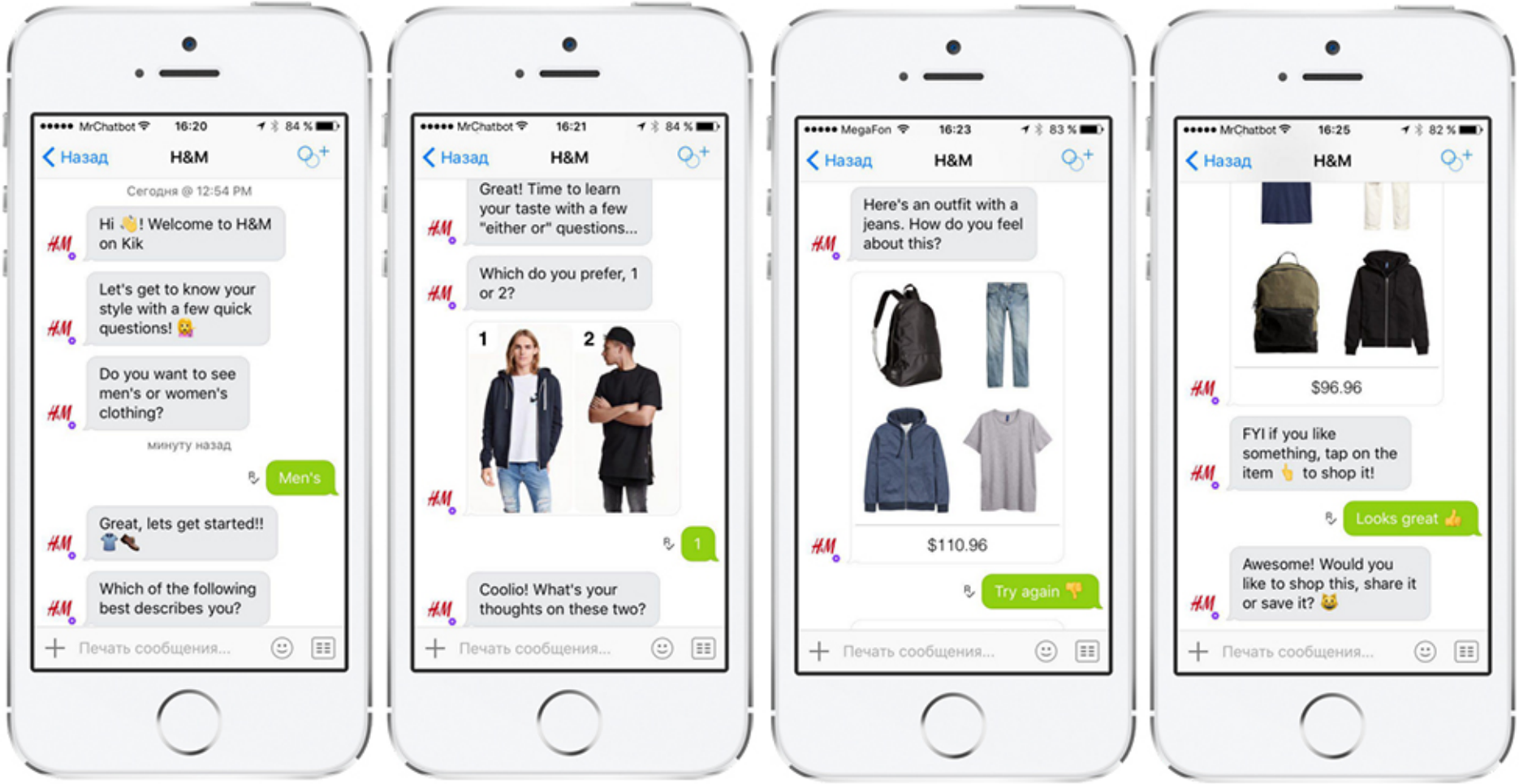

Source: https://www.forbes.com/sites/rachelarthur/2017/07/19/conversational-commerce-ebay-ai-chatbot/

# Hotel Chatbot



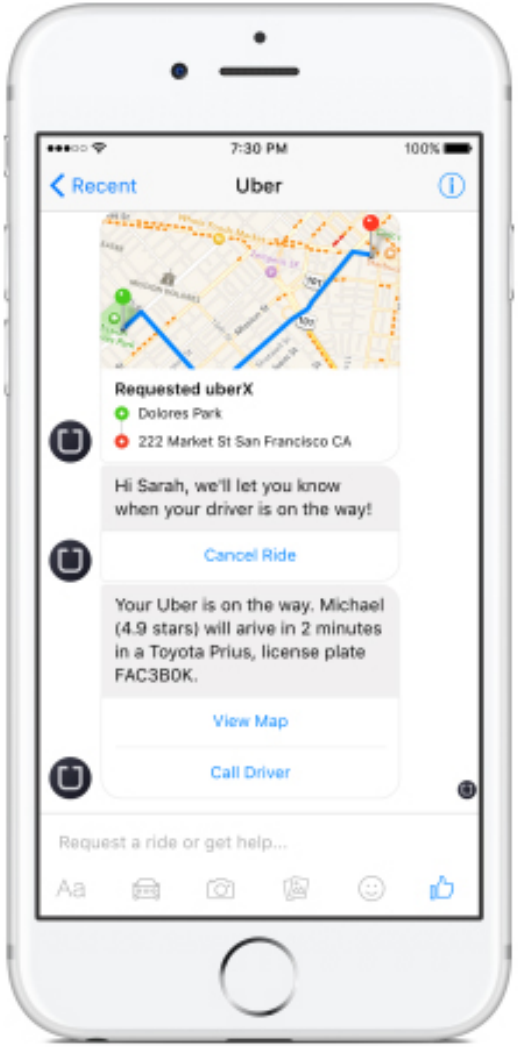

Source: https://sdtimes.com/amazon/guest-view-capitalize-amazon-lex-available-general-public/

# H&M's Chatbot on Kik




Source: http://www.guided-selling.org/from-e-commerce-to-conversational-commerce/

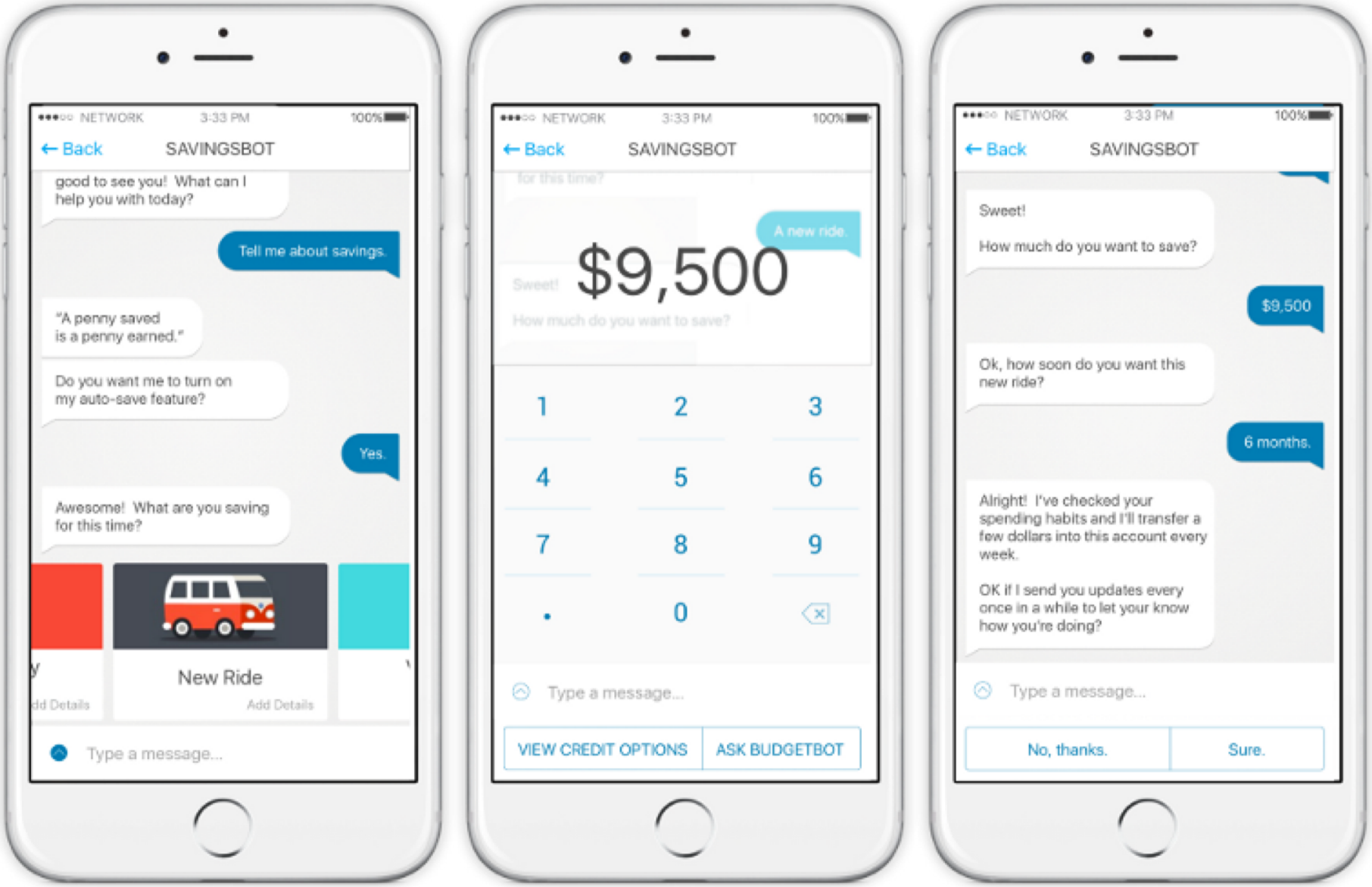
# Uber’s Chatbot on Facebook’s Messenger




Uber’s chatbot on Facebook’s messenger
- one main benefit: it loads much faster than the Uber app

Source: http://www.guided-selling.org/from-e-commerce-to-conversational-commerce/

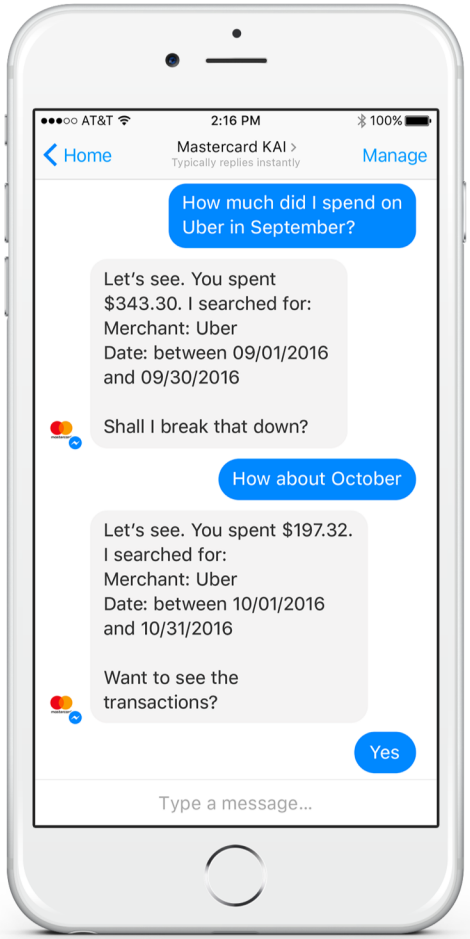
# Savings Bot

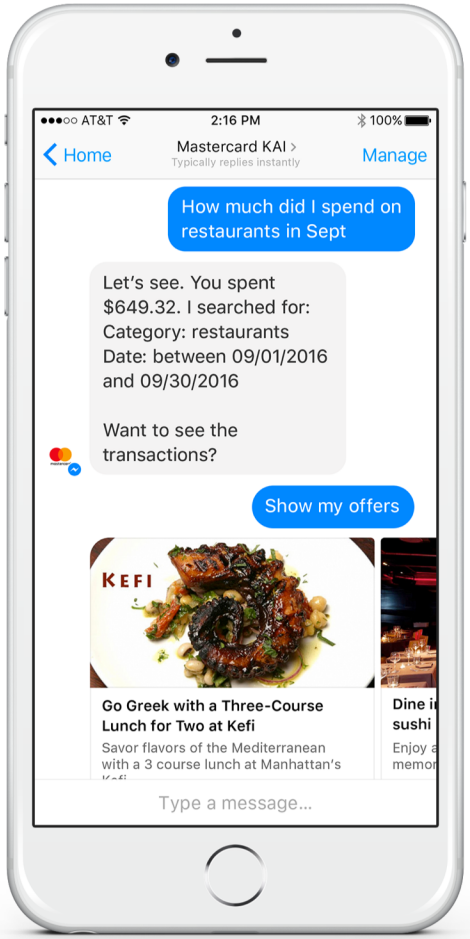


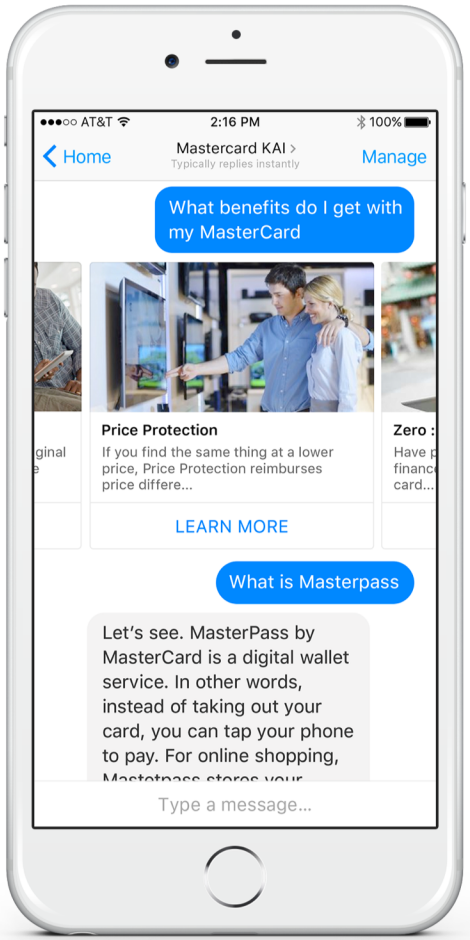

Source: https://chatbotsmagazine.com/artificial-intelligence-ai-and-fintech-part-1-7cae1e67dc13

# Mastercard Makes Commerce More Conversational

mastercard




POWERED BY
Kasisto

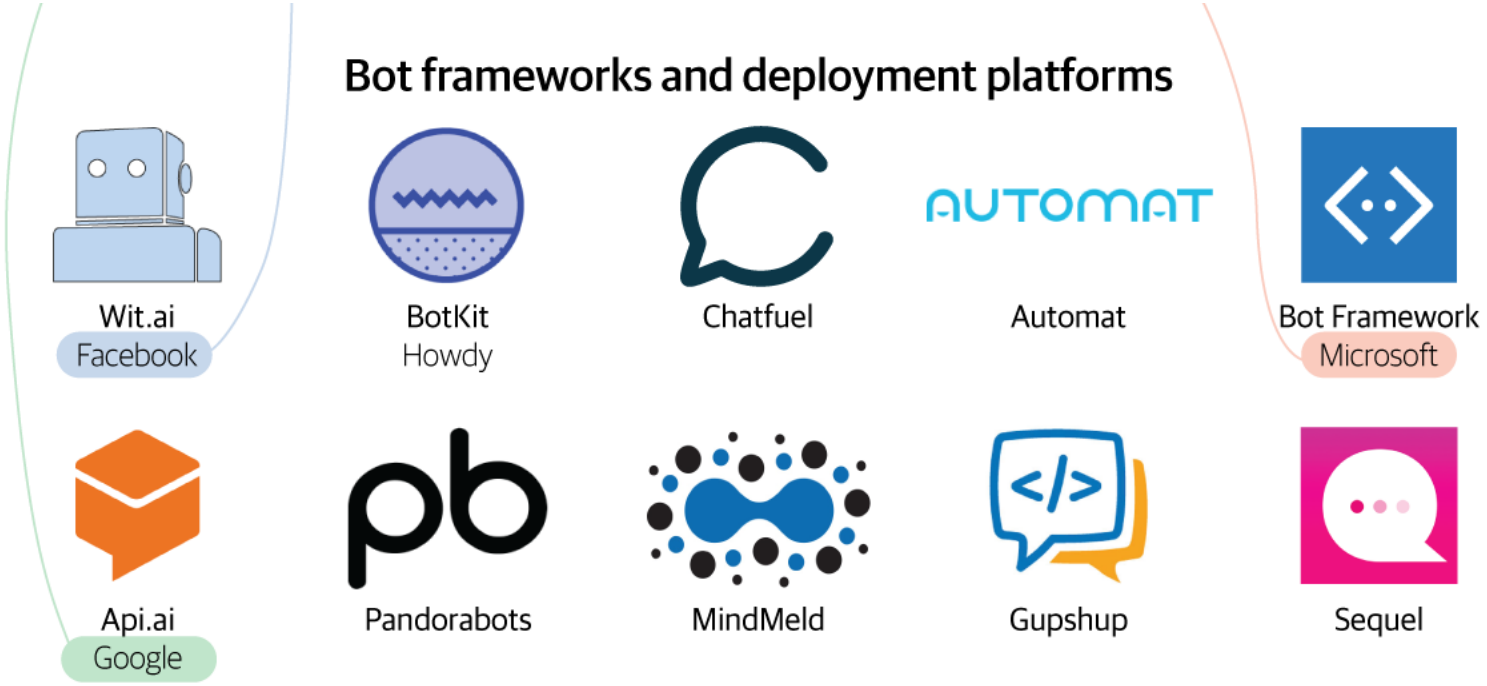
Source: https://newsroom.mastercard.com/press-releases/mastercard-makes-commerce-more-conversational-with-launch-of-chatbots-for-banks-and-merchants/

# Bot Platform Ecosystem

# The bot platform ecosystem
## and the emerging giants

Nearly every large software company has announced some sort of bot strategy in the last year. Here's a look at a handful of leading platforms that developers might use to send messages, interpret natural language, and deploy bots, with the emerging bot-ecosystem giants highlighted.


Source: https://www.oreilly.com/ideas/infographic-the-bot-platform-ecosystem



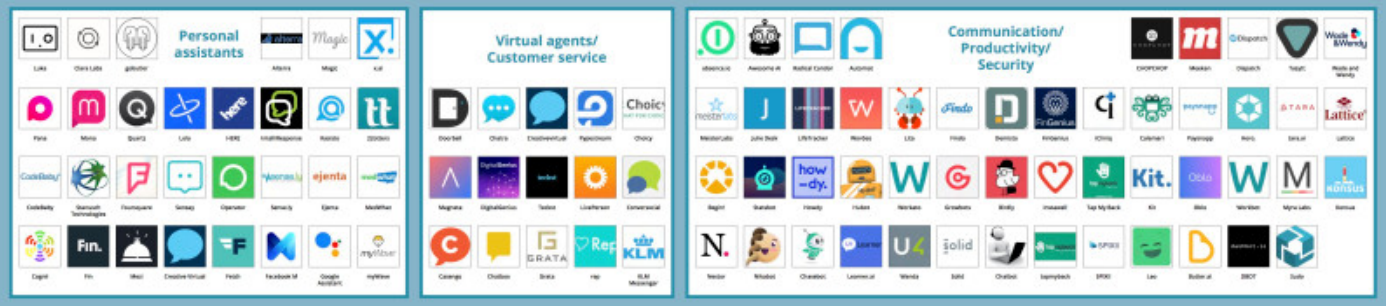

Source: https://www.oreilly.com/ideas/infographic-the-bot-platform-ecosystem

DESIGNED BY
JON CIFUENTES

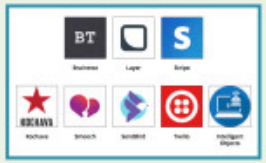
# Bots Landscape

POWERED BY
VB | Profiles

## Bots with traction

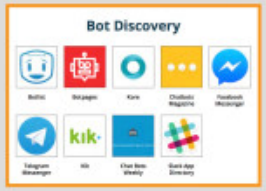



## Connectors/ Shared Services

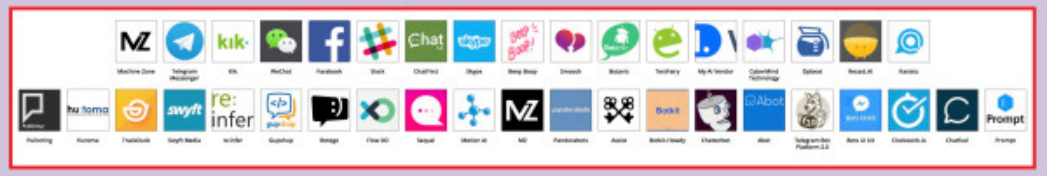


## AI Tools: Natural Language Processing, Machine Learning, Speech & Voice Recognition

## Bot Discovery




## Bot developer frameworks and tools



## Analytics


## Messaging

Source: https://venturebeat.com/2016/08/11/introducing-the-bots-landscape-170-companies-4-billion-in-funding-thousands-of-bots/

# RECAST.AI Messenger Bot Landscape

May 2017

## Food

The Wine Pairer, Plum, Pescetarian Kitchen, Hungry, Foodie, Fitmeal, Entrée, Chatobook, Make My Sushi, Voome

## Communication

Tangowork, Typeform, Anony, Tarjimly, Refugio, Rescue, Messenger Match, Sensay, LangLearnBot, Chat Club, Lingio Translate, Decodemoji, U-Report Global, Twiggo

## Utilities

Poncho, Calcbot, Smokey, DotCom, Server Monsitoring, English Dictionary, Youtube Search, Idea Bot, QRobot, Instant Translator

## Personal

M, Assist, Operator, Uber, Swelly, AskVoila, Ikea Build, Selectionnist, Bud Light Bot, Ask Gary Vee, Gidi, Visabot

## Design

ColoretoBot, Connie Digital, AWWWARDS, Mr. Norman, Graphic Design, SnapBot

## Analytics

SISENSE, Stockflare, PageInsights, DAM, BuzzLogger, Trading Bot

## News

CNN, TIA, Digg, WSJ, Reddit Bot, Al Jazeera, Hacker News, Wired, The Guardian, France Info, Chatbots Mag, VentureBeat

## Travel

Grindbase, KLM, British Airways, Space Explorer, AustrianAirlines, SnapTravel, Skyscanner, Kayak, Ticketbot, Rapido

## Entertainment

Spotify, Kim Kardashian, La Bringue, 50 Cent, L'oquillo Fiel, Lindsay Lohan, Maroon 5, MTV News, Axwell Λ Ingrosso, RedBull TV, SantaBot, Star Wars Bot, Citron, Pokébot

## Developer Tools

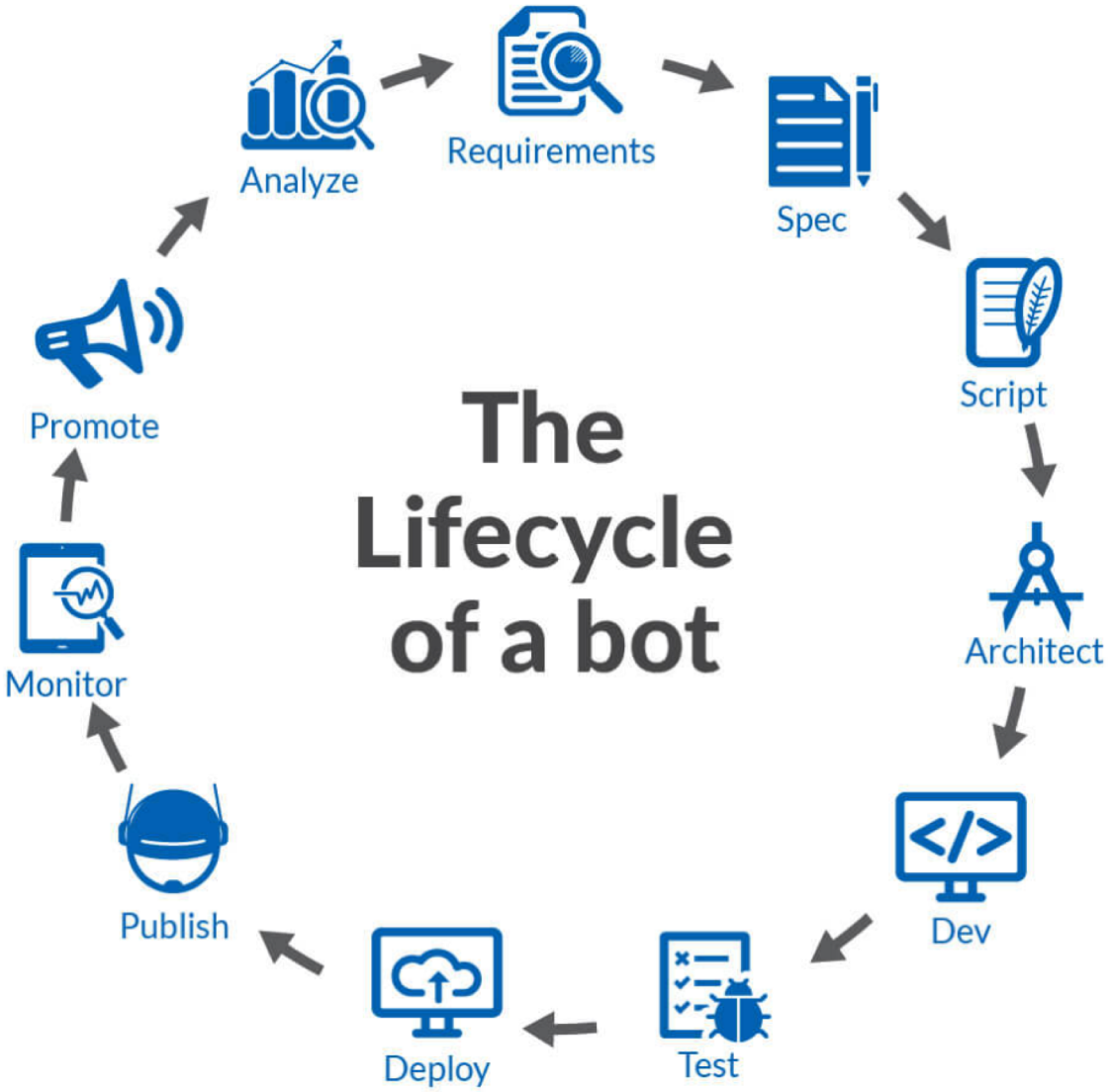
HackerOne, Wiredelta, Robbie, Zilly

## Education

Genius, Kimchi, MemoryzerBot, Ainstein

Source: https://medium.com/@RecastAI/2017-messenger-bot-landscape-a-public-spreadsheet-gathering-1000-messenger-bots-f017fdb1448a /

# The Bot Lifecycle

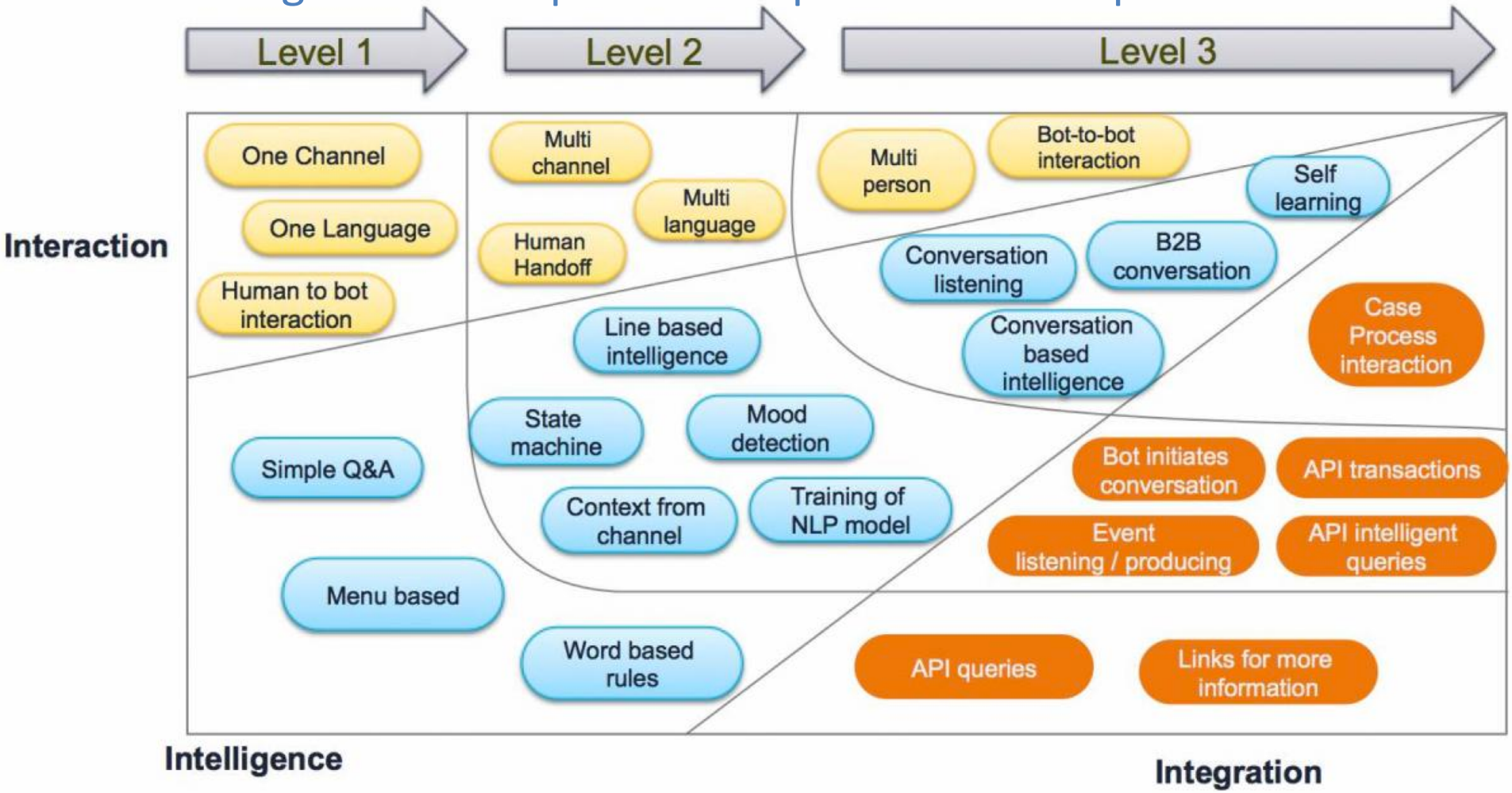



Source: https://chatbotsmagazine.com/the-bot-lifecycle-1ff357430db7

# Chatbots

# Bot Maturity Model

Customers want to have simpler means to interact with businesses and get faster response to a question or complaint.




Source: https://www.capgemini.com/2017/04/how-can-chatbots-meet-expectations-introducing-the-bot-maturity/

# Question Answering (QA)

# IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3

Tamkang University
淡江大學

2011

Tamkang University

# IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-9 RITE


**Department of Information Management**
**Tamkang University, Taiwan**

**Min-Yuh Day** **Chun Tu**

myday@mail.tku.edu.tw



NTCIR-9 Workshop, December 6-9, 2011, Tokyo, Japan

Tamkang University
淡江大學

2013

Tamkang University

# IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-10 RITE-2


**Department of Information Management**
**Tamkang University, Taiwan**


**Min-Yuh Day**


**Chun Tu**


**Hou-Cheng Vong**


**Shih-Wei Wu**


**Shih-Jhen Huang**

myday@mail.tku.edu.tw



NTCIR-10 Conference, June 18-21, 2013, Tokyo, Japan

# IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-11 RITE-VAL 2014


Tamkang University

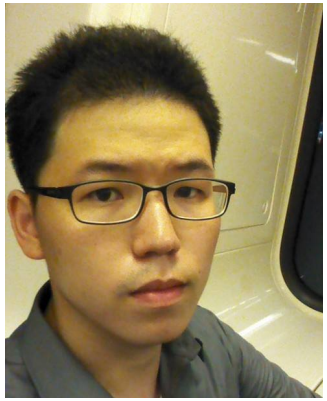
淡江大學

Min-Yuh Day

Ya-Jung Wang

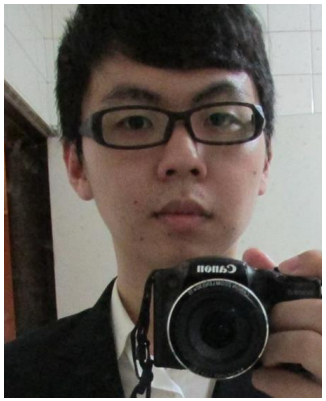
Che-Wei Hsu

En-Chun Tu



Huai-Wen Hsu

Yu-An Lin



Shang-Yu Wu

Yu-Hsuan Tai

Cheng-Chia Tsai



NTCIR-11 Conference, December 8-12, 2014, Tokyo, Japan

NTCIR

Tamkang University
淡江大學

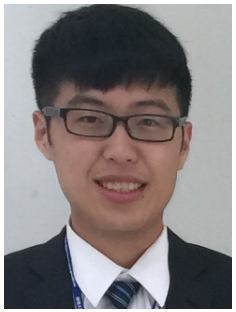
# 2016

# IMTKU Question Answering System for World History Exams at NTCIR-12 QA Lab2


## Department of Information Management
## Tamkang University, Taiwan

Sagacity Technology

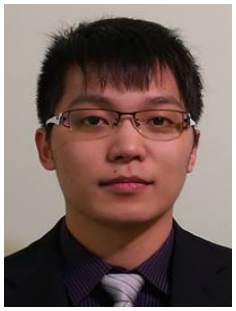

Min-Yuh Day


Cheng-Chia Tsai


Wei-Chun Chung


Hsiu-Yuan Chang

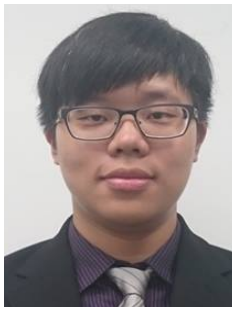

Tzu-Jui Sun


Yuan-Jie Tsai


Jin-Kun Lin


Cheng-Hung Lee


Yu-Ming Guo


Yue-Da Lin


Wei-Ming Chen


Yun-Da Tsai


Cheng-Jhih Han


Yi-Jing Lin


Yi-Heng Chiang


Ching-Yuan Chien

myday@mail.tku.edu.tw



NTCIR-12 Conference, June 7-10, 2016, Tokyo, Japan

NTCIR

# 2017

Tamkang University
淡江大學

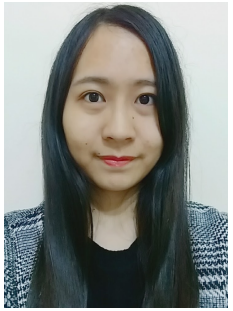
# IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3


**Department of Information Management**
**Tamkang University, Taiwan**

**Min-Yuh Day**

**Chao-Yu Chen**

**Wanchu Huang**



**Shi-Ya Zheng**

**I-Hsuan Huang**

**Tz-Rung Chen**

**Min-Chun Kuo**

**Yue-Da Lin**

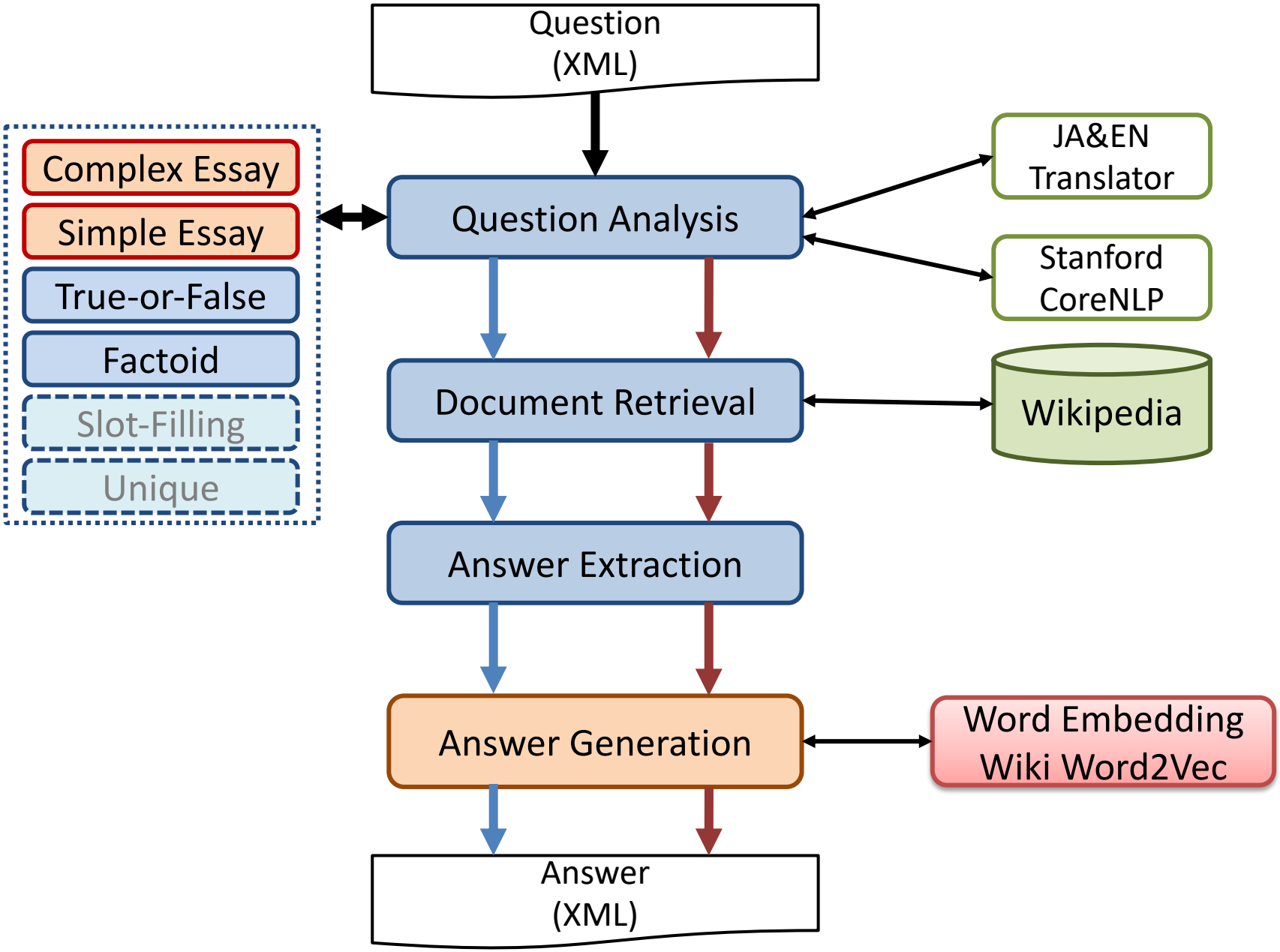
**Yi-Jing Lin**

myday@mail.tku.edu.tw

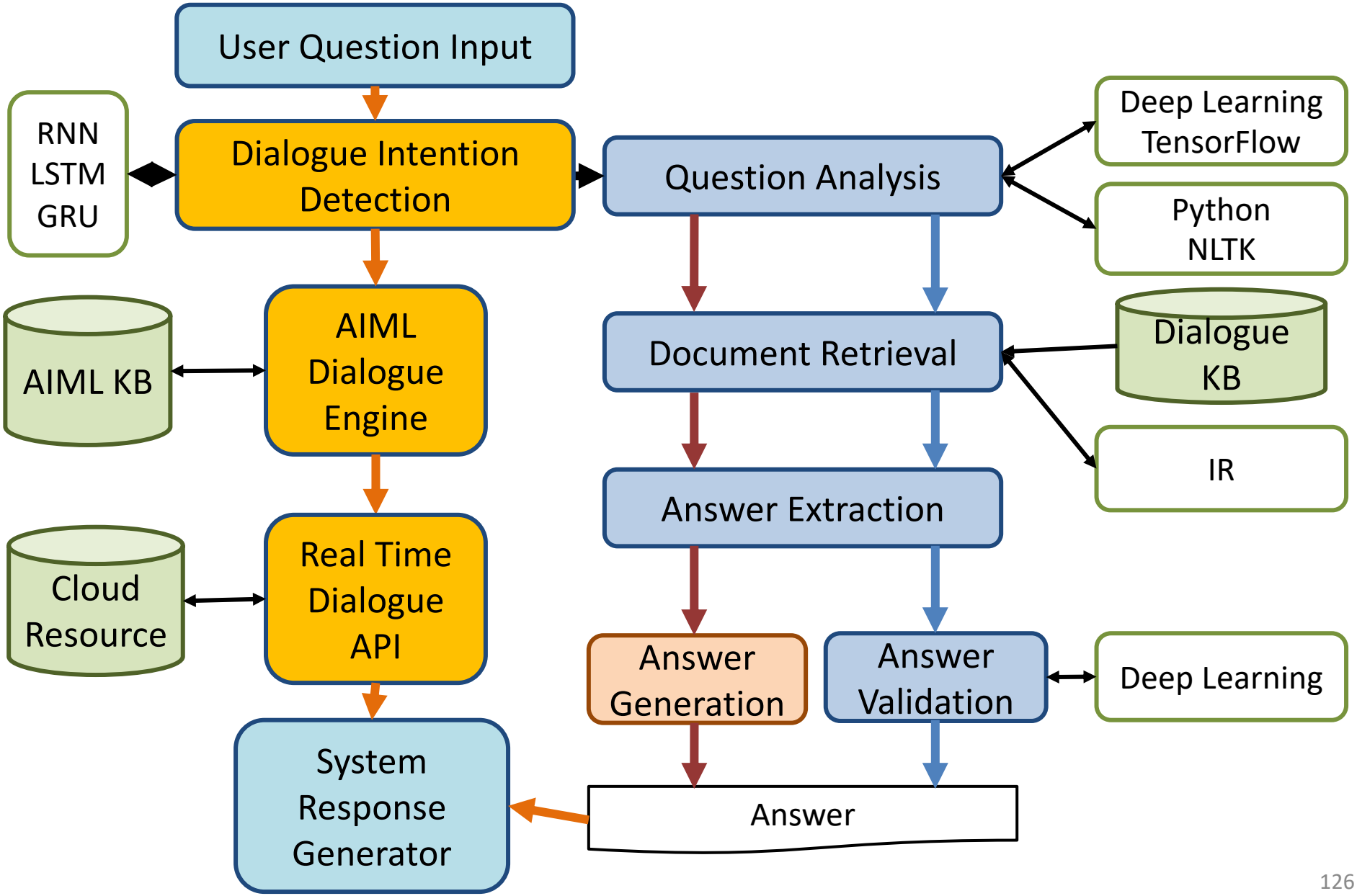


NTCIR-13 Conference, December 5-8, 2017, Tokyo, Japan

# IMTKU System Architecture for NTCIR-13 QALab-3



# System Architecture of Intelligent Dialogue and Question Answering System



# AI Dialogue System

# Chatbot


Source: https://www.mdsdecoded.com/blog/the-rise-of-chatbots/

# Can machines think?

**(Alan Turing ,1950)**

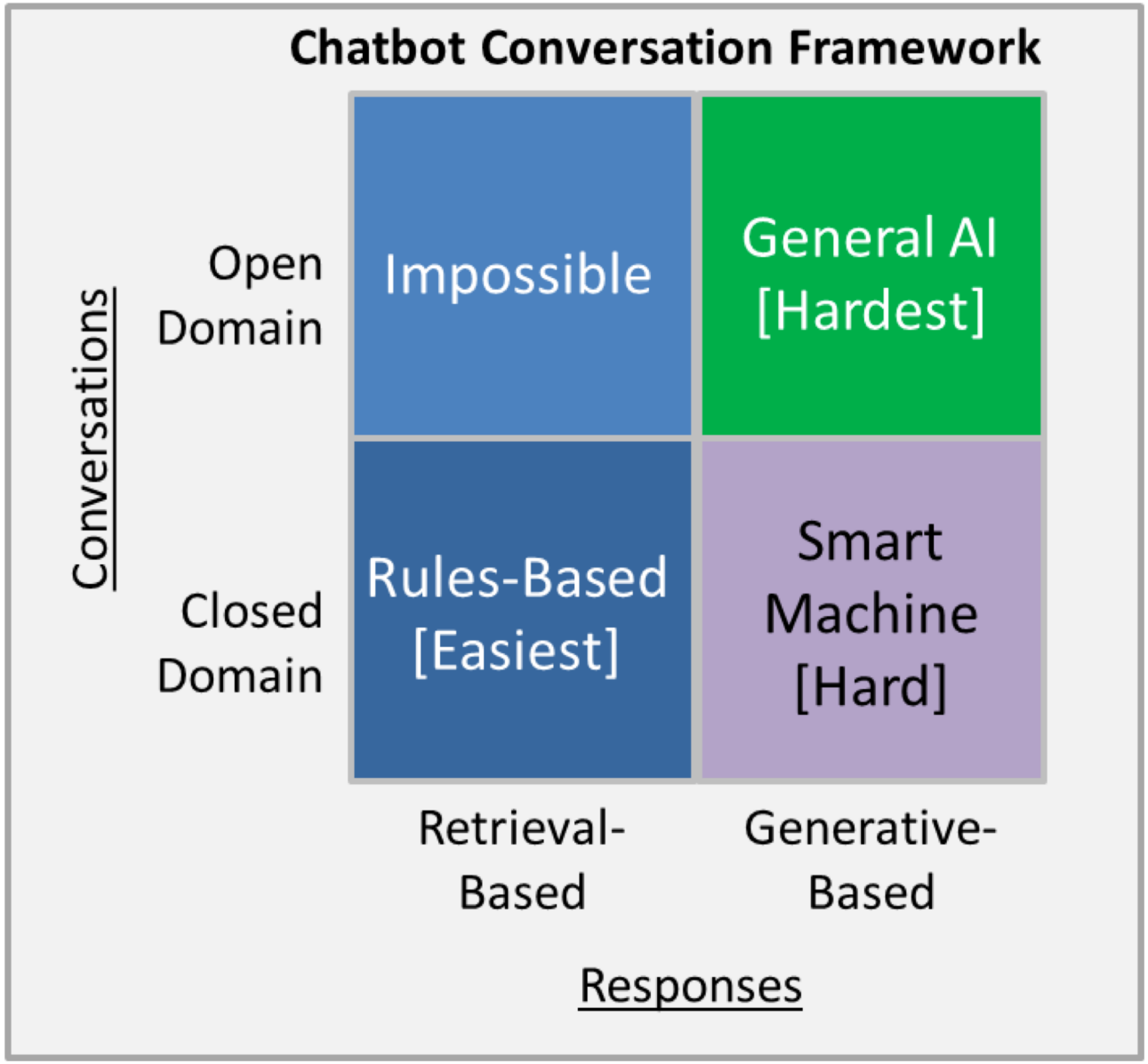
Source: Cahn, Jack. "CHATBOT: Architecture, Design, & Development." PhD diss., University of Pennsylvania, 2017.

# Chatbot

"online human-computer dialog system with natural language."

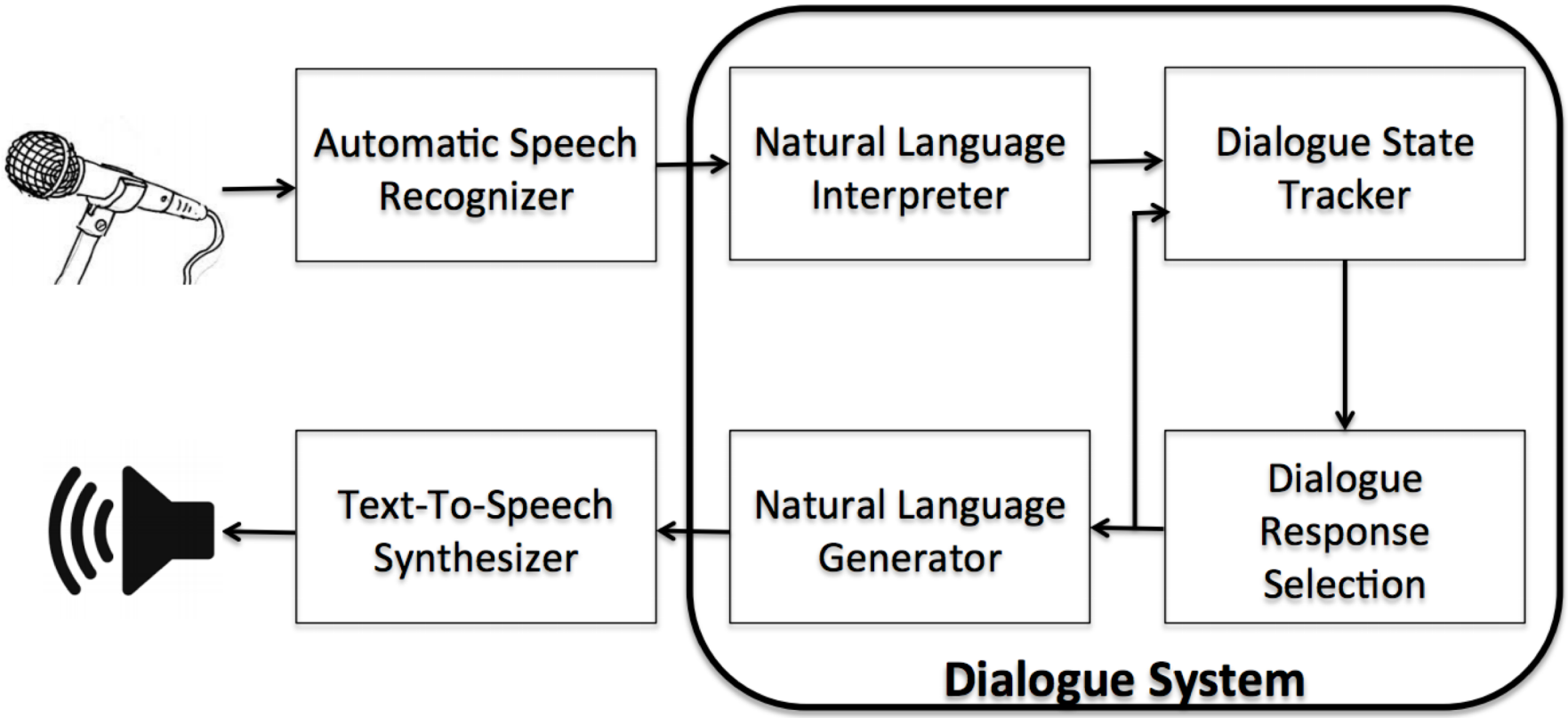
Source: Cahn, Jack. "CHATBOT: Architecture, Design, & Development." PhD diss., University of Pennsylvania, 2017.

# Chatbot Conversation Framework




Source: https://chatbotslife.com/ultimate-guide-to-leveraging-nlp-machine-learning-for-you-chatbot-531ff2dd870c

# Dialogue System




Source: Serban, I. V., Lowe, R., Charlin, L., & Pineau, J. (2015). A survey of available corpora for building data-driven dialogue systems. *arXiv preprint arXiv:1512.05742*.


# Short Text Conversation Task (STC-3)
# Chinese Emotional Conversation Generation (CECG) Subtask

Source: http://coai.cs.tsinghua.edu.cn/hml/challenge.html

# NTCIR Short Text Conversation STC-1, STC-2, STC-3

| | Japanese | Chinese | English |
|---|---|---|---|
| NTCIR-12 STC-1<br>22 active participants | Twitter, Retrieval | Weibo, Retrieval | |
| NTCIR-13 STC-2<br>27 active participants | Yahoo! News, Retrieval+ Generation | Weibo, Retrieval+ Generation | |
| NTCIR-14 STC-3 | | Weibo, Generation for given emotion categories | |
| | | Weibo+English translations, distribution estimation for subjective annotations | |

Chinese Emotional Conversation Generation (CECG) subtask

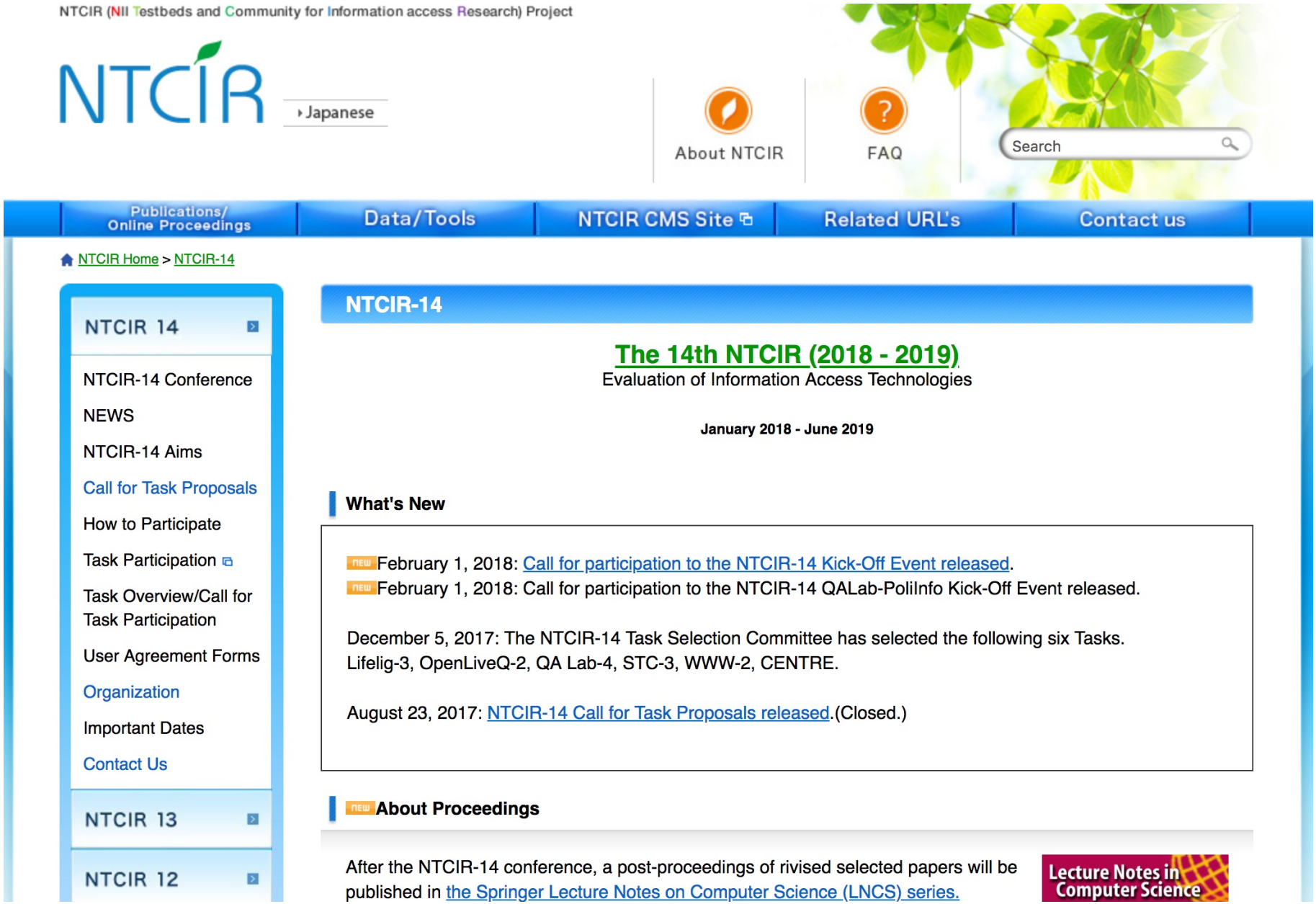
Dialogue Quality (DQ) and Nugget Detection (ND) subtasks

Single-turn, Non task-oriented

Multi-turn, task-oriented (helpdesk)

Source: https://waseda.app.box.com/v/STC3atNTCIR-14

# The 14th NTCIR (2018 - 2019)




http://research.nii.ac.jp/ntcir/ntcir-14/index.html

# NTCIR-14 STC-3

## Short Text Conversation Task (STC-3)

## Chinese Emotional Conversation Generation (CECG) Subtask


Short Text Conversation Task (STC-3)

Chinese Emotional Conversation Generation (CECG) Subtask

Home

Task Definition

Dataset Description

Evaluation Metric

Time Schedule

Copy Rights & Contacts

### Call for Participation

In recent years, there has been a rising tendency in AI research to enhance Human-Computer Interaction by humanizing machines. However, to create a robot capable of acting and talking with a user at the human level requires the robot to understand human cognitive behaviors, while one of the most important human behaviors is expressing and understanding emotions and affects. As a vital part of human intelligence, emotional intelligence is defined as the ability to perceive, integrate, understand, and regulate emotions. Though a variety of models have been proposed for conversation generation from large-scale social data, it is still quite challenging (and yet to be addressed) to generate emotional responses.

In this challenge, participants are expected to generate Chinese responses that are not only appropriate in content but also adequate in emotion, which is quite important for building an empathic chatting machine. For instance, if user says “My cat died yesterday”, the most appropriate response may be “It’s so sad, so sorry to hear that” to express sadness, but also could be “Bad things always happen, I hope you will be happy soon”to express comfort.

Previous Evaluation Challenge at NLPCC 2017

Overview of the NLPCC 2017 Shared Task: Emotion Generation Challenge

### Links

NTCIR NTCIR-14

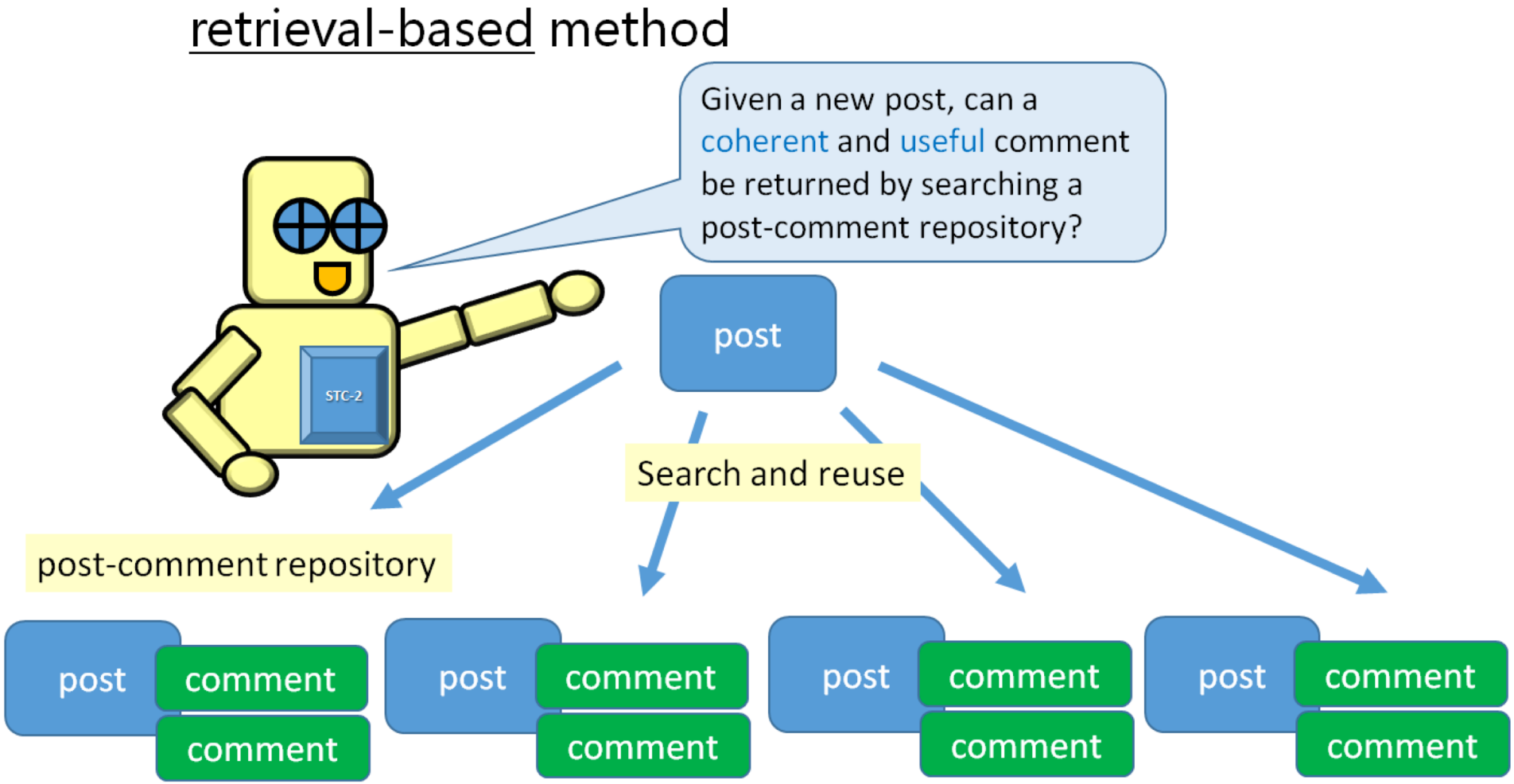
STC-3 NTCIR-14 STC-3

NLPCC NLPCC 2017

AI lab. of Computer Science, Tsinghua University, Beijing 100084, China.

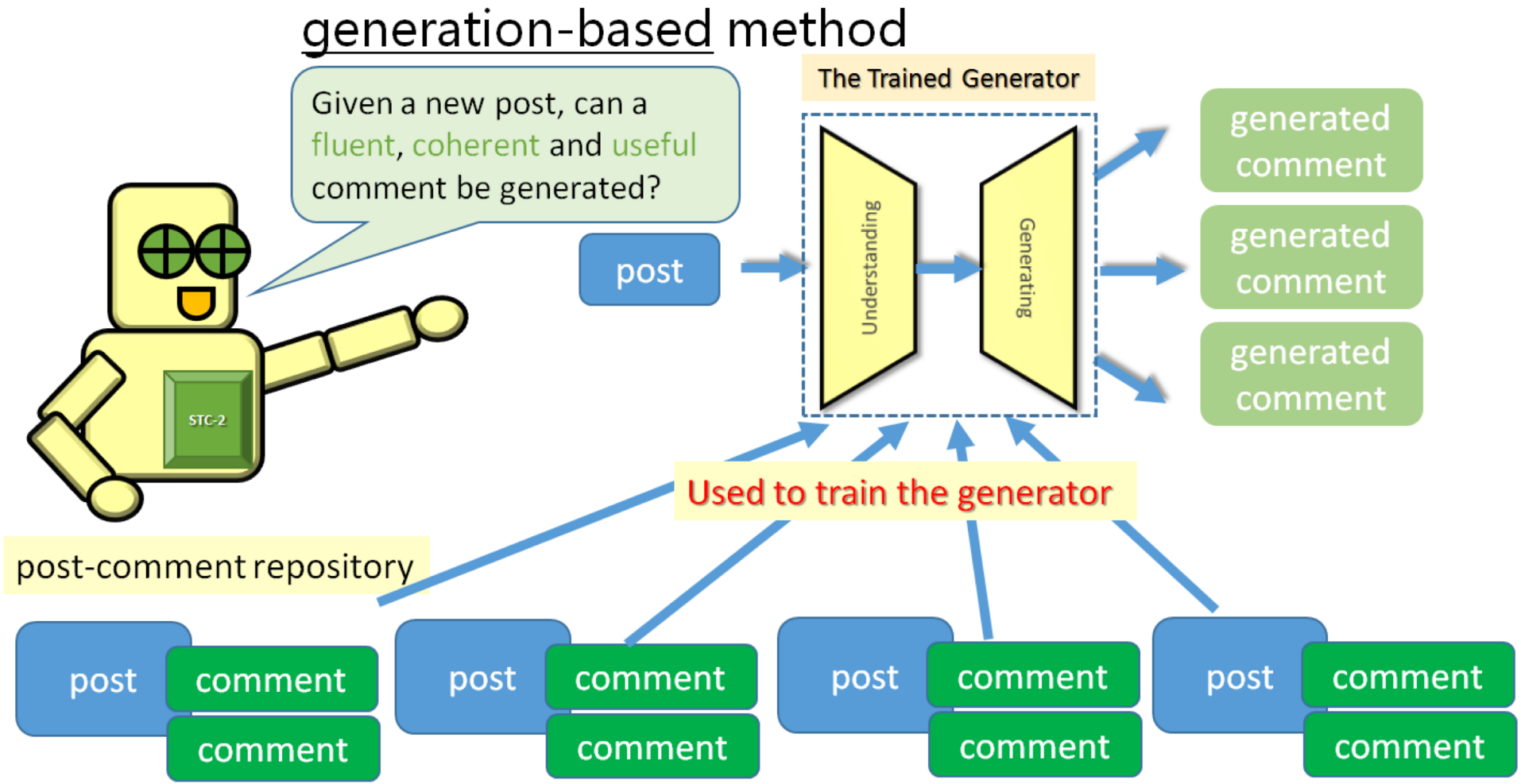
http://www.aihuang.org/p/challenge.html

# Short Text Conversation (NTCIR-13 STC2) Retrieval-based




Source: http://ntcirstc.noahlab.com.hk/STC2/stc-cn.htm

# Short Text Conversation (NTCIR-13 STC2) Generation-based




Source: http://ntcirstc.noahlab.com.hk/STC2/stc-cn.htm

# Given post:

# 爱狗还会做饭的男人，最帅了！

## The man who cooks and loves dogs is very handsome!

| Response | Chinese / Translated English | Emotion Class | Coherence and Fluency | Emotion Consistency | Label |
|---|---|---|---|---|---|
| Response 1 | 会做饭的男人是很帅的啊。<br>The man who cooks is handsome. | 喜欢<br>Like | Yes | Yes | 2 |
| Response 2 | 哈哈，我也觉得。<br>Haha, I feel the same way. | 喜欢<br>Like | Yes | No | 1 |
| Response 3 | 这是哪部电影里的？<br>Which movie is this from? | 厌恶<br>Disgust | No | Yes | 0 |
| Response 4 | 哈哈,你也是。<br>Haha, the same to you. | 喜欢<br>Like | No | No | 0 |
| Response 5 | 我爱你会。<br>I love you, will you. | 厌恶<br>Disgust | No | Yes | 0 |
| Response 6 | 这是同主义同的道！<br>This is the same way of the same doctrine! | 厌恶<br>Disgust | No | No | 0 |

Source: http://coai.cs.tsinghua.edu.cn/hml/challenge/evaluation_metric/

# NLPCC
# Emotion Classification Challenge
# 6 classes (64%)

- 0: Other
- 1: Like
- 2: Sadness
- 3: Disgust
- 4: Anger
- 5: Happiness

Source: http://coai.cs.tsinghua.edu.cn/hml/challenge/dataset_description/

# Chinese Emotional Conversation Generation (CECG)

| Post (Given) | Emotion Category (Given) | Response (to be generated) |
|---|---|---|
| 爱狗还会做饭的男人，最帅了！<br>The man who cooks and loves dogs is very handsome! | 喜欢<br>Like | 会做饭的男人是很帅的啊。<br>The man who cooks is handsome. |
| 爸爸，明天是六一啦，带我出去玩吧！<br>Daddy, tomorrow is June 1th Children's Day. Please take me out to play! | 喜欢<br>Like | 好，一定带。<br>Yes, of course. |
| 被特别在乎的人忽略，会很难过，而装做不在乎，会更难过。<br>It's sad to be ignored by someone that you really care, and it's harder to pretend that you don't care. | 悲伤<br>Sadness | 因为在乎，所以在乎。<br>I am concerned with it, because I care about it. |
| 冰天雪地的哈尔滨！你要冻死我咋地？！？！<br>Harbin is in the snow! Are you going to freeze me to death?!?! | 喜欢<br>Like | 注意保暖，小心别感冒!<br>Keep warm. Watch out for getting cold! |
| 本来想学一把沧桑，结果令我更忧伤。<br>I wanted to learn the vicissitudes of life, but I became sadder. | 悲伤<br>Sadness | 这是一个悲伤的故事。<br>It a sad story. |
| 今天一整天都在海边训练。虽然很累，但还是很开心的！<br>I have been training at the seaside all day. Though very tired, I still very happy! | 快乐<br>Happiness | 是的呢，开心！<br>Yeah, happy! |

Source: http://coai.cs.tsinghua.edu.cn/hml/challenge/task_definition/

# Sample responses generated by Seq2Seq and ECM (Emotional Chatting Machine)

| Post | Model | | Response(Original) | Response(Translated) |
|---|---|---|---|---|
| 承诺，就是一个骗子说给一个傻子听的。<br>A promise is what a cheater says to a fool. | Seq2Seq | | 承诺，就是一个骗子说给一个傻子听的。 | A promise is what a cheater says to a fool. |
| | ECM | Like | 承诺是一个专一的傻子 | Promise is a single-minded fool |
| | | Happy | 我就是一个开心的傻子 | I'm just a happy fool |
| | | Sad | 我就是一个悲伤的傻子 | I am a sad fool |
| | | Disgust | 一个骗子说给一个傻子听 | A cheater says to a fool |
| | | Angry | 不管你信不信，反正我信了！ | Whatever you believe or not, I trust in it! |
| 知道真相的我眼泪笑下来<br>Knowing the truth, I laughed myself to tears | Seq2Seq | | 知道真相的我眼泪掉下来。 | After knowing the truth, I burst into tears. |
| | ECM | Like | 太可爱了，太可爱了！ | Too lovely, it's too lovely. |
| | | Happy | 笑得我眼泪都出来了。 | I can't help laugh myself to tears. |
| | | Sad | 知道真相的我眼泪掉下来。 | After knowing the truth, I burst into tears. |
| | | Disgust | 这是真的还是假的？ | Is this true? |
| | | Angry | 什么意思？没看懂。 | What do you mean? I don't understand. |

Source: Zhou, Hao, Minlie Huang, Tianyang Zhang, Xiaoyan Zhu, and Bing Liu. "Emotional chatting machine: emotional conversation generation with internal and external memory." *arXiv preprint arXiv:1704.01074* (2017).

# Sample responses generated by Seq2Seq and ECM (Emotional Chatting Machine)

| Post | Model | | Response(Original) |
|---|---|---|---|
| 承诺，就是一个骗子说给一个傻子听的。<br>A promise is what a cheater says to a fool. | Seq2Seq | | 承诺，就是一个骗子说给一个傻子听的。 |
| | ECM | Like | 承诺是一个专一的傻子 |
| | | Happy | 我就是一个开心的傻子 |
| | | Sad | 我就是一个悲伤的傻子 |
| | | Disgust | 一个骗子说给一个傻子听 |
| | | Angry | 不管你信不信，反正我信了！ |

Source: Zhou, Hao, Minlie Huang, Tianyang Zhang, Xiaoyan Zhu, and Bing Liu. "Emotional chatting machine: emotional conversation generation with internal and external memory." *arXiv preprint arXiv:1704.01074* (2017).

# Summary

1. 前言
2. AI於金融業之商業運用
   - 資料科學
   - 人工智慧投資分析
   - 財務大數據分析
3. 現行人工智慧投資分析探究
4. 個案分析-國內外AI發展現況
5. QA

元大投信 Yuanta Funds

# Q & A

Tamkang University 淡江大學

# 人工智慧投資分析於金融服務商業應用趨勢

# (AI Investment Analysis for Finance Services and Business Applications Trends)

時間：2018年12月14日(五) 下午2:00 至 4:00
地點：元大投信 (台北市中山區南京東路三段225號6樓)
主辦單位：證基會/人才培訓中心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2018-12-14

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