AI Humanoid Conversational
Robo-Advisor

Time: 10:30-12:00, 2019/5/6 (Monday)
Place: A205, Engineering Building 5, NCU
Host: Prof. Chia-Hui Chang,
Department of Computer Science and Engineering, National Central University

Min-Yuh Day
Assistant Professor
Dept. of Information Management,
Tamkang University

http://mail.tku.edu.tw/myday/
2019-05-06
Min-Yuh Day, Ph.D.

Assistant Professor, Information Management, TKU
Visiting Scholar, IIS, Academia Sinica
Ph.D., Information Management, NTU

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

• AI Robo-Advisor in FinTech
• Conversational Commerce
• AI Humanoid Robo-Advisor
AI Robo-Advisor in FinTech
AIWISFIN
AI Conversational Robo-Advisor
(人工智能對話式理財機器人)
First Place, InnoServe Awards 2018

https://www.youtube.com/watch?v=sEhmyoTXmGk
2018 The 23th International ICT Innovative Services Awards (InnoServe Awards 2018)

• Annual ICT application competition held for university and college students
• The largest and the most significant contest in Taiwan.
• More than ten thousand teachers and students from over one hundred universities and colleges have participated in the Contest.

https://innoserve.tca.org.tw/award.aspx
2018 International ICT Innovative Services Awards (InnoServe Awards 2018)
(2018第23届大专校院资讯应用服务创新竞赛)

## 榮譽榜

| 屆別 | 第23ší
|------|------|

### 組別

- **資訊應用視一**
  - 第一名: IP1-06, 淡江大學
  - 指導教授: 戴敏育老師
  - 學生: 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
  - 指導教授: 戴敏育老師
  - 學生: 陳元致, 鄧旭廷, 王慶宇, 邱少文

### 資料

表格內全文搜尋: AIWISFIN

[https://innoserve.tca.org.tw/award.aspx](https://innoserve.tca.org.tw/award.aspx)
Artificial Intelligence (AI)
The timeline in Figure 1.8 shows the terminology used to describe analytics since the 1970s. During the 1970s, the primary focus of information systems support for decision making focused on providing structured, periodic reports that a manager could use for decision making (or ignore them). Businesses began to create routine reports to inform decision makers (managers) about what had happened in the previous period (e.g., day, week, month, quarter). Although it was useful to know what had happened in the past, managers needed more than this: They needed a variety of reports at different levels of granularity to better understand and address changing needs and challenges of the business. These were usually called management information systems (MIS). In the early 1970s, Scott-Morton first articulated the major concepts of DSS. He defined DSSs as “interactive computer-based systems, which help decision makers utilize data and models to solve unstructured problems” (Gorry and Scott-Morton, 1971). The following is another classic DSS definition, provided by Keen and Scott-Morton (1978):

Decision support systems couple the intellectual resources of individuals with the capabilities of the computer to improve the quality of decisions. It is a computer-based support system for management decision makers who deal with semistructured problems.

Note that the term decision support system, like management information system and several other terms in the field of IT, is a content-free expression (i.e., it means different things to different people). Therefore, there is no universally accepted definition of DSS.

During the early days of analytics, data was often obtained from the domain experts using manual processes (i.e., interviews and surveys) to build mathematical or knowledge-based models to solve constrained optimization problems. The idea was to do the best with limited resources. Such decision support models were typically called operations research (OR). The problems that were too complex to solve optimally (using linear or nonlinear mathematical programming techniques) were tackled using heuristic methods such as simulation models. (We will introduce these as prescriptive analytics later in this chapter and in a bit more detail in Chapter 6.)

In the late 1970s and early 1980s, in addition to the mature OR models that were being used in many industries and government systems, a new and exciting line of models had emerged: rule-based expert systems. These systems promised to capture experts’ knowledge in a format that computers could process (via a collection of if–then–else rules or heuristics) so that these could be used for consultation much the same way that one...
AI in FinTech
Robo-Advisors
FinTech high-level classification

- Lending
- Payments
- Robo Advisors
- Analytics
- Others

- Profile
- Advice
- Re-Balance
- Indexing

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https://www.wealthfront.com/
Betterment
Online Financial Advisor

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Right for every type of investor

New investor
I'm new to investing, or am looking for some guidance.

Hands-off investor
I invest, but don't have the time or desire to do it myself.

Hands-on investor
I'm a confident, hands-on investor looking for an optimal solution.

https://www.betterment.com/
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

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/
Artificial Intelligence (AI) in Fintech

General Purpose/ Predictive Analytics

AYASDI  Digital Reasoning  context relevant  H2O
KENSICO  cortical.io  Numenta  turi
DataRobot  nervana systems

Market Research & Sentiment Analysis

indico  acuity  Lucena  Numerai
Dataminr™

Search Engine

alphasense

Source: https://www.cbinsights.com/blog/artificial-intelligence-fintech-market-map-company-list/
Artificial Intelligence (AI) in Fintech

Quantitative Trading
- Sentient Technologies
- CLONE ALGO
- Alpaca
- Walnut Algorithms

AI Assistants/Bots
- KASIST
- Trim
- Penny
- Insurify
- Sure

Credit Scoring
- Typescore
- Aire
- Creditvidya
- Zest Finance
- ADF
- Applied Data Finance
- Wecash
- CREAM FINANCE

Blockchain
- Skry
- Euclid

Debt Collection
- TrueAccord

Fraud Detection
- Feedzai
- Biocatch

Personal Banking
- Personetics
- SBDA Group

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
FinTech: Investment Management

Source: http://www3.weforum.org/docs/WEF_The_future__of_financial_services.pdf
5 FinTech: Investment Management
Empowered Investors
Process Externalization
FinTech: Market Provisioning

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

Created By

Source: https://www.cbinsights.com/blog/alternative-data-startups-market-map-company-list/
Conversational Commerce
AI Chatbot for Conversational Commerce
Chatbots: Evolution of UI/UX

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

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

Can machines think?
(Alan Turing, 1950)

Chatbot

“online human-computer dialog system with natural language.”

Chatbot Conversation Framework

Open Domain
- Impossible
- Rules-Based [Easiest]

Closed Domain
- Smart Machine [Hard]
- Generative-Based

Responses

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

Hotel Chatbot

**BookHotel**

**Intents**
An intent performs an action in response to natural language user input.

**Utterances**
Spoken or typed phrases that invoke your intent.

**Slots**
Slots are input data required to fulfill the intent.

**Fulfillment**
Fulfillment mechanism for your intent.

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 - 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

Mastercard Makes Commerce More Conversational

Chatbots

Bot Maturity Model

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

Question Answering (QA)
IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3
IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-9 RITE

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Min-Yuh Day
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Chun Tu

NTCIR-9 Workshop, December 6-9, 2011, Tokyo, Japan
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
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IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-11 RITE-VAL

Tamkang University

2014

Ya-Jung Wang
Che-Wei Hsu
En-Chun Tu

Min-Yuh Day

Huai-Wen Hsu
Yu-An Lin
Shang-Yu Wu
Yu-Hsuan Tai
Cheng-Chia Tsai

NTCIR-11 Conference, December 8-12, 2014, Tokyo, Japan
2016
IMTKU Question Answering System for World History Exams at NTCIR-12 QA Lab2

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NTCIR-12 Conference, June 7-10, 2016, Tokyo, Japan
IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3

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NTCIR-13 Conference, December 5-8, 2017, Tokyo, Japan
IMTKU Emotional Dialogue System for Short Text Conversation at NTCIR-14 STC-3 (CECG) Task

Department of Information Management
Tamkang University, Taiwan

Min-Yuh Day  Chi-Sheng Hung  Yi-Jun Xie  Jihh-Yi Chen  Yu-Ling Kuo  Jian-Ting Lin

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NTCIR-14 Conference, June 10-13, 2019, Tokyo, Japan
IMTKU System Architecture for NTCIR-13 QALab-3

- Complex Essay
- Simple Essay
- True-or-False
- Factoid
- Slot-Filling
- Unique

Question (XML)

Question Analysis

Document Retrieval

Answer Extraction

Answer Generation

Answer (XML)

JA&EN Translator

Stanford CoreNLP

Wikipedia

Word Embedding Wiki Word2Vec

NTCIR-13 Conference, December 5-8, 2017, Tokyo, Japan
System Architecture of Intelligent Dialogue and Question Answering System

User Question Input → Question Analysis
→ Dialogue Intention Detection
→ Document Retrieval
→ Answer Extraction
→ Answer Generation
→ Answer Validation
→ Answer

- RNN LSTM GRU
- AIML KB
- Cloud Resource
- AIML Dialogue Engine
- Real Time Dialogue API
- System Response Generator
- Deep Learning TensorFlow
- Python NLTK
- Dialogue KB
- IR
- Deep Learning

AIML KB

Cloud Resource

AIML Dialogue Engine

Real Time Dialogue API

System Response Generator

Deep Learning

Document Retrieval

Answer Extraction

Answer Generation
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**

<table>
<thead>
<tr>
<th></th>
<th>Japanese</th>
<th>Chinese</th>
<th>English</th>
</tr>
</thead>
<tbody>
<tr>
<td>NTCIR-12 STC-1</td>
<td>Twitter, Retrieval</td>
<td>Weibo, Retrieval</td>
<td></td>
</tr>
<tr>
<td>22 active</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTCIR-13 STC-2</td>
<td>Yahoo! News, Retrieval+</td>
<td>Weibo, Retrieval+</td>
<td></td>
</tr>
<tr>
<td>27 active</td>
<td>Generation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>participants</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NTCIR-14 STC-3</td>
<td></td>
<td></td>
<td>Weibo, Generation for given emotion categories</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Multi-turn, task-oriented (helpdesk)</td>
</tr>
</tbody>
</table>

- **Chinese Emotional Conversation Generation (CECG) subtask**
- **Dialogue Quality (DQ) and Nugget Detection (ND) subtasks**
- **Weibo+English translations, distribution estimation for subjective annotations**

Source: [https://waseda.app.box.com/v/STC3atNTCIR-14](https://waseda.app.box.com/v/STC3atNTCIR-14)
The 14th NTCIR (2018 - 2019)

Evaluation of Information Access Technologies

January 2018 - June 2019

What's New

- February 1, 2018: Call for participation to the NTCIR-14 Kick-Off Event released.
- February 1, 2018: Call for participation to the NTCIR-14 QALab-PolInfo Kick-Off Event released.

December 5, 2017: The NTCIR-14 Task Selection Committee has selected the following six Tasks: Lifelig-3, OpenLiveQ-2, QA Lab-4, STC-3, WWW-2, CENTRE.

August 23, 2017: NTCIR-14 Call for Task Proposals released. (Closed.)

About Proceedings

After the NTCIR-14 conference, a post-proceedings of revised selected papers will be published in the Springer Lecture Notes on Computer Science (LNCS) series.

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

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

http://www.aihuang.org/p/challenge.html
Short Text Conversation (NTCIR-13 STC2)
Retrieval-based

retrieval-based method

Given a new post, can a coherent and useful comment be returned by searching a post-comment repository?

Short Text Conversation (NTCIR-13 STC2)

Generation-based

generation-based method

Given a new post, can a fluent, coherent and useful comment be generated?

post

The Trained Generator

Understanding

Generating

generated comment

generated comment

generated comment

post-comment repository

post

comment

comment

comment

post

comment

comment

comment

post

comment

comment

comment

used to train the generator

Given post:

爱狗还会做饭的男人，最帅了！

The man who cooks and loves dogs is very handsome!

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

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

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

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

AI Humanoid Robo-Advisor
AI Humanoid Robo-Advisor for Multi-channel Conversational Commerce
System Architecture of AI Humanoid Robo-Advisor
Conversational Model
(LINE, FB Messenger)

**Conversation Example:**

- **User:** Hi there!
- **AI:** I want some info about stock.
- **User:** Why do you want INFO ABOUT STOCK?
- **AI:** To get personal recommendations.
- **User:** What you said was too complicated for me.
- **AI:** Price 2330 TSMC.

**Message:**

- **AI:** 2330台積電各項資訊如下:
  - 市價: 233.0
  - 買價: 233.0
  - 賣價: 233.5
  - 成交量: 30,664
  - 前日收盤價: 229.5
  - 開盤: 232.5
  - 最高: 234.0
  - 買低: 230.5

**Response:**

- **AI:** Hi there!
- **User:** I am doing very well. How are you?
- **AI:** I need your help.
- **User:** Help is assistance I can give you.
Conversational Robo-Advisor
Multichannel UI/UX
Robots

ALPHA 2

ZENBO
### Portfolio Performance in 2016

#### Annual Portfolio Statistics

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

Portfolio Cumulative Returns

Cumulative Returns
Markowitz v.s. Black-litterment

IEEE EM-RITE 2019

The 8th IEEE International Workshop on Empirical Methods for Recognizing Inference in TExt

(IEEE EM-RITE 2019)

In conjunction with IEEE IRI 2019
Los Angeles, California, USA
July 30 - August 1, 2019

https://sites.google.com/view/emrite2019
The 10th International Workshop on Mining and Analyzing Social Networks for Decision Support

(MSNDS 2019)

In conjunction with IEEE/ACM ASONAM 2019

Vancouver, Canada

27-30 August, 2019

https://sites.google.com/view/msnds2019/
Summary

• AI Robo-Advisor in FinTech
• Conversational Commerce
• AI Humanoid Robo-Advisor
References


AI Humanoid Conversational
Robo-Advisor

Time: 10:30-12:00, 2019/5/6 (Monday)
Place: A205, Engineering Building 5, NCU
Host: Prof. Chia-Hui Chang,
Department of Computer Science and Engineering, National Central University

Min-Yuh Day
Assistant Professor
Dept. of Information Management,
Tamkang University

http://mail.tku.edu.tw/myday/
2019-05-06