AI Robo-Advisor and Chatbot for Conversational Commerce in FinTech

Host: Prof. Yean-Fu Wen
Graduate Institute of Information Management, National Taipei University
Time: 10:00-12:00, 2019/11/20 (Wednesday)
Place: 8F40, Business Building, Sanxia Campus, National Taipei University
Address: No. 151, University Rd., Sanxia Dist., New Taipei City 23741, Taiwan

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

http://mail.tku.edu.tw/myday/
2019-11-20
Min-Yuh Day, Ph.D.

Associate 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
• AI Chatbot for Conversational Commerce
• AI Humanoid Robo-Advisor
AI
Robo-Advisor
in
FinTech
AIWISFIN
AI Conversational Robo-Advisor
(人工智慧對話式理財機器人)

First Place, InnoServe Awards 2018

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

https://innoserve.tca.org.tw/award.aspx
IMTKU
Emotional Dialogue System for Short Text Conversation at NTCIR-14 STC-3 (CECG) Task
IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-9 RITE

Department of Information Management
Tamkang University, Taiwan

Min-Yuh Day
myday@mail.tku.edu.tw

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
Hou-Cheng Vong
Shih-Wei Wu
Shih-Jhen Huang

myday@mail.tku.edu.tw
IMTKU Textual Entailment System for Recognizing Inference in Text at NTCIR-11 RITE-VAL

Tamkang University 2014

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
2016 IMTKU Question Answering System for World History Exams at NTCIR-12 QA Lab2

Department of Information Management
Tamkang University, Taiwan

myday@mail.tku.edu.tw
IMTKU Question Answering System for World History Exams at NTCIR-13 QALab-3

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myday@mail.tku.edu.tw
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  Jhih-Yi Chen  Yu-Ling Kuo  Jian-Ting Lin

myday@mail.tku.edu.tw

NTCIR-14 Conference, June 10-13, 2019, Tokyo, Japan
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

Meet your financial copilot

We'll build a free financial plan for the life you want and automate your investments at a low cost.

Our all-in-one solution gives you the financial expertise you need, right in your pocket. No spreadsheets, no annoying sales calls, no judgment.

GET STARTED

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

HELLO, INVESTOR

Betterment is an online financial advisor built for people who refuse to settle for average investing. People who demand better. People like you.

Get started  Watch our video

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

General Purpose/Predictive Analytics
- AYASDI
- KENSCH
- DataRobot
- Nervana Systems

Market Research & Sentiment Analysis
- indico
- Mocuity
- Lucena Quantitative Analytics
- NUMERAI
- Dataminr

Search Engine
- alphasense

Quantitative Trading
- sentient technologies
- CLONE ALGO
- Alpaca
- WALNUT ALGORITHMS
- INSURIFY
- SURE.
- Skry
- EUKLID
- feedzai
- TrueAccord

AI Assistants/Bots
- KASIST
- TRIM
- Penny
- Cleo
- FinGenius

Blockchain
- Cleo
- FinGenius

Credit Scoring
- TypeScore
- aire
- creditvidya
- zestfinance
- ADF
- CREAM

Personal Banking
- personometrics
- SBDA group

Debt Collection
- feedzai
- Biocatch

Fraud Detection
- Less Friction. Less Fraud.

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
Kensho  cortical.io  Numenta  turi
DataRobot  nervana systems

Market Research & Sentiment Analysis
indico  acuity trading  Lucena Quantitative Analytics  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
- EUKLID

Debt Collection
- TrueAccord

Fraud Detection
- feedzai
- Biocatch
- Less Friction. Less Fraud.

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
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
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

**WEB/APP/SOCIAL MEDIA DATA**
- yipit Data
- 7PARK Data
- App Annie
- Selerity
- Datamirr
- Datasift

**WEATHER DATA**
- Aclima
- The Climate Corporation

**LOCATION/FOOT TRAFFIC**
- Foursquare
- Placemeter
- Airsage

**CREDIT CARD TRANSACTIONS**
- Earnest
- Second Measure

**ALTERNATIVE CREDIT**
- First Access

**ALTERNATIVE DATA MONETIZERS/AGGREGATORS**
- Eagle Alpha
- Quantum Data
- Premise

**SATELLITE DATA**
- Orbital Insight
- Spire
- Rezatec
- Ursa
- Rs Metrics
- UrtheCast

**WEATHER DATA**
- Planet Labs
- Windward

Created By CB Insights

Source: https://www.cbinsights.com/blog/alternative-data-startups-market-map-company-list/
AI Chatbot for Conversational Commerce
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>Platform 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>Applications Examples</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>

Chatbot
Dialogue System
Intelligent Agent
Chatbot
Dialogue System

Overall Architecture of Intelligent Chatbot

Dialogue Subtasks

Dialogue subtasks

- **Dialogue Generation**
  - 8 leaderboards
  - 27 papers with code

- **Dialogue State Tracking**
  - 2 leaderboards
  - 21 papers with code

- **Goal-Oriented Dialog**
  - 13 papers with code

- **Task-Oriented Dialogue Systems**
  - 10 papers with code

- **Short-Text Conversation**

- **Dialogue Understanding**
  - 5 papers with code

- **Goal-Oriented Dialogue Systems**
  - 2 papers with code

- **Task-Completion Dialogue Policy Learning**
  - 2 papers with code

- **Visual Dialogue**
  - 2 papers with code

Source: [https://paperswithcode.com/area/natural-language-processing/dialogue](https://paperswithcode.com/area/natural-language-processing/dialogue)
Can machines think?

(Alan Turing, 1950)

Chatbot

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

Chatbot Conversation Framework

Conversations

- Open Domain
- Closed Domain

Responses

- Retrieval-Based
- Generative-Based

- Impossible
- Rules-Based [Easiest]
- Smart Machine [Hard]
- General AI [Hardest]

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

**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.

Bot Life Cycle and 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.

General AI agents with platforms
Developer access available now or announced

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

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

IMTKU System Architecture for NTCIR-13 QALab-3

- Question (XML)
  - Complex Essay
  - Simple Essay
  - True-or-False
  - Factoid
  - Slot-Filling
  - Unique

- Question Analysis
  - JA&EN Translator
  - Stanford CoreNLP
  - Wikipedia

- Document Retrieval
  - Stanford CoreNLP
  - Wikipedia

- Answer Extraction

- Answer Generation
  - Word Embedding Wiki Word2Vec

- Answer (XML)

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

User Question Input

Dialogue Intention Detection

AIML Dialogue Engine

Real Time Dialogue API

System Response Generator

AIML KB

Cloud Resource

RNN LSTM GRU

Question Analysis

Document Retrieval

Answer Extraction

Answer Generation

Answer Validation

Answer

Deep Learning

TensorFlow

Python NLTK

Dialogue KB

IR

Deep Learning
IMTKU Emotional Dialogue System Architecture

1. Retrieval-Based Model
2. Generation-Based Model
3. Emotion Classification Model
4. Response Ranking
The system architecture of IMTKU retrieval-based model for NTCIR-14 STC-3

Retrieval-Based Model

Post

Word Segmentation

Corpus

Building Index

Keyword Boolean Query

Solr Matching

Distinct Result Data

Emotion Matching

Emotion Classification

Word2Vec Similarity Ranking

Retrieval-Based Response
The system architecture of IMTKU generation-based model for NTCIR-14 STC-3

**Generation-Based Model**

- Training Data
  - Building Word Index
  - Word Embedding
  - Training Data Seq2seq model

- Post
  - Word Segmentation
  - Short Text Emotion Classifier
  - Trained Model
  - Emotion Matching
  - Word2Vec Similarity Ranking

**Generative Model**

Generation-Based Response
The system architecture of IMTKU emotion classification model for NTCIR-14 STC-3

Emotion Classification Model

Corpus → Emotion Classification → Training Dataset → MLP LSTM BiLSTM → Emotion Classification Model → Emotion Prediction

NTCIR-14 Conference, June 10-13, 2019, Tokyo, Japan
The system architecture of IMTKU Response Ranking for NTCIR-14 STC-3

Response Ranking

4

STC3 Corpus → Chinese Segmentation using Jieba → Stop Words Removal → Word2Vec → 1.2 million data (300 dimensions) → Vector of Corpus
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><strong>NTCIR-12 STC-1</strong></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><strong>NTCIR-13 STC-2</strong></td>
<td>Yahoo! News, Retrieval + Generation</td>
<td>Weibo, Retrieval + Generation</td>
<td></td>
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<tr>
<td>27 active</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>participants</td>
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<td><strong>NTCIR-14 STC-3</strong></td>
<td></td>
<td>Weibo, Generation for given emotion categories</td>
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<td></td>
<td>Chinese Emotional Conversation Generation (CECG) subtask</td>
<td>Weibo+English translations, distribution estimation for subjective annotations</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dialogue Quality (DQ) and Nugget Detection (ND) subtasks</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Single-turn, Non task-oriented**
- **Multi-turn, task-oriented (helpdesk)**

Source: [https://waseda.app.box.com/v/STC3atNTCIR-14](https://waseda.app.box.com/v/STC3atNTCIR-14)
Dialogue on Airline Travel Information System (ATIS)
The ATIS (Airline Travel Information System) Dataset

https://www.kaggle.com/siddhadev/atis-dataset-from-ms-cntk

<table>
<thead>
<tr>
<th>Sentence</th>
<th>what</th>
<th>flights</th>
<th>leave</th>
<th>from</th>
<th>phoenix</th>
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</thead>
<tbody>
<tr>
<td>Slots</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>O</td>
<td>B-fromloc</td>
</tr>
<tr>
<td>Intent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>atis_flight</td>
</tr>
</tbody>
</table>

Training samples: 4978  
Testing samples:  893  
Vocab size:  943  
Slot count:  129  
Intent count:  26

SF-ID Network (E et al., 2019)

Slot Filling (SF)
Intent Detection (ID)

A Novel Bi-directional Interrelated Model for Joint Intent Detection and Slot Filling

Intent Detection on ATIS
State-of-the-art

Source: [https://paperswithcode.com/sota/intent-detection-on-atis](https://paperswithcode.com/sota/intent-detection-on-atis)
# Slot Filling on ATIS

## State-of-the-art

### Slot Filling on ATIS

<table>
<thead>
<tr>
<th>RANK</th>
<th>METHOD</th>
<th>F1</th>
<th>PAPER TITLE</th>
<th>YEAR</th>
<th>PAPER</th>
<th>CODE</th>
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<tr>
<td>1</td>
<td>SF-ID</td>
<td>0.958</td>
<td>A Novel Bi-directional Interrelated Model for Joint Intent Detection and Slot Filling</td>
<td>2019</td>
<td>⏺️</td>
<td>⏺️</td>
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<td>2</td>
<td>Capsule-NLU</td>
<td>0.952</td>
<td>Joint Slot Filling and Intent Detection via Capsule Neural Networks</td>
<td>2018</td>
<td>⏺️</td>
<td>⏺️</td>
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</tbody>
</table>

Source: [https://paperswithcode.com/sota/slot-filling-on-atis](https://paperswithcode.com/sota/slot-filling-on-atis)
AI Humanoid Robo-Advisor
AI Humanoid Robo-Advisor for Multi-channel Conversational Commerce

- AI Portfolio Asset Allocation
- AI Conversation Dialog System
- Multichannel Platforms
  - Web
  - LINE
  - Facebook
  - Humanoid Robot
System Architecture of AI Humanoid Robo-Advisor

Asset Allocation
- Get daily trading info (Date & AdjClose)
- Data Preprocessing
- Build forecasting model
- Create Portfolio

Model Training
- Set up parameters
- Construct model
- Model testing
- Model Comparison

Strategy comparison
- Black-Litterman
- Markowitz
- Average Weight
- Buy and hold

Dialog System
- Build up our knowledge base
- Connect APIs
- Evaluate

Sequence to Sequence
- Use STC, Weibo for model training
- Remove words with low frequency
- Build Seq2Seq model
- Train Seq2Seq

Platforms
- LINE
- FACEBOOK
- Web Application

AIDL
- Get financial Q&A
- Convert Q&A information into AIML tag

AI Humanoid Robo-advisor
Conversational Model
(LINE, FB Messenger)
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>
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<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>
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<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>
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<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: Portfolios

Cumulative Returns
Markowitz v.s. Black-litterment

Summary

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


AI Robo-Advisor and Chatbot for Conversational Commerce in FinTech

Host: Prof. Yean-Fu Wen
Graduate Institute of Information Management, National Taipei University
Time: 10:00-12:00, 2019/11/20 (Wednesday)
Place: 8F40, Business Building, Sanxia Campus, National Taipei University
Address: No. 151, University Rd., Sanxia Dist., New Taipei City 23741, Taiwan

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