Slide 1

Accounting in the Era of the 4th industry

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Short bio

- Prof.Dr. Do Phuc is currently a senior lecturer in Data Science at University of Information Technology, VNU-HCM. He has published more than 100 scientific papers. His interests are data mining, text mining, social network analysis and big data analysis and applications, AI in Finnace.

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Outline

- The era of the 4th industry
- Overview of accounting
- New technologies and the application to accounting
- Five jobs under threats by new technologies
- Threats and opportunities, recommendations
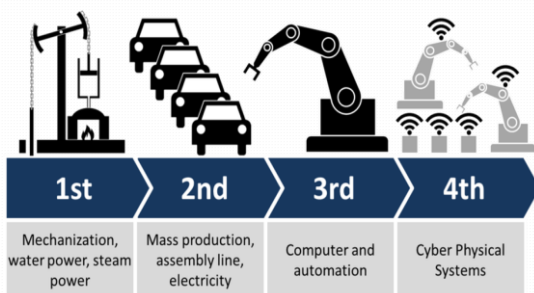- Conclusion
- References

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The era of 4th Industry
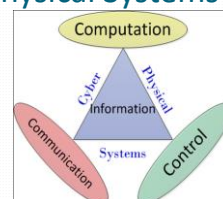
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The 4th industrial revolution

1st	2nd	3rd	4th
Mechanization, water power, steam power	Mass production, assembly line, electricity	Computer and automation	Cyber Physical Systems

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Cyber Physical Systems

A cyber-physical system (CPS) is a system of collaborating computational elements controlling physical entities.
CPS are physical and engineered systems whose operations are monitored, coordinated, controlled and integrated by a computing and communication core. They allow us to add capabilities to physical systems by merging computing and communication with physical processes.

The 4ᵗʰ industrial revolution

- With the 4th Industrial Revolution, triggered by digital technologies, digital transition .
- Three pillars are data science, artificial intelligence, IoT
- Some professions will disappear, some will develop more, and new branches of professions that were never known will develop.
- These systems will influence the accounting

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Overview of Accounting

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Accounting Activities

- Areas of accounting:
  - Financial accounting
  - Managerial accounting
- **Financial accounting**
  - Documenting all transactions of a company that have an impact on the financial state of the firm. Bookkeeping
  - Using documented transactions to create reports for external parties and agencies

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Accounting Activities (cont'd.)

- Managerial accounting
  - Determine costs and profitability of company's activities
  - Provide managers with detailed information
    - Informed decisions
    - Create budgets
    - Determine profitability
  - Information that managers use to control day-to-day activities, develop long-term plans
  - Decision making based on data analysis

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II. The new technologies and the application to Accounting

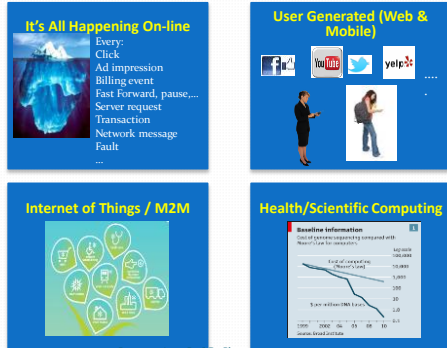Presenter: Assoc Prof. Do Phuc, 2020   11

Big data

- "Big Data are high-speed, diverse, large-volume information assets that require new forms of processing to enhance decision-making.
- We can analyze and derive knowledge, rules that support decision-making in management, production and business.
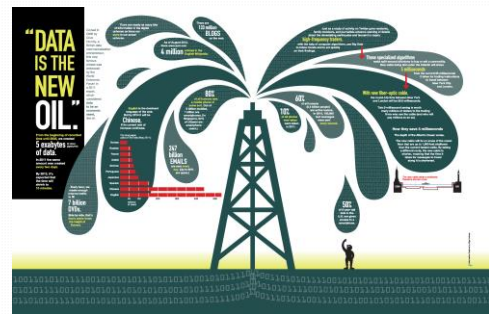
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"Big Data" Sources

It's All Happening On-line

Every:
Click
Ad impression
Billing event
Fast Forward, pause,...
Server request
Transaction
Network message
Fault
...

User Generated (Web & Mobile)

Internet of Things / M2M

Health/Scientific Computing

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"Data is the New Oil" – World Economic Forum 2011

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5 Vs of Big Data

- Raw Data: Volume
- Change over time: Velocity
- Data types: Variety
- Data Quality: Veracity
- Information for Decision Making: Value

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Big Data and Accounting

- Accounting and auditing are currently facing the challenge of large amounts of structured data (e.g., general ledger or transaction data) and unstructured data (e.g.: email, voice or free text fields in databases, Wi-Fi sensors, electronic tags, ...)
- They are big data with an increasing number of unstructured data sources such as email communications and social network, social media.
- How to process big data?

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Internet of Things – IoTs?

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IoT?

- "An IoT system is a network of networks where, typically, a massive number of objects, things, sensors or devices are connected through communications and information infrastructure to provide value-added services via intelligent data processing and management for different applications (e.g. smart cities, smart health, smart grid, smart home, smart transportation, and smart shopping)."

    -- IEEE Internet of Things Journal

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What is Cloud Computing ?

- Cloud Computing is a technology that uses the internet or long distance connections and central remote data centers (Servers) to maintain data and applications.
- Cloud computing allows consumers, businesses and employees to run applications and services without installation, and to access their personal files independent of machine used (PC, Laptop, Smart Phones and Thin Clients) with internet access.

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What is Blockchain?

- Blockchain is a system of
  - Transactions
  - Immutable ledgers
  - Decentralized peers
  - Encryption processes
  - Consensus mechanisms

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Immutable

- As with existing databases, Blockchain retains data via transactions
- The difference is that once written to the chain, the blocks can be changed, but it is extremely difficult to do so.
- Like a ledger written in ink, an error would be resolved with another entry
- Blockchain is a decentralized peer to peer network. Where each node has a copy of the ledger.

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Decentralized Peers

- Rather than the centralized "Hub and Spoke" type of network, Blockchain is a decentralized peer to peer network. Where each NODE has a copy of the ledger.

Legacy Network
Centralized DB

Blockchain Network
Distributed Ledgers

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Why "Learn" ?

- Machine learning is programming computers to learn the data and generate a model to process a problem like human beings
- ML in classification or prediction like
  - credit approval system
  - stock price prediction
  - bankruptcy prediction
  - fraudulent balance sheet detection....

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Applications

- Association
- Supervised Learning
  - Classification
  - Regression
- Unsupervised Learning
- Reinforcement Learning

Supervised Learning: Uses

- Use the rule to predict the output for future inputs
- The rule is easy to understand
- The rule is simpler than the data it explains
- We train a model by using the historical data
- For example. Stock price prediction, loan approval
-

Unsupervised Learning

- Learning "what normally happens"
- No output
- Clustering: Grouping similar instances
- Example applications
  - Customer segmentation in CRM
  - Image compression: Color quantization
  - Bioinformatics: Learning motifs

Reinforcement Learning

- Learning a policy by using an agent that move to the new state and receive a reward.
- The agent can learn a policy to move in the environment
- Application
  - Autonomous car
  - Game playing
  - Robot in a maze
  - Multiple agents, partial observability, …

Expert system

- Expert system is a type of knowledge base system designed for a specific area of application.
- Human knowledge will be fed into the knowledge base in the expert system and then the expert system can provide decision based on the data you fit into the ES.

Expert System Applications

- Some applications of the expert system in finance-accounting include:
- • Auditing: Risk analysis, internal control assessment, audit planning, account analysis, report release
- • Cost accounting and management audit: Allocating and evaluating costs, allocating resources, controlling and analyzing variance, planning and management control …(managerial accounting).

Expert System Applications

- • Financial accounting: ensuring accounting regulations, analyzing evaluation, preparing financial statements, ...
- • Analysis of financial statements: financial and economic analysis, financial assessment, trend analysis and ...
- • Financial planning, budgeting, budget management, securities transactions, insurance, banking, credit allocation ...

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Financial Advisor
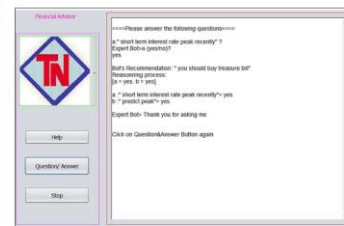
Financial Advisor

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Artificial neural networks

- An artificial neural network (ANN) simulates the functions of the human nervous system with a multitude of neurons that are interconnected through the network.
- ANN is learned by experience (through learning data), saving those experiences and used in appropriate situations.
- Neural networks are used to solve problems of prediction, classification and control ...
- Neural networks can be used for financial prediction, business status, credit rating, risk. ...**(Managerial accounting)**

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AI in Accounting

- **Data Collection**
- Accountants deal with a lot of data. AI technology can process, handle, and analyze massive amounts of data far more efficiently and faster than the average human.

- **Streamline Admin Tasks**
- Accountant's job is processing routine paperwork.
- AI can solve to create invoices, processing payroll or reports

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AI in Accounting

- **Decision Making**
- **Can AI Give Better Advice Than Management Accountants?** Some, more high-end AI devices, can even make more logical and consistent business decisions

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AI in Accounting

- **Prevention & Detection of Fraud**
- Consultants can use scalable AI investigation tool to prevent & detect fraud and revenue leakages

- **Customer Service**
- Clients to consulting outfits desire instant responses to their questions.
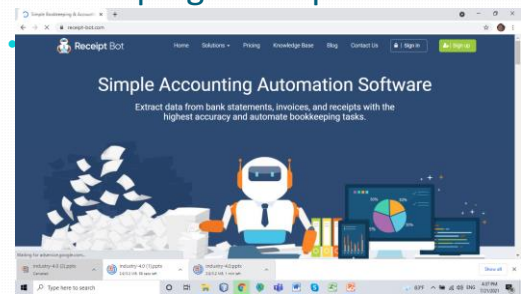- This can be achieved through AI-powered Chatbots

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Five jobs under threats by new technologies

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Bookkeeping- Receipt Bot

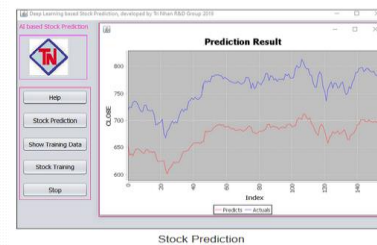Presenter: Assoc Prof. Do Phuc, 2020
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Financial Analysts

- Human financial analysts can no longer compete with Artificially intelligent financial analysis software that can read and recognize trends in historic data to predict future market moves.
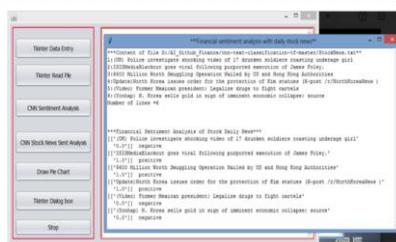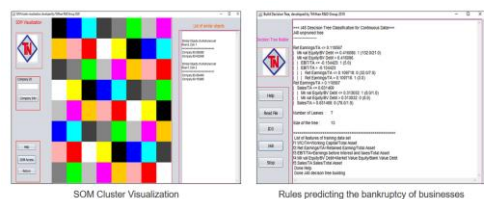
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LSTM based Stock Prediction

Stock Prediction

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Financial Statement Analysis

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SOM Cluster Visualization

Rules predicting the bankruptcy of businesses

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Financial Data Analytics

Biến động ROA theo thời gian của công ty CEO & DXG

Stock Prediction
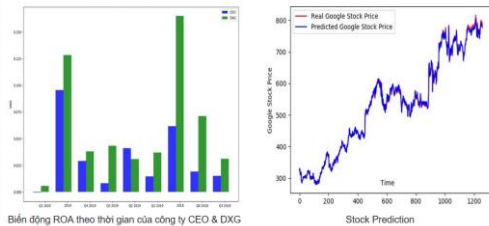
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Inventory Managers

• The supermarket employee restocking the cans in the aisle may soon no longer be a person.

• A robot called the Tally is designed to audit shelves for out-of-stock items, misplaced items, and pricing errors

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Bank Teller and representatives

• First it was the ATM that ate into human banking jobs, then the smartphone app.

• AI won't just be able to conduct cash transactions, it will be able to open accounts and process loans at a fraction of the cost and time it takes for human employees.

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Tax Consulting

• If your role as a tax consultant is limited to tax computations and filing of tax returns, then you are at the risk of becoming redundant in future.

• Even resolution of tax disputes is being automated through AI.

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Chatbot
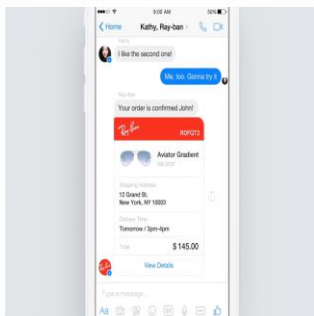
Threats &Opportunities

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Threats from new technologies

- Loss of jobs – Reduced need for humans
- Robot and AI will replace Accountants
- New advanced skills needed to compete
- Too many accounting applications in the market, which is the best one
- Collaborate with AI to improve your jobs.

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Opportunities from new technologies

- Accountants focus on higher level jobs
- Adapt to change & offer new services
- Save time , save cost
- Mobility of service . You can work any time, any place
- New knowledge for Accountants

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New knowledge for accountants

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Tri Nhan Data Science and Application R&D Group

- URL: https://trinhansg.github.io

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New courses for Data Analysis

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New courses for Data Analysis

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New courses for Data Analysis
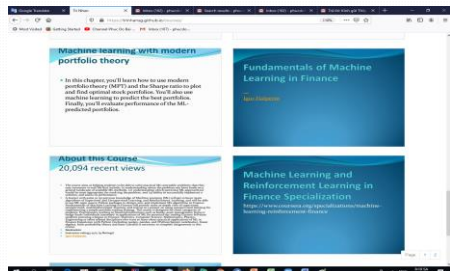
Recommendations

- Upgrade yourself as a future accountant with knowledge in digital technology, globalization and evolving regulations

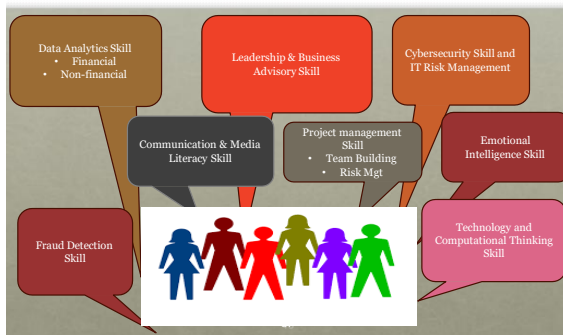- Professional accountants will move to collaborate with the advanced software and new technologies in the era of the 4th industry

Recommendation – Consider these New Skills

- Data Analytics Skill
  - Financial
  - Non-financial
- Leadership & Business Advisory Skill
- Cybersecurity Skill and IT Risk Management
- Communication & Media Literacy Skill
- Project management Skill
  - Team Building
  - Risk Mgt
- Emotional Intelligence Skill
- Fraud Detection Skill
- Technology and Computational Thinking Skill

Conclusions

- Technological advances historically have eliminated some jobs and created others. IT, especially AI, will strongly penetrate the Finance industry.
- Therefore Accounting students need to be equipped with new knowledge to meet the new requirements of the digital transformation era.
- The growth of big data, increased processing power, flexible cloud platforms, expanding global commerce, e-commerce (Amazon, Alibaba …) are the factors driving opportunities for AI solutions.

Conclusions

- The impact of AI on the accounting and business finance industry will open up new applications.
- Some jobs will be changed, others will be reshaped and new job opportunities will be created in the digital age.
- In the new age, new requirements will arise and we will also enjoy new technology, so it is necessary to design and teach new subjects, new training programs to update knowledge.
- Accounting students have a deep understanding of IT and finance.

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Thank you for your attention

For more information, please send email to:
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Q&A (1/4)

- 1.Could you explain more about the Emotional Intelligence Skill?
- **Process the psychology, emotion, sentiment analysis**
- 2.Could you explain more about the Computation Thinking Skill?
- **How the computer process a problem in real life. What steps, what data, what algorithm**
- 3. Could you please reveal more about the way AI threats the Tax consulting field?
- **Tax consulting-> knowledge of Tax.**
- **Move this knowledge to Tax Advisor, chatbot, expert system.**

Q&A (2/4)

- 4. because of the industrial revolution 4.0, is the role of accountant essential ?
- You learn new technologies and use them in you carrier to improve your job. Accounting, Auditing and Finance are very important in business.
- 5.Dear professor, you have mentioned many technologies that can basically replace accountants. Then, what else is there for future accountants to actually work with their job and what distinguishes accountants from financial advisors?
- Future of Accounting, Accountants know how to use the advanced software to improve your profession. Please focus on the higher job of accounting activity like data analysis, financial analysis, strategy, ... support the decision making of CEO.. to make good future for you and your business.

Q&A (3/4)

- 6. What do you think about the role of humans when accounting is being automatic?
- Accountants will focus of higher job such as data analysis,
- 7."In the future, the accounting don't need humans because it already has the automatic program" ?
- The accounting still requests human resource but the high level accounting with new skill and knowledge. The financial activities will be replaced by AI

Q&A (4/4)

- 8. Is there any solution to help the accounting - auditing industry take full advantage of the industrial revolution 4.0 and at the same time limit the negative impacts of this revolution?
- Of course, we will study and process the negative impacts of the 4th resolution. For example human beings will lose their jobs. For example the university must help the students to understand new technologies and use them to improve the quality of their jobs. University must prepare new skills to the future accountants.
- 9.Having to accumulate soft skills and life skills, in line with the needs and pace of life in the world today, how many languages do we need to understand and work on besides English?
- I think you must good in English first, because English is for business. I also hope to learn Chinese, because China now is the 2nd GDP country of the world.
- Thank you for your questions
-

Thank you for your attention

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