

Name _____ Student ID _____



Prince of Songkla University

Faculty of Engineering

Department of Computer Engineering

Midterm Exam: 1 Semester

Year: 2016

Date: 14 ต.ค. ๕๗

Time: 13.30 - 16.30

Subject ID: 242-676

Room: A200

Subject Name: Introduction to Machine Learning

Instruction: Open book

Duration: 3 hr. (180 Minutes)

Suggestion:

- Exam with 10 pages (cover include) total 6 questions (overall 20 % marks)
- Write your name and student id on every page

ทูลจตุรตในการสอบ โทษชั้นต่ำคือ
ปรับตักในรายวิชาที่ทูลจตุรต และพัทการเรียน 1 ภาคการศึกษา

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1. Introduction – (5 Marks)

1.1 Can we build never-ending learners?

1.2. Can machine learning theories and algorithms help explain human learning?

1.3. Can we design programming languages containing machine learning primitives?

1.4. Will computer perception merge with machine learning?

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2. Make conclusion of this subject and answer the question at the end. – (5 Marks)

Machine Learning is a sub-set of artificial intelligence where computer algorithms are used to autonomously learn from data and information. In machine learning computers don't have to be explicitly programmed but can change and improve their algorithms by themselves.

Today, machine learning algorithms enable computers to communicate with humans, autonomously drive cars, write and publish sport match reports, and find terrorist suspects. I firmly believe machine learning will severely impact most industries and the jobs within them, which is why every manager should have at least some grasp of what machine learning is and how it is evolving.

In this post I offer a quick trip through time to examine the origins of machine learning as well as the most recent milestones.

1950 — Alan Turing creates the “Turing Test” to determine if a computer has real intelligence. To pass the test, a computer must be able to fool a human into believing it is also human.

1952 — Arthur Samuel wrote the first computer learning program. The program was the game of checkers, and the IBM computer improved at the game the more it played, studying which moves made up winning strategies and incorporating those moves into its program.

1957 — Frank Rosenblatt designed the first neural network for computers (the perceptron), which simulate the thought processes of the human brain.

1967 — The “nearest neighbor” algorithm was written, allowing computers to begin using very basic pattern recognition. This could be used to map a route for traveling salesmen, starting at a random city but ensuring they visit all cities during a short tour.

1979 — Students at Stanford University invent the “Stanford Cart” which can navigate obstacles in a room on its own.

1981 — Gerald Dejong introduces the concept of Explanation Based Learning (EBL), in which a computer analyses training data and creates a general rule it can follow by discarding unimportant data.

1985 — Terry Sejnowski invents NetTalk, which learns to pronounce words the same way a baby does.

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1990s — Work on machine learning shifts from a knowledge-driven approach to a data-driven approach. Scientists begin creating programs for computers to analyze large amounts of data and draw conclusions — or “learn” — from the results.

1997 — IBM’s Deep Blue beats the world champion at chess.

2006 — Geoffrey Hinton coins the term “deep learning” to explain new algorithms that let computers “see” and distinguish objects and text in images and videos.

2010 — The Microsoft Kinect can track 20 human features at a rate of 30 times per second, allowing people to interact with the computer via movements and gestures.

2011 — IBM’s Watson beats its human competitors at Jeopardy.

2011 — Google Brain is developed, and its deep neural network can learn to discover and categorize objects much the way a cat does.

2012 – Google’s X Lab develops a machine learning algorithm that is able to autonomously browse YouTube videos to identify the videos that contain cats.

2014 – Facebook develops DeepFace, a software algorithm that is able to recognize or verify individuals on photos to the same level as humans can.

2015 – Amazon launches its own machine learning platform.

2015 – Microsoft creates the Distributed Machine Learning Toolkit, which enables the efficient distribution of machine learning problems across multiple computers.

2015 – Over 3,000 AI and Robotics researchers, endorsed by Stephen Hawking, Elon Musk and Steve Wozniak (among many others), sign an open letter warning of the danger of autonomous weapons which select and engage targets without human intervention.

2016 – Google’s artificial intelligence algorithm beats a professional player at the Chinese board game Go, which is considered the world’s most complex board game and is many times harder than chess. The AlphaGo algorithm developed by Google DeepMind managed to win five games out of five in the Go competition.

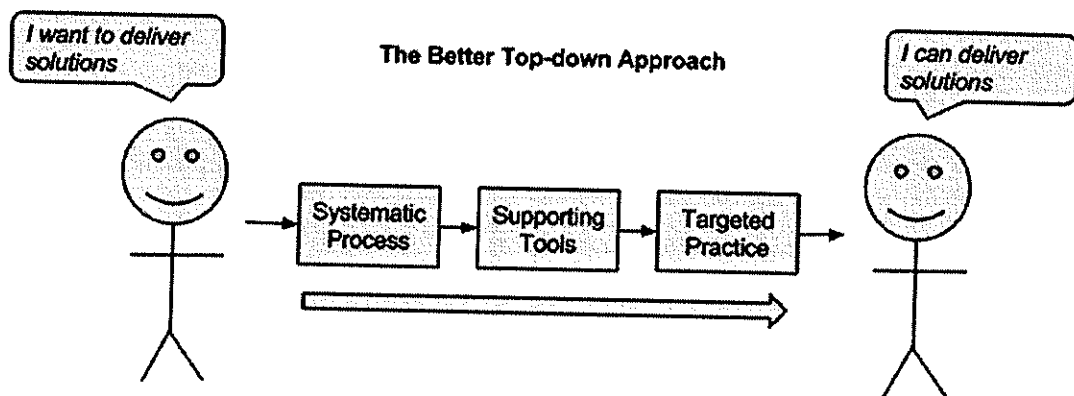
So are we drawing closer to artificial intelligence? Some scientists believe that’s actually the wrong question.

They believe a computer will never “think” in the way that a human brain does, and that comparing the computational analysis and algorithms of a computer to the machinations of the human mind is like comparing apples and oranges.

5. The Top-Down approach to getting started in machine learning – (5 Marks)

Step of Machine Learning:

1. Believe. Know that you can learn machine learning by practicing working through problems (top-down) rather than studying theory (bottom-up).
2. Pick a Process. Select a systematic process for working through a machine learning problem from beginning to end that you can use to reliably get a good result on any problem you work on.
3. Pick a Tool. Select a tool or platform that you can use to actually work through problems and map it onto your chosen systematic process.
4. Pick a Dataset. Select datasets to work on and practice the process. Ideally select properties of problems that you want to practice and find well understood datasets that have those traits on which to practice.
5. Build a Portfolio. Write up your results and learnings in semi-formal work products (blog posts, presentations, tech reports) and share them publicly to demonstrate your growing machine learning skills and capabilities and engage like-minded practitioners.



From above idea, write your example case that show all of those step.

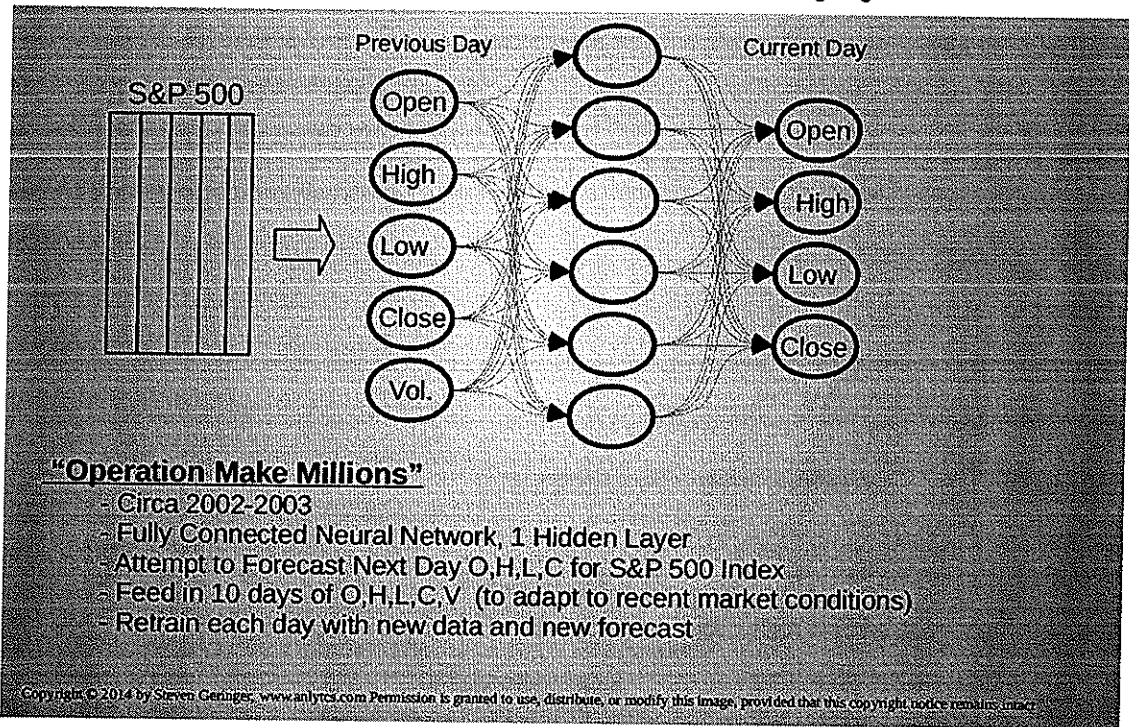
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6. Stock forecasting with machine learning – (5 Marks)

A few years back, I decided that machine learning algorithms could be designed to forecast the next day's Open, High Low, Close for the SP500 index. Armed with that information, it would be a cinch to make \$Millions !

The following chart shows the initial design of machine learning algorithme.



Explain what do you think about this design should be good or not, why?
