IST 707 Applied Machine Learning

HW1: What is Machine Learning

**Task 1: What, Why, and Where?**

Combine what you read from the following articles and the week 1 lecture to answer the following questions. **Write a short paragraph for each question.**

[PwC 2021 AI Predictions](https://www.pwc.com/us/en/tech-effect/ai-analytics/ai-predictions.html)

[McKinsey: Notes from the AI Frontier](https://www.mckinsey.com/featured-insights/artificial-intelligence/notes-from-the-ai-frontier-applications-and-value-of-deep-learning)

1. What is machine learning?  
   Machine Learning is a branch of Artificial Intelligence which focuses on teaching systems the ability to interpret patterns from data to use in better data driven decision making.
2. Where can you use machine learning?  
   According to the PwC article, use cases where companies have successfully used machine learning are
   1. Increase productivity through automation
   2. Improve decision-making
   3. Improve customer experience
   4. Innovate products and services
   5. Improve employee experience and skills acquisition
   6. Develop new data-driven business models
   7. Increase agility
   8. Increase valuation of company
   9. Improve retention and recruitment
   10. Strengthen resilience
   11. Enhance stakeholder trust

The McKinsey article was able to find examples of successful machine learning instances in 19 different industries.

1. Why should we use machine learning?  
   Decision-making using Machine Learning is so powerful for a simple reason: it can enable companies to incorporate and analyze far more information than any human being could do on their own. It enables a company to tackle more than just 1 business outcomes together – enhance decision making, business transformation, and systems improvement. Over the long run, it saves companies time and money in getting to business decisions faster.
2. What benefits does machine learning have over other traditional methods of analysis, prediction, and decision-making?
   1. Machine learning based analysis tend to be more detailed as they usually consume more data. The outcomes can be more well-rounded whereas traditional analysis can have some points missing because of human errors.
   2. Machine learning can make use of diverse range of data types, that some traditional analysis cannot make use of.
   3. Machine learning can be used to enhance the performance of existing analytics use cases.
   4. Machine learning based analysis tend to faster than traditional analytics.
3. What business problems are machine-learning and artificial intelligence most suited to?  
   The McKinsey article mentioned the below 3 real-life examples where Machine Learning was used to beneficial results
   1. Machine learning can be used to detect anomalies to detect need for maintenance
   2. ML driven logistics optimization can be used to reduce costs and forecast trends
   3. ML can be used to enhance customer satisfaction by improving customer service management

As mentioned previously in answer of question 2, ML can be used to  
Increase productivity through automation

* 1. Improve decision-making
  2. Improve customer experience
  3. Innovate products and services
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**Task 2: Practice Your Critical Thinking and Writing**

Read the following two news articles. One criticizing Google Flu Trends, and the other defending it. **Write one paragraph to summarize the criticism, and another paragraph for the defense. Write the third paragraph to offer your own thoughts**, e.g., is the criticism valid? Does the defense make sense? What other problems or benefits do you see in Google Flu Trend or similar big data applications?

[NYT: Google Flu Trends: The Limits of Big Data](https://bits.blogs.nytimes.com/2014/03/28/google-flu-trends-the-limits-of-big-data/)

[Atlantic: In Defense of Google Flu Trends](https://www.theatlantic.com/technology/archive/2014/03/in-defense-of-google-flu-trends/359688/)

In criticism, the New York Times points out that Google Flu Trends consistently overestimated number of flu cases in the US. To sum, big data professionals also found that when they combined google flu trends with CDC data, it produced much better forecast. They also cited an article that declared that google was guilty of assuming that Big Data sets trump traditional data collection and analysis.

In the defense of the Google Flu Trends, the Atlantic publishes that flu trends, which attempted to predict the prevalence of the flu from searches that users made was not a complete failure. In fact, the system was not designed to be a replacement for traditional surveillance network or supplant the need for lab-based diagnosis or surveillance. Google flu trends was never meant to replace the CDC with an algorithm.

Google Flu Trends was never meant to be a standalone indicator and was never meant to replace any CDC data and research. It was designed to give a signal for the flu. Google Flu Trends acted as a pioneer in big data in the field of medical research and has proved as a good alternative resource of data for any research that followed. The co-creators of google flu trends consistently communicated their goal. However, the biggest problem with it is that it should never be used alone. Any results drawn from this data alone will be flawed. In any case, it at least now serves as a good example for students learning Big Data and Machine Learning Concepts.

**Submission requirements:**

Word document or PDF, using 12-point Arial or Times New Roman and at least 1-inch margins on all sides.

**Grading criteria:**

All prompts are thoroughly answered and demonstrate a critical understanding of the material. Writing should be precise and concise. Points would be deducted for both incorrect and irrelevant content.