ARTIFICIAL INTELLIGENCE IN SUPPLY CHAIN MANAGEMENT

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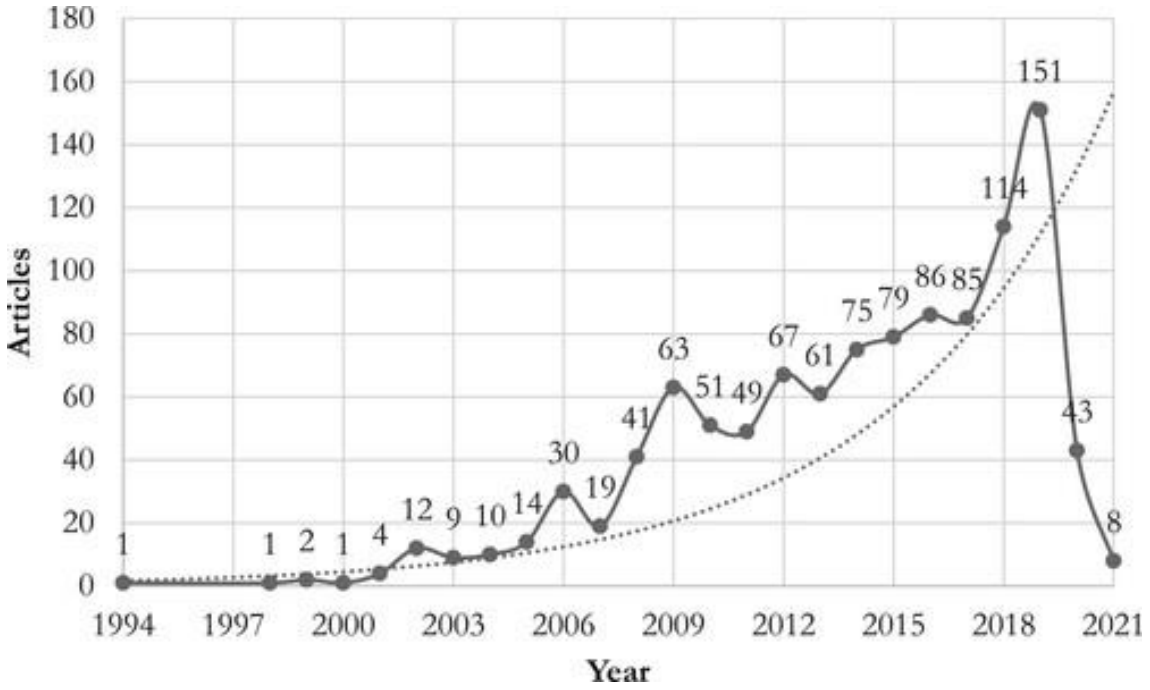
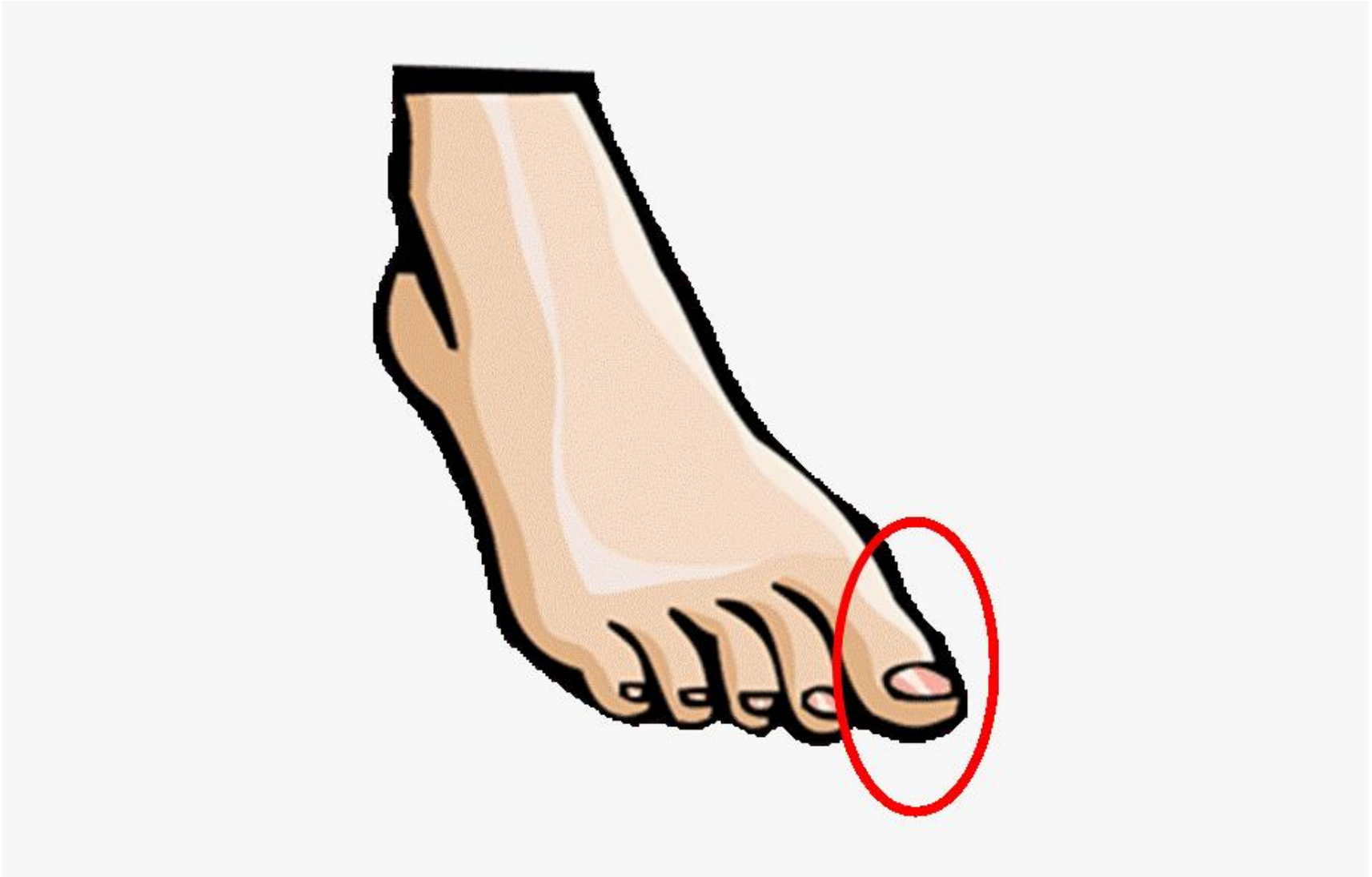
RECENT JUMP IN SUPPLY CHAIN PUBLICATIONS

- Massive influx in the past 15 years
  - Credited to Industry 4.0



MAIN SEARCHES ABOUT SCM AI

- **Supply Chain Network Design**
  - Determining the best location and size of facilities
  - Nonlinear integer program and genetic algorithm (GA) for solving product return and freight consolidation problems
- **Demand Planning**
  - Logistics, manufacturing, and sourcing activities
  - Agent-based forecasting →predict aggregate demand of products
- **Green Supply Chain Management**
  - Sustainability with rising environmental pressures
  - Fuzzy multi-criteria decision-making model to find green suppliers



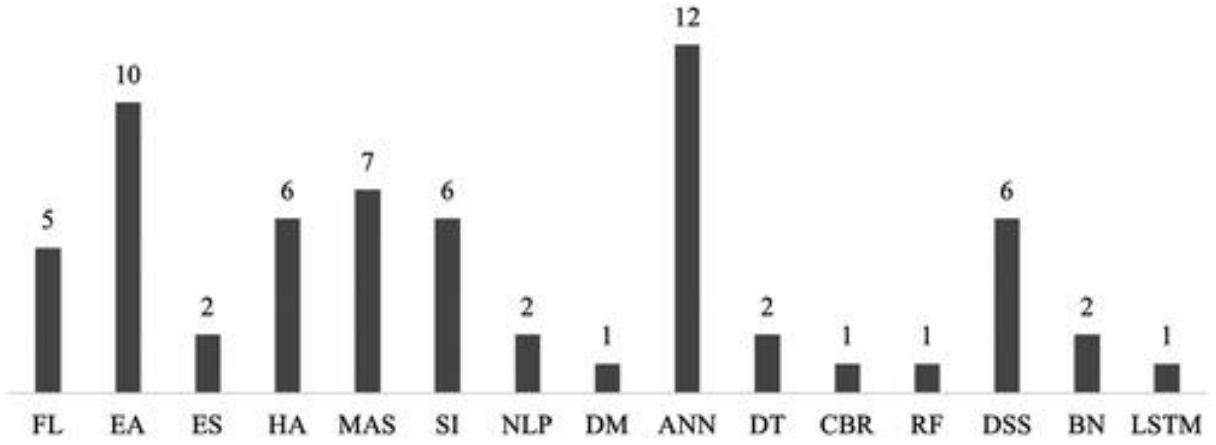
TECHNOLOGY, ORGANIZATION, ENVIRONMENT (TOE)

Studies how AI will affect Technology, Organization, and Environment

- Technology
  - Internal and External aspects and their advantages, compatibilities, and complexities
- Organization
  - Resources such as firm size, management, leadership style, and HR quality
- Environment
  - Structure of industry, competition, regular environment, and development of economics

NOTABLE ARTIFICIAL INTELLIGENCE ALGORITHMS

- Artificial neural networks (ANN)
  - Google's search algorithm
- Evolutionary algorithms (EA)
  - Can find the shortest travel time between destinations for supplier businesses
- Multi-Agent Systems (MAS)
  - AI Chatbots interact with customers, answer queries, and give personalized recommendations



ARTIFICIAL NEURAL NETWORKS (ANN)

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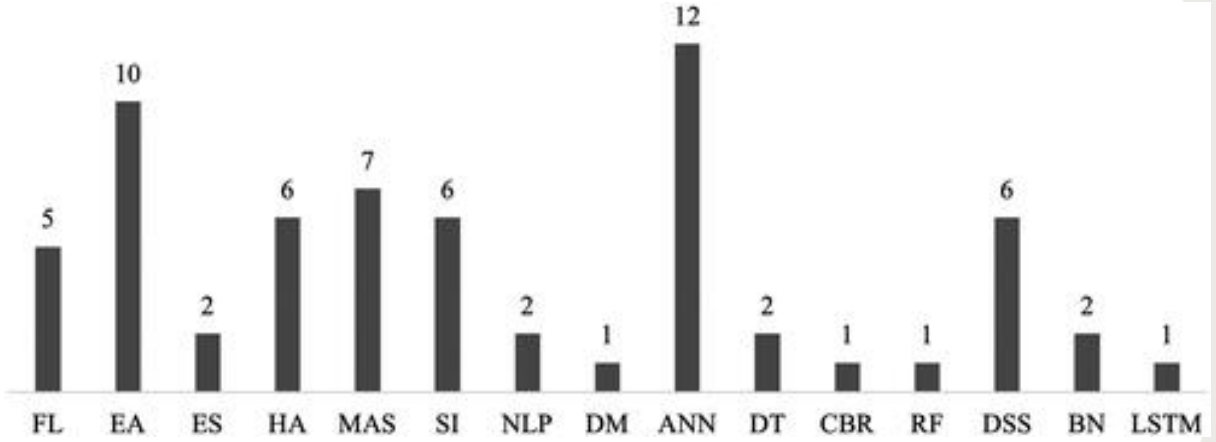
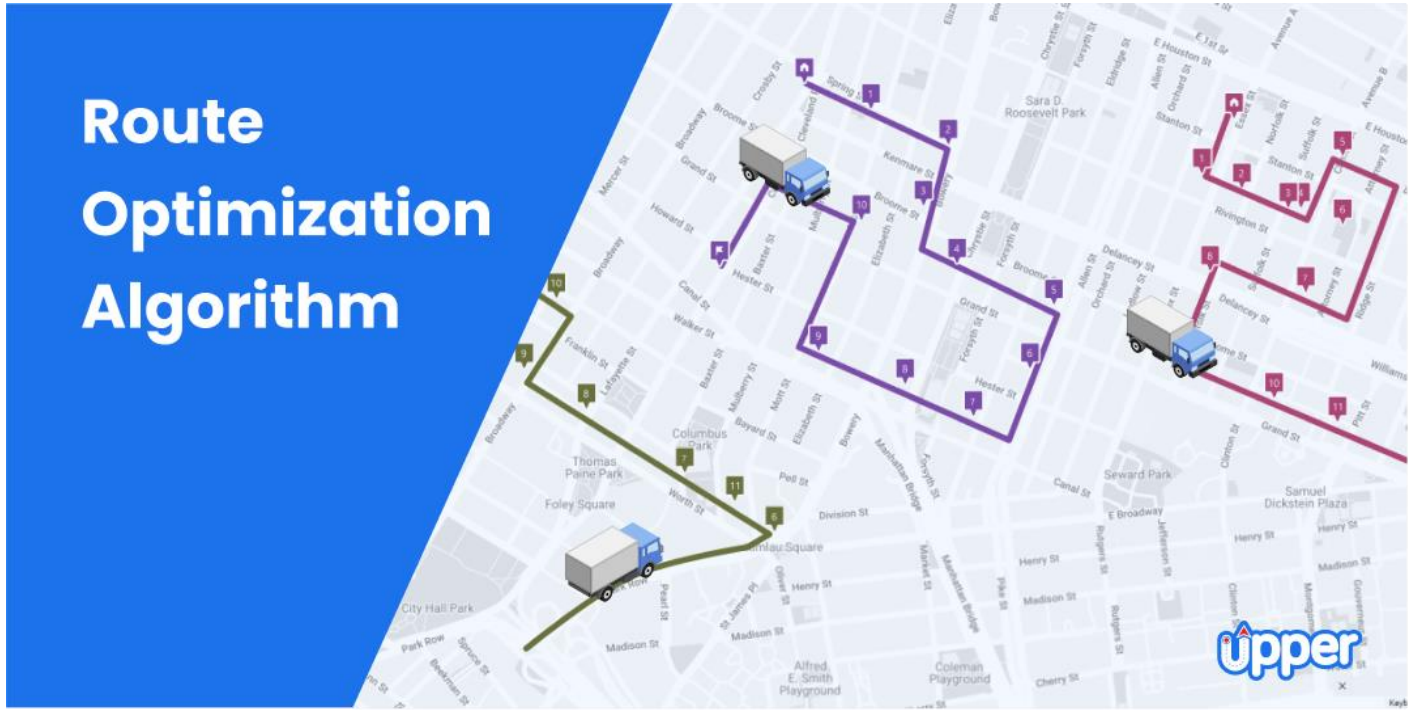


EVOLUTIONARY ALGORITHMS (EA)



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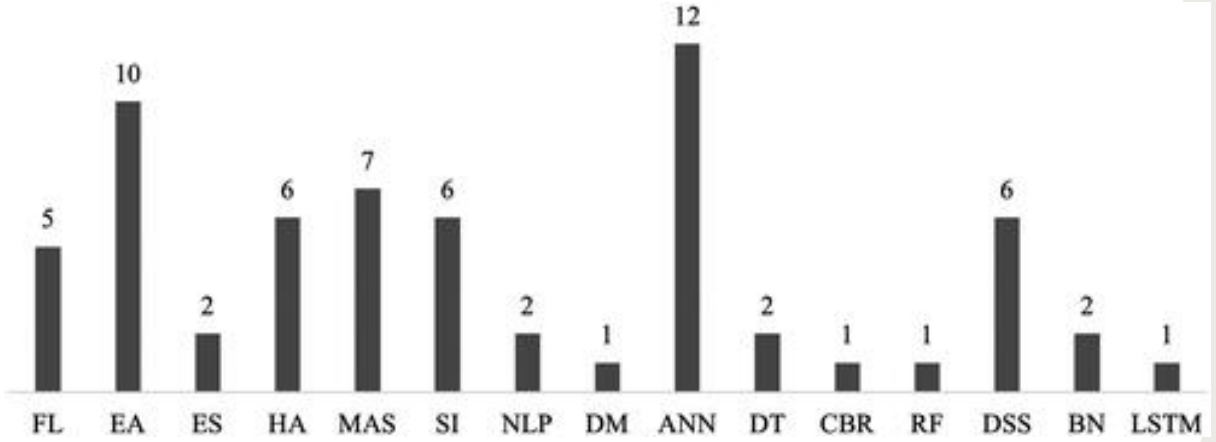
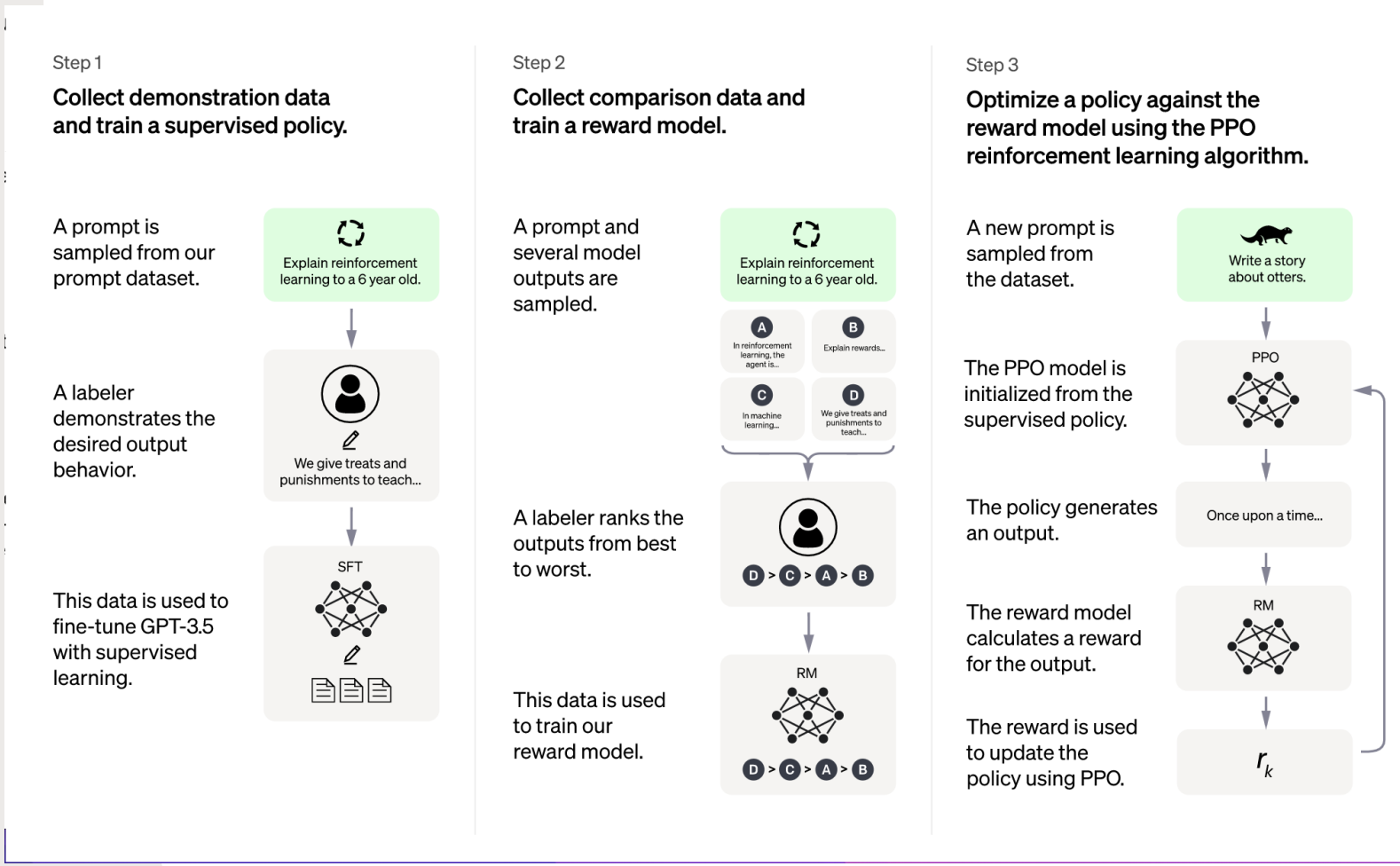


MULTI-AGENT SYSTEMS (MAS)



CHAT GPT AND GPT-4

- Data analytics is seen as obsolete due to Chat GPT
  - Predicts user output based on user input
  - Made artificial intelligence accessible to all instead of a few individuals
- GPT-4 is introduced in March 2023
  - Write, interpret, execute, and run complex code for data analytics
  - Helps choose suppliers, integration in sales, and demand forecasting

CONCERNS AND DANGERS

- Increased reliance on AI
- Delegation of authority may not always be helpful
- Displace workers
- Unethical usage
    - Impact sourcing is a solution
    - Sama the training company has false claims of ethical usage of AI in SCND
    - Paid less than $2 an hour
- Consumers should be aware of the effects and social impact of AI

RISK MITIGATION

- Risk Prediction Models
  - Various models, some using real-time data and others using historical

- Just-in-time production – the ability to adjust to rapidly fluctuating demands
  - Climate Change
  - Imposes a 1.3 Trillion-dollar risk within the next 5 years

BARRIERS TO ENTRY

- Adopting AI starts with top-level management.
  - Clear business strategy and objectives

- Cost of Implementing AI
  - A study on 90% of businesses shows that AI implementation works only 30% of the time on the first try

- Timely
  - AI takes a long time to train, as the training process includes collecting, screening, eliminating, acknowledging missing data, and extracting data to train the model
  - Repeat the process when errors occur

DISRUPTIONS IN THE SUPPLY CHAIN CAUSED BY COVID-19

- Damaged customer's ability to pay for goods and services
- Suppliers are unable to produce and supply enough raw materials to meet demand
- The needs of healthcare institutions were not being met during the time of COVID-19
- Businesses did not have enough workers to keep factories up and running

HOW ARTIFICIAL INTELLIGENCE(AI) IS FIXING DISRUPTIONS CAUSED BY COVID-19

- Supply chains can use AI to harness big data to enable managers to rapidly predict risks via identification and quantification from past impact and prescribe mitigating strategies tailored to the particular scenario.
  - These insights can be used to improve operational and financial performance.

- Predictive Analysis uses AI to anticipate historical demand by analyzing past sales data, market patterns, and outside variables such as variations in consumer behavior due to past pandemics. Now that we have the data from COVID-19 we can stop these supply shortages sooner by basing our supply chains on historical data from COVID-19.

- AI takes menial jobs away so factories can stay up and running for longer

AI AND SUPPLY CHAIN MANAGEMENT IN THE HEALTHCARE INDUSTRY

- COVID-19 created an inventory shortage within the healthcare industry
- Hospitals had their inventory tracked and reported, and they would trade between themselves when a shortage was detected.
- Hospitals used AI applications to rank patients based on their critical condition, this along with an ethics board would then have to choose where to allocate their resources.
- Computer-generated programs help the healthcare industry provide reminders for patients about med reconciliation, pain reassessment, or blood glucose checks.

THANK YOU!

Questions?