**Career Essentials in Generative AI by Microsoft and LinkedIn**

**Lecture 1 – What is Generative AI?**

* Generative AI’s primary output is to generate content.
* Generative AI Models
  + Natural Language Models
    - Natural language generation
    - GPT – Generative Pre-Trained Transformer (by OpenAI)
    - OpenAI Codex (GitHub Co-pilot service)
    - Limitation of GPT-3
      * Lack of Common Sense
      * Lack of Creativity
      * No understanding of generated text
      * Biased Databases
      * Danger of normalization of mediocrity with creative writing
  + Text-to-Image Models
    - Generative Services
      * Midjourney
      * DALL-E
      * Stable Diffusion
    - Industrial Applications
      * Cuebric (by Seyhan Lee)
      * Stitch Fix
  + Generative Adversarial Networks (GANs)
    - Input type of data will be giving same type of data as output
    - Real-World Example
      * Audi (for wheel designing)
      * Beko (for creating brand-funded AI film)
      * Fraud Detection Modeling
  + Variational Autoencoders (VAE uses Anomaly Detection)
    - Real-World Example
      * Uber uses VAE in their financial transaction to detect fraud
      * Google also used VAE to detect network intrusions
      * Anomaly detection in industrial quality control
* Future of Generative AI Models
  + Computer Graphics and Animation (Gaming Sector)
  + Natural Language (better understanding of generated texts)
  + Energy Sector
  + Transportation Sector

**“Always remember that you (human) are the power behind AI”**

**“We live in the time of cutting-edge obsolescence”**

**Lecture 2 - Generative AI: The Evolution of Thoughtful Online Search**

* Search Engines vs Reasoning Engines
  + How search engines work
    - Crawling
    - Indexing
    - Ranking
  + How reasoning engines work
    - Pre-training Phase
      * Trained on massive data (text, image, code)
      * Learns language patterns, grammar, syntax and facts
    - Subsequent Training Phase
      * Predicts the next words in response to prompt
      * Model improves it understand of prompt gradually and eventually generates high-quality and human-like responses

|  |  |
| --- | --- |
| **Search Engines** | **Reasoning Engines** |
| * Explore a subject further | * Understand and interpret human language |
| * Not optimized for deeper questions | * Provide direct relevant responses |
| * Don’t truly understand a query | * Maintain context and understand intent |

* The evolution of Thoughtful online search
  + Power of Prompt engineering
    - Resources for prompt engineering
      * OpenAI Documentation
      * ChatGPT Discord Server
      * PromptPapers
  + Thoughtful search strategies
    - Be specific
    - Provide Context (give examples to get more desired output)
    - Break Things Down
    - Use clear language (use industrial language to get more accurate results)
    - Experiment! (perform prompting and learn from past results)
  + Thoughtful search approaches
    - Role-Play Scenario
    - Analogies
    - Debate – Style Questions
    - Creative Exercises

**“With great power, comes great responsibility”**

**Lecture 3 - Streamlining Your Work with Microsoft Copilot**

* <https://copilot.microsoft.com>
* Use Copilot in
  + Going to official website of Microsoft copilot
  + In Microsoft-Edge, by pressing CTRL + SHIFT + . (period)
  + On windows OS, you get copilot preview at the taskbar
* Use Copilot for
  + Answer Questions
  + Summarize information
  + Compose text
  + Solve problems
  + Create and Analyze images
* Copilot Users
  + Business User
    - Copilot with Entra ID (Sign in with Microsoft 365 Business/Enterprise account)
    - Copilot for Microsoft 365 (Paid Subscription – Business)
  + Individual User
    - Copilot with MSA (Sign in with a free personal account)
    - Copilot Pro (Paid Subscription – Individual)

**Lecture 4 - Learning Microsoft 365 Copilot**

* Use Microsoft Copilot in
  + Word – to generate draft and modifying existing documents
  + Excel – to analyze data
  + PowerPoint – to create and improve presentations
  + Outlook – to draft mail and summarize conversation
  + Teams – to get summaries of meetings and chats
  + Loop Workspace (<https://loop.mircrosoft.com/learn>) – to generate or modify content
  + Microsoft 365 Chat (<https://www.office.com/chat>) – language model with your organisation Microsoft graph

**Lecture 5 - Ethics in the Age of Generative AI**

* Distinguishing tech from human behaviors
  + Deep fakes
  + Inaccurate chatbots
  + Legal confusion
  + Biases
* Pillars of Ethical AI Framework
  + Responsible data practices
  + Boundaries on safe and appropriate use
  + Robust transparency
* Applying these pillars in real world examples
  + Input – Output checkpoints
  + Internal audit process
  + Risk Assessment
* Goals of Ethical Data Organization and how to test/audit them
  + Priority privacy
    - Conduct a privacy audit
    - Create a training curriculum
  + Reducing bias
    - Be curious who the data serves
    - Consider who interpreted the data
  + Promoting transparency
* Preparing technology teams to make ethical decisions
  + Possess specific skills and expertise
  + Work under tight timelines
  + Subject to specific regulatory requirements
* Ethical Challenges
  + Security and Privacy of data collection, storage, use and reuse
  + Audit algorithms so that they are free from bias
  + Reduce their environmental impact
* How to create a culture of Ethical Decision – Making
  + Foster ethical communication & establish ethical training
* Framework for consulting customers in building AI (LISA)
  + L – Listen to users before you start
  + I – Involve customers in decisions (feedback)
  + S – Share privacy policies (transparency of how and where users’ data is been used)
  + A – Audit your work
* Framework for Communication for Ethical AI (ETHICS)
  + E – Executives and Board members
  + T – Technologies
  + H – Human rights advocates
  + I – Industry experts
  + C – Customers and users
  + S – Society
* Steps to Promote ETHICS Framework
  + Establish various sessions between groups
  + Develop training programs
  + Create a cross-functional team
  + Systematically collect and address user feedback
  + Engage formally and informally with external stakeholders
* What it takes to be an Ethical Leader in AI
  + Incorporate communities into design
  + Build skills beyond technology
  + Become a steward of a human-centred future

**“Building a great product means listening to your customers”**

**Lecture 6 - Introduction to Artificial Intelligence**

* Artificial Intelligence
  + A system that shows behavior that could be interpreted as human intelligence
  + Experiment to understand matching pattern (Symbolic approach) – Chinese Room Argument by John Searle
* Strong AI and Weak AI
  + Strong AI
    - Machine displays all person-like behavior
  + Weak AI
    - AI that’s confined to a very narrow task
* Machine Learning
  + Program a system to become intelligence through observation
  + Designing a system to learn and improve on its own
  + By learning through data, machines could continue to grow with more data
* Artificial Neural Network – ANN
  + AI system which mimics the structure of the human brain
  + ANN uses hundreds (or millions) of numerical dials

**“Machine Learning systems feed on data to learn new things”**

* Common AI Systems
  + Robotics
  + Natural Language Processing (NLP)
  + Internet of Things (IoT)
* Approaches of Learning in Machine Learning
  + Supervised Learning
    - Labelled Data
    - Guided by a tutor and set of data with a label
  + Unsupervised Learning
    - Unlabelled Data
    - Guided by observations
* Data sets
  + Training Data Set
    - A smaller chunk of data that the machine uses to learn
  + Testing Data Set
    - Much larger than data used in training data set
* Identifying Patterns
  + Classifying Data
    - Binary Classification
      * Has two outcomes (classification)
      * Uses Supervised Learning
      * Can be used in
        + Booking data
        + Fraudulent transactions
        + Spam
  + Data Clusters
    - AI system uses unsupervised learning to create its own group of data
    - Uses Unsupervised Learning
  + Reinforcement Learning
    - Machine Learning algorithms that use rewards as a way to give the system incentive to find new patterns
    - Q – Learning
      * Reinforcement Learning that will find the best course of action, given the current state of the agent
      * Used to improve the quality of outcome
* Machine Learning Algorithms
  + K – nearest neighbor (KNN)
    - A supervised machine algorithm that plots new data and compares it to existing data
    - Euclidean Distance
      * A mathematical formula that can help see the distance between data points
  + K – mean clustering
    - An unsupervised machine learning algorithm
    - Used to create clusters based on what the machine sees in the data
  + Regression Analysis
    - A supervise machine learning algorithm
    - Looks at the relationship between the predictors and the outcome
  + Naïve Bayes Algorithm
    - It assumes that all predictors are independent form one another
* Ensemble modeling
  + Bagging
    - When one uses several versions of the same machine – learning algorithm
  + Stacking
    - When one uses several different machine learning algorithms
* Bias and Variance
  + Bias
    - The gap between the predicted value and the actual outcome
  + Variance
    - When the predicted values are scattered all over the place
  + Bais Variance Trade-Off
    - When making a prediction, one need to balance the bias and variance in data
* Underfitting and Overfitting
  + Underfitting
    - Identifying patterns that work with a small data but does not fit at larger datasets
  + Overfitting
    - Creating a lot of complexity and missing out data outliers (data that is close but does not fit the model)
* Artificial Neural Networks – ANN
  + A type of machine learning that uses a structure like the human brain to break down massive datasets
  + Layers in ANN
    - Input layer
    - Hidden layers (Activation function)
    - Output layer
  + Feedforward Neural Network
  + Bias is on the neuron, not the connections
  + Cost Function
    - A number that the system uses to measure its answer against the correct answer
  + Gradient Descent
  + Backpropagation of error (backprop)
* Steps to remember while building an AI system
  + Figure out what you want from the data
  + Determine the type of machine learning model you need (standard ML algorithms or ANN)
  + ML algorithms
    - K – nearest neighbor
    - Naïve Bayes
  + ANN
    - Feed training set
    - Determines how much to change the weights
    - Use backpropagation to adjust the weights to lower the cost function
    - Add data from test set
* Things about AI Systems
  + They are only as good as the data they’re given
  + They learn by trying different things
  + They can do things human can’t