Cognitive Computing, Deep Learning, and Text Analytics – Reviewer

Cognitive Computing

Field of AI that mimics human thought to aid in decision-making. Key features include learning, reasoning, adaptability, and human-computer interaction. Applications: IBM Watson (healthcare), recommendation engines, autonomous vehicles.

Shallow Networks

Neural networks with one or two hidden layers. Used for simple data patterns such as spam detection.

Neural Network Development Process

1. Data Collection & Preprocessing – Gather and normalize data. 2. Model Initialization – Choose layers and activation functions. 3. Training – Use forward and backward propagation to adjust weights. 4. Evaluation & Tuning – Test for accuracy and adjust parameters.

Deep Neural Networks (DNNs)

Networks with multiple hidden layers that can learn complex patterns. Used for image, voice, and language recognition.

Deep Learning Concepts

Subset of machine learning focused on multi-layered neural networks. Uses activation functions (ReLU, Sigmoid) and backpropagation to learn.

Convolutional Neural Networks (CNNs)

Specialized for image/video processing. Consist of convolutional, pooling, and fully connected layers. Used in face and tumor recognition.

Recurrent Neural Networks (RNNs)

Handle sequential data and retain past information. Example: predictive text.

Long Short-Term Memory (LSTM)

Type of RNN for long-term dependencies. Uses input, forget, and output gates. Examples: translation, stock prediction.

Text Mining

Extracting meaningful information from text using NLP. Applications: sentiment and feedback analysis.

Text Analytics

Converts text to structured insights through tokenization, vectorization, and NER.

Text Mining Process

1. Data Collection 2. Preprocessing 3. Feature Extraction (TF-IDF) 4. Modeling with ML algorithms.

Natural Language Processing (NLP)

AI that enables machines to understand human language. Used in chatbots, translation, and summarization.

Sentiment Analysis

Determines emotional tone in text. Approaches: Lexicon-based and Machine Learning-based. Example: movie reviews.

Quick Quiz for Review

1. What is the main goal of cognitive computing?
2. How do shallow networks differ from deep networks?
3. What is backpropagation used for in deep learning?
4. Which type of neural network is best for sequential data?
5. What are the main steps in the text mining process?
6. Give one real-world example of NLP in use.
7. What are the two main approaches to sentiment analysis?