Professional Certificate in AI in Medical Imaging

Clinical Decision Support Systems

A:

Artificial Intelligence (AI): The simulation of human intelligence processes by machines, especially computer systems. These processes include learning (the acquisition of information and rules for using the information), reasoning (using the rules to reach approximate or definite conclusions), and self-correction.

Algorithm: A set of statistical processing steps. In AI, algorithms take in data and perform specific operations on it to produce a result.

Anatomical Model: A 3D representation of a patient's anatomy generated from medical images. It can be used for surgical planning, medical training, and other applications.

Augmented Reality (AR): An technology that superimposes a computer-generated image on a user's view of the real world, providing a composite view.

C:

Classification: A process used to predict the categorical class labels of new instances, based on past observations.

Computed Tomography (CT): A medical imaging method that uses computer-processed combinations of many X-ray images taken from different angles to produce cross-sectional images of the body.

Convolutional Neural Networks (CNN): A type of deep learning model that is especially good at processing grid-structured data, such as images.

Clinical Decision Support System (CDSS): A computer-based information system that provides health care professionals and patients with clinical knowledge and patient-specific information, intelligently filtered and presented at appropriate times, to enhance health and health care.

D:

Deep Learning: A subset of machine learning that is based on artificial neural networks with representation learning. It can process a wide range of data resources, requires less data preprocessing by humans, and can often produce more accurate results than traditional machine learning approaches.

DICOM (Digital Imaging and Communications in Medicine): A standard for transmitting medical imaging information. It defines the formats for medical images and related information that can be exchanged with

different imaging equipment.

Diagnostic Imaging: The use of various imaging technologies, such as X-ray, CT, MRI, and ultrasound, to diagnose medical conditions.

E:

Evidence-based Medicine: The conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients.

F:

False Negative: A test result that incorrectly indicates that a given condition is not present.

False Positive: A test result that incorrectly indicates that a given condition is present.

Feature Engineering: The process of extracting or creating features from raw data that make machine learning algorithms work.

G:

Genetic Algorithm: A search heuristic that is inspired by Charles Darwin's theory of natural evolution. This algorithm reflects the process of natural selection where the fittest individuals are selected for reproduction in order to produce the offspring of the next generation.

I:

Image Segmentation: The process of partitioning a digital image into multiple segments. The goal is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.

Imaging Informatics: The use of computers to manage and interpret medical imaging data.

Integrated Clinical Environment (ICE): A software environment that provides a unified view of all the information required for patient care, including medical images, lab results, and electronic health records.

L:

Label: The ground truth or actual class of a given instance.

Labeling: The process of assigning a label to a given instance.

Learning Rate: A parameter that determines how much an algorithm adjusts the weights of the network with respect to the loss gradient.

M:

Magnetic Resonance Imaging (MRI): A medical imaging technology that uses magnetic fields and radio waves to create detailed images of the organs and tissues within the body.

Machine Learning (ML): A type of artificial intelligence that allows systems to learn and improve from experience without being explicitly programmed.

Medical Imaging Informatics: The application of informatics in the field of medical imaging.

N:

Neural Network: A computing model whose layered structure is inspired by the organization of the animal brain.

O:

Object Detection: The process of identifying instances of semantic objects of a certain class in digital images and videos.

Optimization: The process of finding the best solution(s) from all feasible solutions.

P:

PACS (Picture Archiving and Communication System): A medical imaging technology that provides economical storage and convenient access to medical images.

Precision Medicine: An approach to disease treatment and prevention that takes into account individual variability in genes, environment, and lifestyle for each person.

Predictive Modeling: The process of creating a mathematical representation of a real-world situation for the purpose of predicting future outcomes.

R:

Radiology: A specialty that uses medical imaging to diagnose and treat diseases.

Radiomics: The extraction and analysis of large amounts of quantitative features from medical images.

Regression: A statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables.

S:

Semantic Segmentation: The process of dividing an image into multiple segments, each of which is semantically meaningful and corresponds to a particular object or scene.

Support Vector Machine (SVM): A popular machine learning algorithm for classification and regression analysis.

T:

Transfer Learning: A machine learning method where a pre-trained model is used as the starting point for a similar problem.

True Negative: A test result that correctly indicates that a given condition is not present.

True Positive: A test result that correctly indicates that a given condition is present.

U:

Ultrasound: A medical imaging technology that uses high-frequency sound waves to produce images of the inside of the body.

V:

Validation: The process of evaluating a model or system on a separate data set to ensure that it generalizes well to new data.

W:

Workflow: A sequence of connected steps performed by a person or a group to achieve a goal.

These terms and definitions provide a comprehensive overview of key concepts in Clinical Decision Support Systems, as covered in the Professional Certificate in AI in Medical Imaging. From Artificial Intelligence to Workflow, this glossary covers a wide range of topics, providing clear and concise explanations of each term. Whether you're new to the field or a seasoned professional, this glossary serves as a valuable resource for understanding and navigating the complex world of AI in