
Executive Certificate in AI Applications in Nutrition Education

Deep Learning for Food Image Recognition

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 rules to reach approximate or definite conclusions), and self-correction.

Related terms: Machine Learning, Deep Learning, Neural Networks

Convolutional Neural Networks (CNN or ConvNet): A type of deep learning neural network that has shown great success in image processing and computer vision tasks. CNNs are designed to automatically and adaptively learn spatial hierarchies of features from images.

Related terms: Deep Learning, Neural Networks, Computer Vision

Deep Learning: A subset of machine learning that is based on artificial neural networks with representation learning. Deep learning models learn to represent data by training on a large amount of data and are able to automatically extract features and patterns from the data.

Related terms: Artificial Intelligence, Machine Learning, Neural Networks

Feature Extraction: The process of transforming raw data into a set of features that are more informative and suitable for modeling. In food image recognition, feature extraction involves extracting visual features such as color, texture, and shape from images.

Related terms: Image Processing, Computer Vision, Deep Learning

Food Image Recognition: The use of computer vision and machine learning techniques to automatically identify and classify food items in images. Food image recognition has applications in nutrition education, dietary assessment, and food safety.

Related terms: Computer Vision, Machine Learning, Deep Learning

Fully Convolutional Network (FCN): A type of convolutional neural network that replaces the fully connected layers with convolutional layers, allowing the network to output spatial maps instead of fixed-length vectors. FCNs are often used for semantic segmentation tasks in computer vision.

Related terms: Convolutional Neural Networks, Deep Learning, Computer Vision

Image Augmentation: The process of artificially increasing the size of a training set by applying various transformations to the images, such as rotation, scaling, and flipping. Image augmentation can help

improve the performance of deep learning models by providing more diverse training data.

Related terms: Deep Learning, Computer Vision, Training Set

Image Classification: The process of categorizing images into one of several predefined classes. In food image recognition, image classification involves identifying the type of food present in an image.

Related terms: Food Image Recognition, Deep Learning, Computer Vision

ImageNet: A large-scale image database that is widely used for visual recognition research. ImageNet contains over 14 million images and 21,000 categories, making it a valuable resource for training and testing deep learning models.

Related terms: Deep Learning, Computer Vision, Image Database

ImageNet Large Scale Visual Recognition Challenge (ILSVRC): An annual competition that evaluates algorithms for object detection and image classification on the ImageNet database. ILSVRC has been instrumental in driving progress in deep learning research.

Related terms: Deep Learning, Computer Vision, ImageNet

Machine Learning (ML): A type of artificial intelligence that allows systems to learn and improve from experience without being explicitly programmed. Machine learning algorithms use statistical models to analyze and draw inferences from data.

Related terms: Artificial Intelligence, Deep Learning, Neural Networks

Neural Networks: A type of machine learning model inspired by the structure and function of the human brain. Neural networks consist of interconnected nodes, or artificial neurons, that process information and learn patterns in data.

Related terms: Artificial Intelligence, Machine Learning, Deep Learning

Object Detection: The process of identifying and locating objects within an image. In food image recognition, object detection involves identifying the presence and location of food items in an image.

Related terms: Food Image Recognition, Deep Learning, Computer Vision

Overfitting: A common problem in machine learning where a model learns the training data too well and performs poorly on new, unseen data. Overfitting occurs when a model has too many parameters relative to the amount of training data and is unable to generalize to new data.

Related terms: Machine Learning, Deep Learning, Training Set

Pooling: A process in convolutional neural networks that reduces the spatial dimensions of the feature maps

by taking the maximum or average value within a specified region. Pooling helps to reduce the computational complexity of the network and improves translation invariance.

Related terms: Convolutional Neural Networks, Deep Learning, Computer Vision

Semantic Segmentation: The process of partitioning an image into multiple regions, each corresponding to a specific object class or category. Semantic segmentation is a pixel-level classification task that is used in a variety of applications, including food image recognition.

Related terms: Food Image Recognition, Deep Learning, Computer Vision

Transfer Learning: The process of using a pre-trained deep learning model as a starting point for a new, related task. Transfer learning allows models to leverage the knowledge and features learned from a large dataset and apply it to a smaller, domain-specific dataset.

Related terms: Deep Learning, Machine Learning, Neural Networks

Training Set: A collection of data used to train a machine learning model. The training set is used to fit the parameters of the model and is typically split into separate sets for training and validation.

Related terms: Machine Learning, Deep Learning, Overfitting

Underfitting: A common problem in machine learning where a model fails to learn the underlying patterns in the data. Underfitting occurs when a model has too few parameters or is too simple to capture the complexity of the data.

Related terms: Machine Learning, Deep Learning, Overfitting

VGG16: A deep convolutional neural network developed by the Visual Geometry Group at Oxford University. VGG16 is a 16-layer network that has been widely used as a baseline model for image classification tasks and is often used for transfer learning in food image recognition.

Related terms: Convolutional Neural Networks, Deep Learning, Transfer Learning

YOLO (You Only Look Once): A real-time object detection system that is designed for fast and accurate detection of objects in images. YOLO treats object detection as a regression problem and is able to detect multiple objects in a single pass through the network.

Related terms: Object Detection, Deep Learning, Computer Vision