
Professional Certificate in AI for Automated Skin Lesion Analysis

Feature Extraction and Selection for Skin Lesion Analysis

Acne: A common skin condition characterized by the appearance of spots and pimples, especially on the face, back, and chest. In skin lesion analysis, acne is one of the conditions that AI models may be trained to recognize.

Artificial Intelligence (AI): A branch of computer science that deals with the creation of intelligent machines that work and react like humans. In the context of skin lesion analysis, AI is used to automate the process of analyzing images of skin lesions to detect signs of skin cancer.

Balanced Dataset: A dataset that contains an equal number of examples from each class. In the context of skin lesion analysis, a balanced dataset would contain an equal number of images of malignant and benign skin lesions.

Classification: The process of categorizing data into one of several predefined classes. In skin lesion analysis, classification is used to determine whether a skin lesion is malignant or benign.

Convolutional Neural Network (CNN): A type of deep learning model that is commonly used for image classification tasks. CNNs are designed to automatically and adaptively learn spatial hierarchies of features from images.

Deep Learning: A subset of machine learning that is based on artificial neural networks with representation learning. Deep learning models are able to learn and improve from experience and data, making them well-suited for tasks such as skin lesion analysis.

Dermoscopy: A non-invasive medical procedure for examining the skin, especially for the early detection of skin cancer. Dermoscopy involves the use of a special instrument called a dermatoscope to examine skin lesions.

Feature Extraction: The process of transforming raw data into a set of features that can be used to train a machine learning model. In the context of skin lesion analysis, feature extraction involves identifying and extracting relevant characteristics from images of skin lesions, such as color, texture, and shape.

Feature Selection: The process of selecting a subset of the most relevant features from the set of all available features. In the context of skin lesion analysis, feature selection is used to identify the most important characteristics of skin lesions that are indicative of malignancy.

Generalization: The ability of a machine learning model to perform well on new, unseen data. In the context of skin lesion analysis, generalization is important for ensuring that an AI model can accurately analyze images of skin lesions that it has not encountered during training.

Ground Truth: The true or accepted value for a given data point. In the context of skin lesion analysis, the ground truth is the actual diagnosis of a skin lesion, which is used to evaluate the performance of an AI model.

Hyperparameter Tuning: The process of adjusting the parameters of a machine learning model to improve its performance. In the context of skin lesion analysis, hyperparameter tuning is used to optimize the performance of an AI model by adjusting parameters such as learning rate, number of layers, and number of units per layer.

Image Augmentation: The process of artificially increasing the size of a dataset by applying transformations to the existing data. In the context of skin lesion analysis, image augmentation is used to increase the size of the training dataset by applying transformations such as rotation, scaling, and flipping to the images of skin lesions.

Lesion: A region of the skin that has been affected by a disease or injury. In skin lesion analysis, lesions are the primary focus of the analysis, as they may indicate the presence of skin cancer.

Melanoma: A type of skin cancer that develops from melanocytes, the cells that produce melanin, the pigment that gives skin its color. Melanoma is the most dangerous type of skin cancer, as it can spread quickly to other parts of the body.

Neural Network: A type of machine learning model that is inspired by the structure and function of the human brain. Neural networks are composed of interconnected nodes or units that process and transmit information.

Overfitting: A situation in which a machine learning model performs well on the training data but poorly on new, unseen data. Overfitting occurs when a model is too complex and learns the noise in the training data, rather than the underlying patterns.

Preprocessing: The process of preparing and cleaning raw data before it is used to train a machine learning model. In the context of skin lesion analysis, preprocessing involves cleaning and normalizing the images of skin lesions to improve the performance of the AI model.

Skin Cancer: A type of cancer that develops in the skin cells. Skin cancer is one of the most common types of cancer, and it can be divided into two main categories: non-melanoma skin cancer and melanoma.

Skin Lesion Analysis: The process of examining and diagnosing skin lesions, especially for the early detection of skin cancer. Skin lesion analysis can be performed manually by a dermatologist or automatically using AI.

Supervised Learning: A type of machine learning in which a model is trained on labeled data, i.e., data that has been labeled with the correct answer. In the context of skin lesion analysis, supervised learning is used to train an AI model to recognize signs of skin cancer in images of skin lesions.

Support Vector Machine (SVM): A type of supervised learning algorithm that can be used for classification tasks. SVMs work by finding the hyperplane that maximally separates the data points of different classes.

Texture: A visual characteristic of an image that describes the spatial arrangement of color or intensities. In the context of skin lesion analysis, texture is an important feature that can be used to distinguish between malignant and benign skin lesions.

Transfer Learning: The process of applying a pre-trained machine learning model to a new, related task. In the context of skin lesion analysis, transfer learning is used to leverage the knowledge gained from training a model on a large dataset of images to improve the performance of the model on a smaller dataset of skin lesions.

Training: The process of teaching a machine learning model to make predictions by providing it with labeled data. In the context of skin lesion analysis, training involves providing an AI model with images of skin lesions and their corresponding diagnoses.

Unsupervised Learning: A type of machine learning in which a model is trained on unlabeled data, i.e., data that has not been labeled with the correct answer. In the context of skin lesion analysis, unsupervised learning can be used to identify patterns and clusters in images of skin lesions.

Validation: The process of evaluating the performance of a machine learning model on a separate dataset, called the validation set. In the context of skin lesion analysis, validation is used to tune the hyperparameters of an AI model and to prevent overfitting.

Visual Features: The characteristics of an image that can be used to describe its appearance. In the context of skin lesion analysis, visual features include color, texture, and shape, which can be used to distinguish between malignant and benign skin lesions.