Supervised machine learning

Classification: These algorithms are used to predict categorical labels or classes based on input features. Common classification algorithms include:

Logistic Regression Decision Trees Random Forest Support Vector Machines (SVM) k-Nearest Neighbors (k-NN) Naive Bayes Neural Networks Regression: In regression, algorithms predict continuous numerical values instead of discrete classes. Popular regression algorithms include:

Linear Regression Ridge and Lasso Regression Support Vector Regression (SVR) Decision Trees for Regression Random Forest Regression Gradient Boosting Regressors (e.g., XGBoost, LightGBM)

Supervised learning has been employed in neurosurgical diagnosis, presurgical planning, and outcome prediction. Machine learning has been used to characterize performance during otolaryngology and dental VR procedures [1) 2) 3) 4) 5) 6)]

This algorithm consist of a target / outcome variable (or dependent variable) which is to be predicted from a given set of predictors (independent variables). Using these set of variables, we generate a function that map inputs to desired outputs. The training process continues until the model achieves a desired level of accuracy on the training data. Examples of Supervised Learning: Regression, Decision Tree, Random Forest, KNN, Logistic Regression etc.

Supervised learning is the machine learning task of learning a function that maps an input to an output based on example input-output pairs.

It infers a function from labeled training data consisting of a set of training examples.

In supervised learning, each example is a pair consisting of an input object (typically a vector) and a desired output value (also called the supervisory signal). A supervised learning algorithm analyzes the training data and produces an inferred function, which can be used for mapping new examples. An optimal scenario will allow for the algorithm to correctly determine the class labels for unseen instances. This requires the learning algorithm to generalize from the training data to unseen situations in a “reasonable” way (see inductive bias).

The parallel task in human and animal psychology is often referred to as concept learning.

Neurosurgery

- Individual-level cortical morphological network analysis in idiopathic normal pressure hydrocephalus: diagnostic and prognostic insights
- Radiomic study of common sellar region lesions differentiation in magnetic resonance imaging based on multi-classification machine learning model
- Classification of intracranial pressure epochs using a novel machine learning framework

- GEM-CRAP: a fusion architecture for focal seizure detection
- Aging, mitochondrial dysfunction, and cerebral microhemorrhages: a preclinical evaluation of SS-31 (elamipretide) and development of a high-throughput machine learning-driven imaging pipeline for cerebromicrovascular protection therapeutic screening
- Machine learning-based model to predict long-term tumor control and additional interventions following pituitary surgery for Cushing's disease
- Seizure onset zone classification of intracranial EEG signals from epilepsy patients
- Classification of Alzheimer's disease based on multi-example learning and multi-scale feature fusion

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