HIRISE_api

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HIRISE Api tool

HIRISE_API

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1.1 HIRISE_api.hirise

Modules

HIRISE_api.hirise.Hirise_Image	
HIRISE_api.hirise.Image_Client	
HIRISE_api.hirise.utils	

1.1.1 HIRISE_api.hirise.Hirise_Image

Classes

`HiriseImage`(file_name)	Class that creates an HIRISE image object that has specific attributes including latitude longitude

1.1.2 HIRISE_api.hirise.Image_Client

Classes

`ImageClient()`	

1.1.3 HIRISE_api.hirise.utils

Functions

`LBL_parser`(label_url)	Function that parses the .LBL file in NASA's Planetary Data System
`append_float_data_without_strip`(param, ...)	Function that validates floating point data without stripping the last characters
`downloadRange`(start_range, end, step)	
`file_parameters_list`()	Function that returns file parameters list
`get_website_data`(base_url, page_key[, sub_key])	Function that assistes in wescaping the NASA website
`image_map_parameters_list`()	Function that returns image mapping parameters list
`other_parameters_list`()	Function that returns scaling factor, offset, center filter wavelength parameters list
`timing_parameters_list`()	Function that returns timing parameters list
`validate_append_float_data`(param, list_of_params)	Function that validates floating point data
`viewing_parameters_list`()	Function that returns viewing parameters list

1.2 HIRISE_api.models

Modules

1.2.1 HIRISE_api.models.Affinity_Propagation

Functions

`affinity_propagation_analysis(...[, plot, ...])`	Function that uses as input the encoded image samples and clusters the data using affinity propogation.

1.2.2 HIRISE_api.models.Agglomerative_Clustering

Functions

`agglomerative_clustering_analysis(...[, ...])`	Function that uses as input the encoded image samples and clusters the data using aglomerative clustering.

1.2.3 HIRISE_api.models.BIRCH

Functions

`BIRCH_analysis`(encoded_samples, ...[, plot, ...])	Function that uses as input the encoded image samples and clusters the data using affinity propogation.

1.2.4 HIRISE_api.models.DBSCAN

Functions

`DBSCAN_analysis`(encoded_samples, true_labels)	Function that uses as input the encoded image samples and clusters the data using Density-based spatial clustering of applications with noise.

1.2.5 HIRISE_api.models.Ensemble_Models

Functions

`ensemble_model`(encoded_data, labels, ...[, ...])	
`evaluate_model`(model, translation_dataframe, ...)	Function that uses cross-validation and evalutes the stacking model.
`get_models`([discovery])	Function that defines specified models as an input to the ensemble model.
`get_stacking`([discovery, all_models])	Function that stacks specified models together as an input to the ensemble model.

Classes

`AgglomerativeClusteringWrapper`([n_clusters, ...])	
`DBSCANWrapper`([eps, min_samples, metric, ...])	
`HDBSCANWrapper`([min_cluster_size, ...])	
`OpticsWrapper`(*[, min_samples, max_eps, ...])	

1.2.6 HIRISE_api.models.HDBSCAN

Functions

`HDBSCAN_analysis(encoded_samples[, ...])`	Function that uses as input the encoded image samples and clusters the data using Hierarchical Density-based spatial clustering of applications with noise. The user must specify only the minimum samples, which is the tuning parameters for HDBSCAN.

1.2.7 HIRISE_api.models.KMeans

Functions

`kmeans_analysis(encoded_samples[, clusters, ...])`	Function that uses as input the encoded image samples and clusters the data using K Means clustering of applications with noise.

1.2.8 HIRISE_api.models.Mean_Shift

Functions

`mean_shift_analysis(encoded_samples[, plot, ...])`	Function that uses as input the encoded image samples and clusters the data using Mean Shift Clustering Method.

1.2.9 HIRISE_api.models.OPTICS

Functions

`OPTICS_analysis(dataframe[, eps, ...])`	Function that uses as input the encoded image samples and clusters the data using Ordering Points To Identify Cluster Structure Method.

1.2.10 HIRISE_api.models.metrics

Functions

`calculate_metrics`(model, labels[, verbose])	Function that calulates metrics including, rand score, adjusted rand score, mutual information score, normalized mutual information score, adjusted mutual information score, balanced accuracy score, completeness score, homogeniety score and v-score for a given model.
`classification_metrics_dataframe`(model_list, ...)	Fucntion that creates a metrics dataframe based on the calculated metrics for each model in the model list specified by the user.
`generate_precision_dataframe`(folder_path, ...)	Function that returns a generated a dataframe of all the precision values evaluated for a true and predicted labels after classifiaction analysis on a dataset.
`print_confusion_matrix`(folder_path, ...[, ...])	Function that prints the confusion matrix metric for a given set of image clustering results and the associated images.

1.2.11 HIRISE_api.models.utils

Functions

`elbow_curve`(encoded_samples[, max_values, ...])
`generate_precision_dataframe`(folder_path, ...)
`translate_labels`(translation_list, model_results)

1.3 HIRISE_api.preprocessing

Modules

HIRISE_api.preprocessing.Data_Preparation
HIRISE_api.preprocessing. Dimension_Reduction
HIRISE_api.preprocessing.Encoding
HIRISE_api.preprocessing.Image_Loader
HIRISE_api.preprocessing.utils

1.3.1 HIRISE_api.preprocessing.Data_Preparation

Classes

`DataPreparation()`	Class that allows for data preparation as part of the pre-processing of the hirise images.

1.3.2 HIRISE_api.preprocessing.Dimension_Reduction

Functions

`PCA_analysis`(encoded_samples, labels[, ...])	The PCA analysis allows the user to understand diffrent aspects of the PCA mehod.
`TSNE_analysis`(encoded_samples, labels[, ...])	The T-SNE analysis allows the user to understand diffrent aspects of the TSNE method. The user can choose to plot the 2D and 3D visualisations.
`UMAP_analysis`(encoded_samples[, components, ...])	The UMAP analysis allows the user to understand diffrent aspects of the UMAP method.

1.3.3 HIRISE_api.preprocessing.Encoding

Functions

`create_encoded_samples_dataframe`(folder_path)	Function that uses the autoencoder to encode the samples and return an encoded samples dataframe to the user based on latent dimensions input by the user
`plot_autoencoder_results`(encoder, decoder, ...)	Function that plots the original and reconstructed images form the autoencoder results
`test_batchs`(encoder, decoder, device, ...)	Function that is used to test the Convolutional Autoencoder and return the mean loss, averaged over all input batches.
`train_CAE`(encoder, decoder, device, ...)	Function that is used to train using a single batch input into the autoencoder.
`train_batchs`(encoder, decoder, device, ...)	Function that is used to train the Convolutional Autoencoder and return the mean loss, averaged over all input batches.
`transfer_learning_encoding`(folder_path[, ...])	The Transfer learning function takes in the folder path of the images to

Classes

`CAEDecoder`(encoded_space_dim, fc2_input_dim)	Class that supports functions needed to define the architecture and forward functions of the decoder in the Convolutional Autoencoder
`CAEEncoder`(encoded_space_dim, fc2_input_dim)	Class that supports functions needed to define the architecture and forward functions of the encoder in the Convolutional Autoencoder

1.3.4 HIRISE_api.preprocessing.Image_Loader

Functions

`generate_dataloaders`(folder_path[, transform])	Function that generates the dataloaders for a HIRISE dataset, given folder path specified by the user
`generate_dataset`(folder_path[, transform])	Function that generated the HIRISE Dataset given a folderpath of HIRISE Images
`initialize_encoder_decoder`([latent_dimensions])	Fuction that initialized the encoder and decoder depeining on the latent
`show_classes`(folder_path[, transform, ...])	Function that shows all classes defined by the user though the Image Folders using the Image Folder dataset
`show_encoder_decoder_image_sizes`(folder_path)	Function that returns the input and output image sizes of images that have been through the autoencoding process

Classes

`HiriseImageDataset`(path_to_images[, transform])	Hirise Image Dataset Class that initialize the pytorch ImageLoader Dataset with the folder images to return and image and associated folder name(label)

1.3.5 HIRISE_api.preprocessing.utils

Functions

`create_image_list`(file_path[, transform])	Function that creates a list of all the images in the specified folder in a PIL format
`display_all_images`(file_path, ...[, ...])	Function to display all the image in the folder in a flat rasterfied format.
`display_image_distributions`(image_file_path, ...)	Function to display all the image in the folder as images on a distributed map using TSNE,UMAP or PCA as the preprocessing function
`normalize_results`(encoded_samples)	Function that is used to normalize the values of the encoded samples.
`read_encoded_csv`(file_path[, autoencoder])	
`show_cluster_images`(image_file_path, ...[, ...])	Prints the image in a specified cluster, in the form of a grid with rows and columns specified by the user

1.4 HIRISE_api.tests

Modules

HIRISE_api.tests.test_hirise
HIRISE_api.tests.test_models
HIRISE_api.tests.test_preprocessing

1.4.1 HIRISE_api.tests.test_hirise

Functions

`test_database_exists()`	Function to test accessibility to the downloaded database in the package.
`test_filter_center_latlon()`	Test if filtering by latititude and longitude works ase expected.
`test_get_all_parameters()`	Function to test whether all parameters of the hirise object can be accessed.
`test_get_images()`	
`test_get_individual_parameters()`	Function to test if individual parameters of the hirise

1.4.2 HIRISE_api.tests.test_models

Functions

`test_clustering_results()`	
`test_metrics_function()`	Test if metrics function returns all 9 metrics output as expected
`test_translate_labels()`	Test if label translation function for classification metrics translated user defined labels as expected

1.4.3 HIRISE_api.tests.test_preprocessing

Functions

`test_autoencoder()`	Test if output size of the auto-encoded image is as expected
`test_pca_dimension_reduction()`	Test if output of PCA Analysis is as expected
`test_tsne_dimension_reduction()`	Test if output of TSNE Analysis is as expected
`test_umap_dimension_reduction()`	Test if output of UMAP analysis is as expected

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