ColourPaletteExtractor

Release 0.5.6

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1.1.1 Subpackages

colourpaletteextractor.controller package

Submodules

colourpaletteextractor.controller.controller module

class colourpaletteextractor.controller.controller.**ColourPaletteExtractorController**(*model: colourpaletteextractor.model.model.ColourPaletteExtractorModel*, *view: colourpaletteextractor.view.mainview.MainView*)

Bases: PySide2.QtCore.QRunnable

ColourPaletteExtractor Controller.

Used to connect the ColourPaletteExtractor GUI signals with the appropriate slot to be able to manipulate the associated model.

Parameters
- **model** (*ColourPaletteExtractorModel*) – The main model of ColourPaletteExtractor.
- **view** (*MainView*) – The main window of ColourPaletteExtractor.

current_tab_changed(*i: int*)

Update the current tab index and update the view with the tab's properties.

In most cases, i >= 0, however a value of i = -2 or -3 is also valid for performing a 'dummy' tab change to update the current view shown to the user. A value of -1 will lead to the creation of the default tab (the quick start guide).

Parameters **i** (*int*) – Index of the current tab.

Raises **ValueError** – If the value of i is less than -3.

colourpaletteextractor.controller.worker module

class colourpaletteextractor.controller.worker.**Worker** (*fn*, *function_type: str*, *tab: colourpaletteextractor.view.tabview.NewTab*, **args*, ***kwargs*)

Bases: PySide2.QtCore.QRunnable

Worker thread used to generate the colour palette or report for an image.

Inherits from QRunnable to handler worker thread setup, signals and wrap-up.

Adapted from: ref

Accessed: 01/08/21

Parameters
- **fn** – The function or method to be run as a new thread (generating an image's

colour palette or its colour palette report.

- **tab** (*NewTab*) – tabview.NewTab object associated with the image to be processed.
- **function_type** (*str*) – The action to be run. This can either be 'colour palette' or 'report'.
- ***args** – Arguments to pass to the callback function
- ****kwargs** – Keywords to pass to the callback function

Attributes:

Parameters **progress_callback** – The function callback to run on this worker thread. Supplied args and kwargs will be passed through to the runner.

Raises **ValueError** – If the provided function_type is invalid.

run ( )
Initialise the runner function with passed args, kwargs.

class colourpaletteextractor.controller.worker.**WorkerSignals**
Bases: PySide2.QtCore.QObject
Specify the signals available from a running Worker thread.
Adapted from: ref
Accessed: 01/08/21
Supported signals are:

error
Tuple (exc_type, value, traceback.format_exc()).

finished
Integer emitted upon finishing.
When generating a colour palette, the value is -2. When generating a report, the value is -3. This is used to reload the tab displaying the image with the correct settings and colour palette.

progress
NewTab object for which the GUI is to be updated for and the percentage complete for the current task.
The current task is either generating the colour palette for an image or generating the colour palette report for the image.

result
Object data returned from processing, anything - NOT IN USE.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

Module contents

colourpaletteextractor.examples package

Submodules

colourpaletteextractor.examples.generatecolourpaletteexample module

Contains an example script demonstrating how to generate the colour palette of a sample image.
Module contents

colourpaletteextractor.model package

Subpackages

colourpaletteextractor.model.algorithms package

Submodules

colourpaletteextractor.model.algorithms.cielabcube module

class colourpaletteextractor.model.algorithms.cielabcube.**CielabCube**(*l_star_coord: int*, *a_star_coord: int*, *b_star_coord: int*)

Bases: object

A cube representing a fixed region in the CIELAB colour space.

The cube is used to hold pixels in an image that exist within the cube's region of the CIELAB colour space. The input parameters do not refer to the actual L*, a* and b* values, but depend on the *CUBE_SIZE* specified by the colour palette algorithm (in particular, any variant on the Nieves 2020 algorithm).

In the case of the nieves2020.Nieves2020CentredCubes algorithm, the coordinates refer to the centre of the cube. For the nieves2020.Nieves2020OffsetCubes algorithm, the coordinates refer to the corner of the cube closest to the origin.

Parameters
- **l_star_coord** (*int*) – Perceptual lightness cube coordinate
- **a_star_coord** (*int*) – Green-red cube coordinate
- **b_star_coord** (*int*) – Blue-yellow cube coordinate

add_pixel_to_cube(*pixel: numpy.array*, *c_star: numpy.float64*) → None

Assign a pixel to the cube.

Parameters
- **pixel** (*np.array*) – The pixel as a [L*,a*,b*] triplet.
- **c_star** (*np.float64*) – The C* (chroma, relative saturation) value for the pixel.

property c_stars: list

The C* (chroma, relative saturation) values for all of the pixels in the cube.

C^{*} = \sqrt{{a^{*}}^{2} + {b^{*}}^{2}}

Returns (list[np.float64]) – The list of C* values for all pixels in the cube.

calculate_mean_colour( ) → None

Calculate the mean colour of the pixels in the cube.

Nothing is calculated if the number of pixels in the cube is equal to 0.

property coordinates: numpy.array

The coordinates of the cube ([L*, a*, b*]).

In the case of the nieves2020.Nieves2020CentredCubes algorithm, the coordinates refer to the centre of the cube. For the nieves2020.Nieves2020OffsetCubes algorithm, the coordinates refer to the corner of the cube closest to the origin.

Returns (np.array) – The cube's coordinates.

get_c_star_percentile_value(*percentile: float*) → Union[int, numpy.percentile]

Returns the C* value for the given percentile based on the pixels in the cube.

Parameters **percentile** (*float*) – The percentile to calculate the C* value for.

Returns **(Union[int, np.percentile])** – The C* value for the chosen percentile. If no pixels are found, the return value is 0.

get_l_star_percentile_value(*percentile: float*) → Union[int, numpy.percentile]

Returns the L* value for the given percentile based on the pixels in the cube.

Parameters **percentile** (*float*) – The percentile to calculate the L* value for.

Returns **(Union[int, np.percentile])** – The L* value for the chosen percentile. If no pixels are found, the return value is 0.

increment_pixel_count_after_reassignment ( ) → None
Increase the number of pixels with this cube's mean colour by one.

property l_stars: numpy.array
The L* values for all pixels in the cube.

Returns (np.array) – Array of L* values for all pixels in the cube.

property mean_colour: numpy.array
The mean colour of the pixels in the cube.

Returns (np.array) – The mean colour of the cube as a [L*,a*,b*] triplet.

property pixel_count_after_reassignment: int
The number of pixels in the recoloured image with this cube's mean colour.

Returns (int) – The number of pixels with the cube's mean colour.

property pixels: list
The list of pixels ([L*, a*, b*] triplets) in the cube.

Returns (list[np.array]) – The list of pixels in the cube.

property relevant: bool
The relevancy status of the cube.

Returns (bool) – True if the cube is a relevant cube. Otherwise False.

colourpaletteextractor.model.algorithms.cielabcube.**get_relative_frequencies** (*relevant_cubes: list*, *total_pixels: int*) → list
Calculate the relative frequency of each colour (relevant colour) in the recoloured image.

Parameters
- **relevant_cubes** (*list[CielabCube]*) – List of relevant CielabCube objects.
- **total_pixels** (*int*) – The total number of pixels in the image.

Returns **(list[float])** – The list of relative frequencies for each relevant cube.

colourpaletteextractor.model.algorithms.nieves2020 module

class colourpaletteextractor.model.algorithms.nieves2020.**Nieves2020** (*name*, *url*)
Bases: colourpaletteextractor.model.algorithms.palettealgorithm.PaletteAlgorithm, abc.ABC
Abstract class representing an algorithm to extract the colour palette from an image.
Based on the algorithm proposed by Nieves et al. (2020); see *algorithm* for more information.

CUBE_SIZE = 20
Default delta-E* length of cube side (units).

C_STAR_PERCENTILE = 50
x-th percentile of C* (50%) for secondary relevancy requirements.

MIN_L_STAR = 80
Minimum L* value for secondary relevancy requirements (units).

SECONDARY_THRESHOLD = 0.00375
Minimum secondary pixel count (%) for secondary relevancy requirements.

THRESHOLD = 0.03
Minimum threshold colour in each cube (0.03 = 3%) for primary relevancy requirements.

generate_colour_palette (*image: numpy.array*) → tuple

Generate the colour palette and the recoloured image of the provided image.

Parameters **image** (*np.array*) – The image for which the colour palette is to be generated (in sRGB colour space).

Returns

- **(np.array)** – The recoloured image using only the colours in the colour palette.
- **(list[np.array])** – The list of colours ([R,G,B] triplets) in the image's colour palette.
- **(list[float])** – The relative frequencies of the colours in the recoloured image.

class colourpaletteextractor.model.algorithms.nieves2020.**Nieves2020CentredCubes**

Bases: colourpaletteextractor.model.algorithms.nieves2020.Nieves2020

Subclass of Nieves2020 with the cube coordinates corresponding to the centre of the cube.

As a result, there is only one cube that touches the origin in the CIELAB colour space (is in fact centred on the origin).

NAME = 'Nieves, Gomez-Robledo, Chen and Romero (2020) - Cube centred on CIELAB origin'

Name of the algorithm.

URL = 'https://doi.org/10.1364/AO.378659'

Link to more information about the algorithm.

class colourpaletteextractor.model.algorithms.nieves2020.**Nieves2020OffsetCubes**

Bases: colourpaletteextractor.model.algorithms.nieves2020.Nieves2020

Subclass of Nieves2020 with the cube coordinates corresponding to the cube's corner closest the origin.

As a result, there are eight cube that touch the origin in the CIELAB colour space.

NAME = 'Nieves, Gomez-Robledo, Chen and Romero (2020) - Cube corners at CIELAB origin'

Name of the algorithm.

URL = 'https://doi.org/10.1364/AO.378659'

Link to more information about the algorithm.

colourpaletteextractor.model.algorithms.nieves2020.**convert_lab_2_rgb** (*image: numpy.array*) → numpy.array

Convert an image from the CIELAB colour space to the sRGB colour space.

After conversion, the image is scaled to 8-bit per colour channel (24-bit image).

Illuminant = D65 (name of the illuminant) Observer = 2 (aperture angle of observer)

Parameters **image** (*np.array*) – The image in the CIELAB colour space.

Returns **(np.array)** – The image in the sRGB colour space.

colourpaletteextractor.model.algorithms.nieves2020.**convert_rgb_2_lab** (*image: numpy.array*) → numpy.array

Convert an image from the sRGB colour space to the CIELAB colour space.

The alpha channel of the image (RGBA) is removed if present.

Illuminant = D65 (name of the illuminant) Observer = 2 (aperture angle of observer)

Parameters **image** (*np.array*) – The image in the sRGB colour space.

Returns **(np.array)** – The image in the CIELAB colour space.

colourpaletteextractor.model.algorithms.nieves2020.**get_c_stars** (*lab: numpy.array*) → numpy.array

Get the matrix of C* (chroma) values for each pixel in the image.
C^{*} = \sqrt{{a^{*}}^{2} + {b^{*}}^{2}}

Parameters **lab** (*np.array*) – The image in the CIELAB colour space.

Returns **(np.array)** – Array of C* values corresponding to each pixel in the image.

colourpaletteextractor.model.algorithms.palettealgorithm module

class colourpaletteextractor.model.algorithms.palettealgorithm.**PaletteAlgorithm** (*name: str, url: str*)

Bases: abc.ABC

Abstract class representing an algorithm used to obtain a colour palette from an image.

Parameters
- **name** (*str*) – Name of the algorithm
- **url** (*str*) – Link to a description of the algorithm

property continue_thread: bool

Get the execution status of the algorithm.
A value of *false* would indicate that the algorithm should return without generation a colour palette when it next checks its execution status.

Returns bool – The execution status of the algorithm

abstract generate_colour_palette (*image: numpy.array*) → tuple

Generate the colour palette for the given image.
Analyses the given image to obtain its colour palette. Returns the recoloured image using only the colours found in the colour palette, the colour palette of the image and finally the relative frequencies of each of those colours in the recoloured image.

Parameters **image** (*np.array*) – A 3D array representing an image. It is assumed that the input image is

Returns
- **recoloured__image** (*np.array*) – The recoloured image using only the colours found in the colour palette
- **colour_palette** (*list*) – The list of colours (sRGB 8-bit values) in the colour palette
- **relative_frequencies** (*list*) – The relative frequencies of each colour in the colour palette in the recoloured image

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Note It is assumed that the input image has been encoded in the sRGB colour space.

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property name: str

Get the name of the algorithm.

Returns (str) – The name of the algorithm

set_progress_callback (*progress_callback: PySide2.QtCore.SignalInstance, tab: colourpaletteextractor.view.tabview.NewTab, image_data*) → None

Set the signal function called by the algorithm at regular intervals to update the GUI thread.

Parameters
- **progress_callback** (*QtCore.SignalInstance*) – Signal that when emitted, is used to update the GUI.
- **tab** (*NewTab*) – The tab associated with the image being analysed (see

generate_colour_palette().

- **image_data** (*ImageData*) – *ImageData* object that holds the image being analysed.

property url: str

Get the link to the description of the algorithm.

Returns (str) – The link to the description of the algorithm

colourpaletteextractor.model.algorithms.palettealgorithm.**get_implemented_algorithms**( )

Recursively finds all subclasses of the PaletteAlgorithm class.

Like Python's __class__.__subclasses__(), but recursive. Returns a list containing all subclasses of PaletteAlgorithm.

Adapted from: ref

Accessed: 15/07/2021

Returns:

[object]: List of all non-abstract subclasses of PaletteAlgorithm

Module contents

Submodules

colourpaletteextractor.model.generatereport module

class colourpaletteextractor.model.generatereport.**ColourPaletteReport**(*image_data: colourpaletteextractor.model.imagedata.ImageData*)

Bases: fpdf.fpdf.FPDF, fpdf.html.HTMLMixin

A modified FPDF object to fit the requirements for generating a PDF colour palette report.

Parameters **image_data** (*ImageData*) – The ImageData object holding the image's data (the original image, the recoloured image, and the colour palette).

A4_HEIGHT = 297

The height of an A4 sheet of paper (mm).

A4_WIDTH = 210

The width of an A4 sheet of paper (mm).

IMAGE_START_POSITION = 30

The standard left indentation when placing an image in the PDF report (mm).

IMAGE_WIDTH = 150

The standard width of images in the PDF report (mm).

MARGIN = 10

The size of the margins to be used in the PDF report (mm).

MAX_IMAGE_HEIGHT = 257

The standard maximum height of images in the report (mm).

footer( ) → None

Set the footer used in the PDF report.

header( ) → None

Set the header used in the PDF report.

class colourpaletteextractor.model.generatereport.**ReportGenerator** (*tab: colourpaletteextractor.view.tabview.NewTab*, *image_data: colourpaletteextractor.model.imagedata.ImageData*, *settings: PySide2.QtCore.QSettings*, *progress_callback: PySide2.QtCore.SignalInstance*)

Bases: object

Class used to create, populate a ColourPaletteReport object and save the resulting PDF to disk.

Parameters
- **tab** (*NewTab*) – The tab associated with the image to be analysed.
- **image_data** (*ImageData*) – The ImageData object holding the image's data (the original image, the recoloured image, and the colour palette).
- **settings** (*QSettings*) – The settings for the ColourPaletteExtraction application.
- **progress_callback** (*QtCore.SignalInstance*) – Signal that when emitted, is used to update the GUI.

create_report ( ) → Optional[colourpaletteextractor.model.generatereport.ColourPaletteReport]

Create a ColourPaletteReport object representing the PDF colour palette report.

Returns (Union[ColourPaletteReport, None]) – None if the ColourPaletteReport object was not properly generated, otherwise returns the populated ColourPaletteReport object.

save_report (*pdf: colourpaletteextractor.model.generatereport.ColourPaletteReport*) → None

save the ColourPaletteReport object representing the PDF colour palette report to disk.

Parameters **pdf** (*ColourPaletteReport*) – The ColourPaletteReport object to be saved as a PDF to disk..

colourpaletteextractor.model.generatereport.**generate_report** (*tab: colourpaletteextractor.view.tabview.NewTab*, *image_data: colourpaletteextractor.model.imagedata.ImageData*, *settings: PySide2.QtCore.QSettings*, *progress_callback: PySide2.QtCore.SignalInstance*) → None

Generate a colour palette report for an image.

Parameters
- **tab** (*NewTab*) – The tab associated with the image to be analysed.
- **image_data** (*ImageData*) – The ImageData object holding the image's data (the original image, the recoloured image, and the colour palette).
- **settings** (*QSettings*) – The settings for the ColourPaletteExtraction application.
- **progress_callback** (*QtCore.SignalInstance*) – Signal that when emitted, is used to update the GUI.

Raises **ValueError** – If the provided ImageData object does not have a recoloured image or has no colours in its colour palette.

colourpaletteextractor.model.imagedata module

class colourpaletteextractor.model.imagedata.**ImageData** (*file_name_and_path: str*)

Bases: object

Object to hold the data associated with an image to be analysed.

Stores the original image, its colour palette, the recoloured image, the relative frequency of each colour in the recoloured image, the algorithm used to generate the colour palette and the execution status of the thread used to generate the colour palette.

Parameters **file_name_and_path** (*str*) – Path to the image to be added.

Raises **ValueError** – If the file_name_and_path argument is None.

property `algorithm_used`: type
The algorithm used to generate the image's colour palette.

Returns (type[palettealgorithm.PaletteAlgorithm]) – The class name of the colour palette extraction algorithm.

property `colour_palette`: list
The list of colours in the image's colour palette.

Returns (list[np.array]) – The list of colours ([R,G,B] triplets) in the colour palette.

property `colour_palette_relative_frequency`: list
The relative frequencies of each colour in the colour palette in the recoloured image.
The order of the relative frequencies matches the order of the colours in the colour palette.

Returns (list[float]) – The list of relative frequencies of the colour palette.

property `continue_thread`: bool
Specify if the thread for generating the colour palette or the report should be cancelled.

Returns (bool) – True if the thread should be continued. Otherwise False.

property `extension`: str
The file extension of the original image.

Returns (str) – The file extension of the original image.

property `file_name_and_path`: str
The file path to the original image.

Returns (str) – File path to the original image.

static `get_image_as_q_image` (*image: numpy.array*) → PySide2.QtGui.QImage
Convert a Numpy array representation of an image to a QImage.

Parameters **`image`** (*`np.array`*) – An image represented by a Numpy array.

Returns **(QImage)** – The image converted to a QImage.

Raises **`ValueError`** – If the provided image is not a greyscale, rGB or RGBA image (1, 3, or 4 colour channels).

property `image`: numpy.array
The original image, represented as a 2 or 3-D Numpy array.

Returns (np.array) – The original image as a Numpy array.

property `name`: str
The name of the image, without its file extension.

Returns (str) – The image file name, without its extension.

property `recoloured_image`
The recoloured image, represented as a 3-D Numpy array.

Returns (np.array) – The recoloured image as a Numpy array.

`sort_colour_palette` (*reverse: bool = True*) → None
Sort the colour palette by their relative frequencies in the recoloured image.

Parameters **`reverse`** (*`bool`*) – If True, the colour palette is sorted from largest relative frequency to the smallest. If False, the order is smallest to largest. The default is True.

colourpaletteextractor.model.model module

class colourpaletteextractor.model.model.**ColourPaletteExtractorModel**

Bases: object

ColourPaletteExtractor Model.

Used as the model component of the ColourPaletteExtractor application.

DEFAULT_ALGORITHM

alias of colourpaletteextractor.model.algorithms.nieves2020.Nieves2020CentredCubes

DEFAULT_HEIGHT: int = 894

Default height of the ColourPaletteExtraction application.

Size chosen to show the Quick Start Guide image without the need of scrollbars.

DEFAULT_USER_DIRECTORY: str = 'C:/Users/timch/OneDrive/Documents/ColourPaletteExtractor/Output'

The default user output directory for colour palette reports.

DEFAULT_USE_USER_DIRECTORY: bool = False

Specify by default whether a user's output directory should be used for saving the colour palette report to.

DEFAULT_WIDTH: int = 1523

Default width of the ColourPaletteExtraction application.

Size chosen to show the Quick Start Guide image without the need of scrollbars.

SUPPORTED_IMAGE_TYPES: set = {'jpeg', 'jpg', 'png'}

The set of supported image extensions.

property active_thread_counter: int

The number of active threads still running as part of a batch operation.

Returns (int) – The number of active threads still running.

add_image (*file_name_and_path: str*) → tuple

Given the path to an image, create a new ImageData object and return it and its ID key.

Parameters **file_name_and_path** (*str*) – Path to the image.

Returns

- **(str)** – The dictionary key ('Tab_xx') for the new ImageData object in the image_data_id_dictionary.
- **(ImageData)** – The new ImageData object for holding information about the image (e.g., the colour palette, the recoloured image etc.)

Raises **KeyError** – If the generated dictionary key already exists in the model's dictionary of ImageData objects (image_data_id_dictionary).

change_output_directory (*use_user_dir: bool*, *new_user_directory: str*) → None

Change the output directory for colour palette reports in the ColourPaletteExtractor.ini settings file.

Parameters

- **use_user_dir** (*bool*) – True if the user-selected output directory is to be used. If False, use default temporary output directory.
- **new_user_directory** (*str*) – The path to the new user-selected output directory

close_temporary_directory ( ) → None

Delete the temporary output directory associated with the instance of the application.

generate_palette (*image_data_id: str*, *tab: Optional[colourpaletteextractor.view.tabview.NewTab] = None*, *progress_callback: Optional[PySide2.QtCore.SignalInstance] = None*, *algorithm: Optional[type] = None*) → None

Generate the colour palette for the image in the `ImageData` object with the given image_data_id ID.

The recoloured image, colour palette and relative frequencies of each colour are added to the `ImageData` object with the image_data_id dictionary key.

Parameters

- **image_data_id** (*str*) – The dictionary key/ID ('Tab_xx') for the `ImageData` object in the `image_data_id_dictionary` for which the colour palette of its associated image is to be generated for.
- **tab** (*NewTab*) – The `NewTab` linked to the image that is to have its colour palette generated.
- **progress_callback** (*QtCore.SignalInstance*) – Signal that when emitted, is used to update the GUI.
- **algorithm** (*type[PaletteAlgorithm]*) – The algorithm class to be used to generate the colur palette.

generate_report (*tab: colourpaletteextractor.view.tabview.NewTab*, *progress_callback: PySide2.QtCore.SignalInstance*) → None

Generate the colour palette report for the image linked to the given `NewTab`.

Parameters

- **tab** (*NewTab*) – The `NewTab` linked to the image that is to have its colour palette report generated.
- **progress_callback** (*QtCore.SignalInstance*) – Signal that when emitted, is used to update the GUI.

get_image_data (*image_data_id: str*) → colourpaletteextractor.model.imagedata.ImageData

Returns the `ImageData` object with the given ID/key in the `image_data_id_dictionary`.

Parameters **image_data_id** (*str*) – The dictionary key/ID ('Tab_xx') for the `ImageData` object in the `image_data_id_dictionary` that should be returned.

Returns **(ImageData)** – `ImageData` object with the given ID/key.

property image_data_id_dictionary: dict

The dictionary storing the `ImageData` objects for the images currently open.

Returns (dict) – dictionary storing the `ImageData` objects for the images currently open.

static read_view_settings ( ) → tuple

Get the size and shape of the main window of the GUI.

Returns

- **(Optional[QSize])** – The size of the main window. None if the appropriate setting cannot be found.
- **(Optional[QPoint])** – The position of the main window. None if the appropriate setting cannot be found.

remove_image_data (*image_data_id: str*) → None

Remove `ImageData` object from the dictionary of images (`image_data_id_dictionary`) by its key.

Parameters **image_data_id** (*str*) – The dictionary key ('Tab_xx') for the `ImageData` object in the `image_data_id_dictionary` that should be removed.

set_algorithm (*algorithm_class: type = <class 'colourpaletteextractor.model.algorithms.nieves2020.Nieves2020CentredCubes'>*) → None

Set the algorithm used to generate the colour palette of an image.
If no algorithm_class_name is provided, the DEFAULT_ALGORITHM is used.

Parameters **algorithm_class** (*type[PaletteAlgorithm]*) – The algorithm class.

write_default_settings ( ) → None

Write the default settings to the ColourPaletteExtractor.ini settings file.

static write_view_settings (*size: PySide2.QtCore.QSize, position: PySide2.QtCore.QPoint*) → None

Write the main window's size and shape to the settings file.

Parameters
- **size** (*QSize*) – The size of the GUI.
- **position** (*QPoint*) – The position of the GUI.

colourpaletteextractor.model.model.**generate_colour_palette_from_image** (*path_to_file: str, algorithm: Optional[type] = None*) → tuple

Generate the colour palette for the given images using the specified colour palette extraction algorithm.
An example algorithm would be nieves2020.Nieves2020CentredCubes

Parameters
- **path_to_file** (*str*) – Path to the image to be analysed.
- **algorithm** (*type[PaletteAlgorithm]*) – The Python class of the the colour palette extraction algorithm.

Returns
- **(np.ndarray)** – THe recoloured image using just the colours in the colour palette.
- **(list[np.ndarray])** – The list of colours ([R,G,B] triplets) in the colour palette.
- **(list[float])** – The relative frequencies of the colours in the colour palette in the recoloured image.

colourpaletteextractor.model.model.**get_settings** ( ) → PySide2.QtCore.QSettings

Get the settings file for the ColourPaletteExtraction application.

Returns (QSettings) – The settings for the ColourPaletteExtraction application.

Module contents

colourpaletteextractor.tests package

Subpackages

colourpaletteextractor.tests.helpers package

Submodules

colourpaletteextractor.tests.helpers.helperfunctions module

colourpaletteextractor.tests.helpers.helperfunctions.**get_image** (*path_to_image: str*)

Returns the image found at the given path.

Parameters **path_to_image** (*str*) – Path to the image to be imported.

Returns **(np.array)** – Image represented as a 3D array

Module contents

Submodules

colourpaletteextractor.tests.nieves2020_test module

colourpaletteextractor.tests.nieves2020_test.**test_closest_relevant_colour_used_to_recol**
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( )

colourpaletteextractor.tests.nieves2020_test.**test_nieves2020_centred_cubes_constructor**
( )

colourpaletteextractor.tests.nieves2020_test.**test_nieves2020_offset_cubes_constructor**
( )

colourpaletteextractor.tests.nieves2020_test.**test_primary_requirements_1** ( )

colourpaletteextractor.tests.nieves2020_test.**test_primary_requirements_2** ( )

colourpaletteextractor.tests.nieves2020_test.**test_primary_requirements_3** ( )

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colourpaletteextractor.tests.nieves2020_test.**test_two_colours_in_same_cube_can_meet_sec**
( )

Module contents

colourpaletteextractor.view package

Submodules

colourpaletteextractor.view.mainview module

class colourpaletteextractor.view.mainview.**MainView** (*size: Optional[PySide2.QtCore.QSize] = None*, *position: Optional[PySide2.QtCore.QPoint] = None*, *parent=None*)

Bases: PySide2.QtWidgets.QMainWindow

The main window of the ColourPaletteExtractor application.

Parameters

- **size** (*QSize*) – Size of the main window. Default is None.
- **position** (*QPoint*) – Position of the main window. Default is None.
- **parent** – Parent object of the MainWindow. Defaults to None.

tabs

tabbed widget for displaying and managing imported images.

Type QTabWidget

colour_palette_dock

Type tabview.ColourPaletteDock

_close_request_action
Action for closing the application

Type QAction

open_action
Action for opening a new image

Type QAction

generate_report_action
Action for generating a report for an image

Type QAction

generate_all_report_action
Action for generating a report for all images with a colour palette

Type QAction

generate_palette_action
Action for generating the colour palette for an image

Type QAction

generate_all_palette_action
Action for generating the colour palette for all images

Type QAction

stop_action
Action for stopping the report or colour palette being generated for an image

Type QAction

preferences_menu_action
Action for opening the preferences menu

Type QAction

show_help_action
Action for showing the quick start guide

Type QAction

toggle_recoloured_image_action
Action for toggling between the original and the recoloured image

Type QAction

zoom_in_action
Action for zooming into an image

Type QAction

zoom_out_action
Action for zooming out of an image

Type QAction

about_menu_action
Action for showing the about information widget

Type QAction

show_palette_dock_action
Action for showing the colour palette dock

Type QAction

show_toolbar_action
Action for showing the toolbar

Type QAction

tools
(QToolBar): Toolbar for holding QToolButtons used in the GUI

status
Status bar for holding hints, the progress bar and the current version of the application

Type otherviews.StatusBar

RESOURCES_DIR = 'resources'
The name of the directory containing the icons and images used for the GUI.

Type str

app_icon = 'app_icon'
The name of the file used as the application's icon.

Type str

closeEvent (*event: PySide2.QtGui.QCloseEvent*) → None
Intercept GUI close event to check if the user wishes to close the GUI.

Parameters **event** (*QtGui.QCloseEvent*) – Close event

close_current_tab (*tab_index: int*) → int
Close the tab with the given index.

Parameters **tab_index** (*int*) – The index of the tab to close

Returns **(int)** – The index of the tab that is now visible after closing the selected tab

create_new_tab (*image_id*, *image_data*) → None
Create a new image tab for the main window.

Parameters
- **image_id** (*str*) – ID of the image to be used for the new tab (e.g., 'Tab_1')
- **image_data** (*model.imagedata.ImageData*) – Object containing tab and image properties and state

default_new_tab_image = 'images:how-to-dark-mode.png'
The name of the file used as the default new tab (the quick start guide).

Type str

resources_path = 'C:\\Users\\timch\\PycharmProjects\\MSc-CS-Project---ColourPaletteExtractor\\colourpaletteextractor\\view\\resources'
The path to the resources used for the GUI.
This will vary depending on whether the code has been compiled into an application or is been run from the command line.

Type str

show_file_dialog_box (*supported_file_types: set*) → tuple
Show the dialog box for importing images.

Parameters **supported_file_types** (*set[str]*) – The supported file types (e.g., '.png')

Returns
- **list** (*str*) – The list of the absolute paths to the images to be loaded into the application
- **str** – The filter used when selecting the images to import

staticMetaObject = <PySide2.QtCore.QMetaObject object>

colourpaletteextractor.view.otherviews module

class colourpaletteextractor.view.otherviews.**AboutBox** (*parent=None*)
Bases: PySide2.QtWidgets.QMessageBox
Message box to show the basic information about the application.

Parameters **parent** – The parent object of the AboutBox. The default is None.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

class colourpaletteextractor.view.otherviews.**BatchGenerationProgressWidget**
Bases: PySide2.QtWidgets.QDialog
Custom dialog box shown when multiple colour palette or reports are being generated.
Shows the number of threads to be run and the number of threads completed. Is also has a simple animation attached to it so the user knows that the application has not frozen and is still processing their images.

label
Label used to show the number of threads to be run and the number completed.

Type QLabel

cancel_batch_button
The button used to notify the controller object that the user wishes to cancel the current batch processing.

Type QPushButton

set_cancel_text ( ) → None
Set the text shown to cancelling to let the user know that any incomplete threads are to be cancelled.

show_widget (*total_count: int, batch_type: str*) → None
Reset and show the widget.

Parameters
- **total_count** (*int*) – The total number of threads to be processed.
- **batch_type** (*str*) – The text clarifying what task is being carried out as a batch process.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

update_progress ( ) → None
Update the batch progress bar by increasing the number of completed threads by one.

class colourpaletteextractor.view.otherviews.**ElidedLabel** (*text='', width=40, parent=None*)
Bases: PySide2.QtWidgets.QLabel
Status bar message label that will become elided if there is not enough space to display the entire message.

Adapted from: ref1 and ref2

Accessed: 18/07/2021

Args:

text (str): The text to be shown in the label. The default is an empty string
width (int): The minimum width of the label. The default is 40.
parent: The parent object of the ElidedLabel. The default is None.

elided_text ( ) → str

Get the elided text shown by the label.

Returns (str) – The elided text

paintEvent (*event: PySide2.QtCore.QEvent.Type.Paint*) → None

Update the text shown by the label on receiving a paint event.

Parameters **event** (*QEvent.Type.Paint*) – A paint event

staticMetaObject = <PySide2.QtCore.QMetaObject object>

class colourpaletteextractor.view.otherviews.**ErrorBox** (*box_type: Optional[str] = None, parent=None*)

Bases: PySide2.QtWidgets.QMessageBox

Message box to show warnings and errors.

Parameters

- **box_type** (*str*) – The error box type. Used to customise the icon and main text show.
- **parent** – Parent object of the ErrorBox. Defaults to None.

header

The heading of the ErrorBox.

Type str

append_title (*error: Exception*) → None

Append the title with additional information from an exception.

Parameters **error** (*Exception*) – Exception whose error summary message is appended to the title text.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

class colourpaletteextractor.view.otherviews.**PreferencesWidget** (*parent=None*)

Bases: PySide2.QtWidgets.QDialog

The dialog box for setting a user's preferences.
Currently, the user can change the algorithm used to generate the colour palette, as well as the output directory for any reports that are generated.

Parameters **parent** – The parent object of the PreferencesWidget. The default is None.

browse_button

Button used to open the operating system's file explorer to select a valid output directory.

Type QPushButton

user_path_selector

Text window used to show the user's currently selected output directory.

Type QLineEdit

default_path_button

Button used to select the default output directory.

Type QRadioButton

user_path_button
Button used to select the user's output directory.

Type QRadioButton

output_tab
The output directory settings tab of the preferences dialog box.

Type QWidget

algorithm_tab
The algorithm settings tab of the preferences dialog box.

Type QWidget

get_algorithms_and_buttons ( ) → tuple
Get the list of algorithm classes and their associated buttons.

Returns
- **(list[palettealgorithm.PaletteAlgorithm])** – List of algorithm classes.
- **(list[QRadioButton]])** – List of buttons associated with the algorithm classes.

show_output_directory_dialog_box (*current_path: str*)
Show the dialog box for selecting output directory for reports.

Parameters **current_path** (*str*) – The path to open the system's file explorer to.

Returns **(str)** – Path to the new output directory.

show_preferences ( ) → None
Show the preferences widget.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

update_preferences ( ) → None
Update the preferences dialog box with the correct settings.

class colourpaletteextractor.view.otherviews.**StatusBar** (*parent=None*)
Bases: PySide2.QtWidgets.QStatusBar
The status bar at the bottom of the main window.
This holds the current shortcut tip for the given tab, as well as the progress bar for showing the current progress towards generating a report or the image's colour palette.

Parameters **parent** – Parent object of the StatusBar. Defaults to None.

_status_label
Primary status label.

Type ElidedLabel

_progress_bar
Progress bar used to track the progress of generating a colour palette or a report.

Type QProgressBar

_max_progress
Maximum value for the progress bar.

Type int

_min_progress
Minimum value for the progress bar.

Type int

set_status_bar (*state: int*) → None
Set the state of the status bar elements.
Depending on the state, the primary status label will change to reflect what the application is currently processing.

Parameters **state** (*int*) – The new state of the status bar.

Raises **ValueError** – If state is not a valid state.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

update_progress_bar (*n: float*) → None
Update the current level of progress for the status bar.

Parameters **n** (*float*) – New level of progress for the progress bar.

Raises **ValueError** – If the new progress value exceeds the predefined limits of the progress bar.

colourpaletteextractor.view.tabview module

class colourpaletteextractor.view.tabview.**ColourBox** (*parent=None*)
Bases: PySide2.QtWidgets.QLabel
Modified QLabel to hold an individual colour in the colour palette.

Parameters **parent** – The parent object of the ColourBox. The default is None.

enterEvent (*event: PySide2.QtCore.QEvent*) → None
Intercept an enter event.
In the future, this could be used to trigger the highlighting regions of the image that use this colour in the recoloured image.

Parameters **event** (*QEvent*) – Enter event.

leaveEvent (*event: PySide2.QtCore.QEvent*)
Intercept a leave event.
In the future, this could be used to cancel the highlighting of regions of the image that use this colour in the recoloured image.

Parameters **event** (*QEvent*) – Leave event.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

class colourpaletteextractor.view.tabview.**ColourPaletteDock** (*parent=None*)
Bases: PySide2.QtWidgets.QDockWidget
A modified QDockWidget to hold small images of each colour in an image's colour palette.

Parameters **parent** – Parent object of the ColourPaletteDock. Defaults to None.

add_colour_palette (*colour_palette: list*, *image_id: str*, *relative_frequencies: Optional[list] = None*) → None
Clear the colour palette dock and add a new image's colour palette to the dock.

Parameters
- **colour_palette** (*list[np.array]*) – List of colours in the colour palette.
- **image_id** (*str*) – The ID ('Tab_xx') associated with a tab and image.
- **relative_frequencies** (*list[float]*) – The relative frequencies of each colour in the colour palette in the recoloured image.

remove_colour_palette ( ) → None
Remove all of the ColourBox labels from the colour palette dock.
Adapted from: ref
Accessed: 27/07/2021

staticMetaObject = <PySide2.QtCore.QMetaObject object>

class colourpaletteextractor.view.tabview.**ImageDisplay** (*image_data: colourpaletteextractor.model.imagedata.ImageData*, *parent=None*)
Bases: PySide2.QtWidgets.QLabel
A modified QLabel to display and manipulate the current image.

Parameters
- **image_data** (*imagedata.ImageData*) – The ImageData object that hold the information associated with an image.
- **parent** – Parent object of the ImageDisplay. Defaults to None.

event (*event: PySide2.QtCore.QEvent*) → bool
Intercept the QLabel's event if it is a gesture to allow for zooming into and out of the current image.
Also calls the super class' event handler at the end.

Parameters **event** (*QEvent*) – An event.

Returns **(bool)** – The result from the super class' event handler.

image_zoom (*mouse_pos: PySide2.QtCore.QPoint*, *value: float*) → None
Zoom into or out of an image at the mouse pointer's current location.

Parameters
- **mouse_pos** (*QtCore.QPoint*) – Current position of the mouse cursor.
- **value** (*float*) – The degree of magnification of the image.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

update_image (*image: numpy.array*) → None
Update the image shown by the ImageDisplay.

Parameters **image** (*np.array*) – Numpy array representing an image.

zoom_factor = 1.25
The zoom-in factor used when the user zoom's into the image via the zoom-in button.

zoom_in (*zoom_factor: float = 1.25*) → None
Zoom into the current image.

Parameters **zoom_factor** (*float*) – The new magnification factor for the image.

zoom_out (*zoom_factor: float = 0.8*) → None
Zoom out of the current image.

Parameters **zoom_factor** (*float*) – The new magnification factor for the image.

zoom_out_factor = 0.8
The zoom-out factor used when the user zoom's out of the image via the zoom-out button.

class colourpaletteextractor.view.tabview.**NewTab** (*image_id: Optional[str] = None*, *image_data: Optional[colourpaletteextractor.model.imagedata.ImageData] = None*, *parent=None*)
Bases: PySide2.QtWidgets.QScrollArea
Modified QScrollArea to display and manipulate an image (via the ImageDisplay class).

Parameters
- **image_id** (*str*) – The ID ('Tab_xx') associated with a tab and image.

- **image_data** (*imagedata.ImageData*) – The ImageData object that hold the information associated with an image.
- **parent** – Parent object of the NewTab Defaults to None.

image_display
ImageDisplay used to show the QPixmap representation of the current image.

Type ImageDisplay

change_toggle_recoloured_image_pressed ( ) → None
Toggle the _toggle_recoloured_image_pressed attribute between true and false (its opposite).

property generate_palette_available: bool
The ability to generate the colour palette for the current NewTab object.

Returns (bool) – Returns true if the colour palette can be generated. Otherwise false.

property generate_report_available: bool
The ability to generate the colour palette report for the current NewTab object.

Returns (bool) – Returns true if the colour palette report can be generated. Otherwise false.

get_slider_positions ( ) → PySide2.QtCore.QPointF
Get the grip positions of the horizontal and vertical scrollbars.

Returns (QPointF) – The position of the grip for the horizontal and veritcal scrollbars.

property image_id: str
The image ID of the images and its data that is linked to the current NewTab object

Returns (str) – The ID ('Tab_xx') associated with a tab and image.

property progress_bar_value: float
The current level of progress shown by the status bar for the associated NewTab object.

Returns (float) – The current level of progress shown by thr status bar.

set_slider_positions (*x_position: float*, *y_position: float*) → None
Set the position of the horizontal and vertical scrollbar's grip.

Parameters
- **x_position** (*float*) – Position of the grip for the horizontal scrollbar.
- **y_position** (*float*) – Position of the grip for the vertical scrollbar.

staticMetaObject = <PySide2.QtCore.QMetaObject object>

property status_bar_state: int
The current status bar state, represented by an integer.
See the `otherviews.StatusBar.set_status_bar()` method for more information.

Returns (int) – The current status bar state.

property toggle_recoloured_image_available: bool
Stores the availability of the recoloured image (if it available to be displayed or not).

Returns (bool) – True if the recoloured image is available. Otherwise false.

property toggle_recoloured_image_pressed: bool
The status of the toggle button used to switch between the original image and the recoloured image.

Returns (bool) – True if the recoloured image is displayed by the GUI. Otherwise false.

wheelEvent (*event: PySide2.QtGui.QWheelEvent*) → None

Intercepts the super class' wheelEvent to allow zooming into and out of an image using the mousewheel.

Also calls the super class' wheelEvent handler at the end.

Parameters **event** (*QWheelEvent*) – Mousewheel event

property zoom_level: float

The degree of magnification for the currently displayed image.

Returns (float) – The degree of magnification for the current image.

Module contents

1.1.2 Module contents

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