Qcorr: A Digital Image Correlation Program implemented in QT4

1.0

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Chapter 1

Todo List

Class Qcorr

- Add Stereo functionality to obtain disparity maps

Chapter 2

Bug List

Class Qcorr

- Perhaps a few, but not noticed so far.

Chapter 3

Module Index

3.1 Modules

Here is a list of all modules:

Qcorr 11

Chapter 4

Class Index

4.1 Class Hierarchy

This inheritance list is sorted roughly, but not completely, alphabetically:

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ImgLabel 16
TargetImgLabel 23
Ui_CorrMethodClass 24
    Ui::CorrMethodClass 15
Ui_QcorrClass 25
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        Qcorr 18

Chapter 5

Class Index

5.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

CorrMethod 13
Ui::CorrMethodClass 15
ImgLabel 16
Qcorr (A Digital Image Correlation Program (Template Matcher) implemented in QT4) 18
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Chapter 6

Module Documentation

6.1 Qcorr

Classes

- class Qcorr

  A Digital Image Correlation Program (Template Matcher) implemented in QT4.

Chapter 7

Class Documentation

7.1 CorrMethod Class Reference

Public Member Functions

- **CorrMethod** (QWidget *parent=0)
- int getMethod ()

  Retrieve the selected method to be used in the correlation process.

Private Slots

- void **cancelMethod** ()
- void **chooseMethod** ()

Private Attributes

- int **m_nChosenMethod**
- Ui::CorrMethodClass **ui**

7.1.1 Detailed Description

Definition at line 7 of file corrmethod.h.

7.1.2 Member Function Documentation

7.1.2.1 int CorrMethod::getMethod ()

Retrieve the selected method to be used in the correlation process.

Returns:

selected correlation method (from global enumeration defined in globals.h)

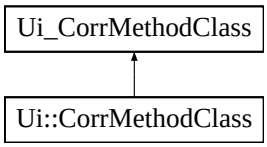
Definition at line 24 of file corrmethod.cpp.

The documentation for this class was generated from the following files:

- src/corrmethod.h
- src/corrmethod.cpp

7.2 Ui::CorrMethodClass Class Reference

Inheritance diagram for Ui::CorrMethodClass::



7.2.1 Detailed Description

Definition at line 132 of file ui_corrmethod.h.

The documentation for this class was generated from the following file:

- ui_corrmethod.h

7.3 ImgLabel Class Reference

Public Member Functions

- **ImgLabel** (Qcorr *parentWindow, QWidget *parent=0)

Protected Member Functions

- void **mousePressEvent** (QMouseEvent *event)
- void **mouseMoveEvent** (QMouseEvent *event)
- void **mouseReleaseEvent** (QMouseEvent *event)

Private Member Functions

- void **setTemplateFlags** (bool status)
- void **checkTemplateRegions** (int mouseX, int mouseY)
- void **displayCoordinatesOnStatusLabel** (QPoint &point0, QPoint &point1)

Private Attributes

- Qcorr * **m_parentWindow**
- QRubberBand * **m_rubberBand**
- QPoint **m_originPoint**
- QPoint **m_finalPoint**
- QPoint **m_currentPressedPoint**
- QPoint **m_labelUpperLeftCornerPoint**
- QPoint **m_labelLowerRightCornerPoint**
- QPoint **m_mousePosPoint1**
- QPoint **m_mousePosPoint2**
- bool **m_bMouseIsPressed**
- bool **m_bStartedTemplateSelection**
- bool **m_bMouseInTemplateRegion**
- bool **m_bMouseAtTemplateTopEdge**
- bool **m_bMouseAtTemplateBottomEdge**
- bool **m_bMouseAtTemplateLeftEdge**
- bool **m_bMouseAtTemplateRightEdge**
- int **m_nXNewPos**
- int **m_nYNewPos**

Friends

- class Qcorr

7.3.1 Detailed Description

Definition at line 19 of file imgLabel.h.

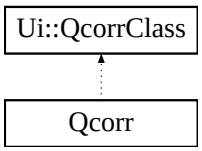
The documentation for this class was generated from the following files:

- src/imgLabel.h
- src/imgLabel.cpp

7.4 Qcorr Class Reference

A Digital Image Correlation Program (Template Matcher) implemented in QT4.

`#include <src/qcorr.h>`Inheritance diagram for Qcorr::



Public Member Functions

- **Qcorr** (QWidget *parent=0)

Private Slots

- void **browseLeftImage** ()
- void **browseRightImage** ()
- void **viewCorrMap** ()
- void **correlate** ()

Private Member Functions

- void **displayImage** (QImage *image, QLabel *label)
- void **displayImageLabel** (QImage *image, ImgLabel *label)
- void **createActions** ()
- void **setImageLabels** ()
- float findCorrelation (const unsigned char *imgTarget, const int nWI, const int nHI, const int nDepthI, const unsigned char *imgTemplate, const int nWT, const int nHT, const int nDepthT, int &rnDx, int &rnDy, int nMethod, bool bMultires)

  Cross-correlation of target image with template image.

- float * convertToGrayScaleFloat (const unsigned char *pchImgOriginalBits, int nSize, int nDepth)

  Cast images to an 8-bit gray-scale channel of type float.

- bool **fileDumpQImage** (const QString &fileName)

Private Attributes

- int **m_nXoffset**
- int **m_nYoffset**
- CorrMethod * **m_corrMethodDialog**
- QString **initialName**
- QImage * **m_leftImage**
- QImage * **m_rightImage**
- QImage * **m_templateImage**
- QImage * **m_corrMapImage**

- ImgLabel * **m_leftImage_label**
- TargetImgLabel * **m_targetImage_label**
- QLabel * **m_status_label**
- QPoint m_matchingPoint

  upper-left corner point where the correlation match was found

- QSize **m_templateSize**

Friends

- class ImgLabel

7.4.1 Detailed Description

A Digital Image Correlation Program (Template Matcher) implemented in QT4. This class combines all other sub-classed QWidgets implemented throughout the program. The main correlation (template matching) functionality is implemented in this class through the procedure convertToGrayScaleFloat()

Note:

Correlation is performed on gray-scale (1 channel image) that are computed in this procedure through the convertToGrayScaleFloat() function.

Compile-time dependencies

- The QT4 Framework

Bug

- Perhaps a few, but not noticed so far.

Todo

- Add Stereo functionality to obtain disparity maps

Author:

Carlos Jaramillo
Joel Gonzalez

Definition at line 48 of file qcorr.h.

7.4.2 Member Function Documentation

7.4.2.1 float * Qcorr::convertToGrayScaleFloat (const unsigned char * *pchImgOriginalBits*, int *nSize*, int *nDepth*) [private]

Cast images to an 8-bit gray-scale channel of type float.

Parameters:

pchImgOriginalBits Buffer of unsigned characters as the source image

nSize Number of pixels in the source image

nDepth Pixel depth of the source image

Returns:

the correlation number computed by method (directly). Additionally, the (dx,dy) offset of the template for which there exists a best match.

Definition at line 876 of file qcorr.cpp.

Referenced by findCorrelation().

7.4.2.2 float Qcorr::findCorrelation (const unsigned char * *imgTarget*, const int *nWI*, const int *nHI*, const int *nDepthI*, const unsigned char * *imgTemplate*, const int *nWT*, const int *nHT*, const int *nDepthT*, int & *rnDx*, int & *rnDy*, int *nMethod*, bool *bMultires*) [private]

Cross-correlation of target image with template image.

Note:

Correlation is performed on gray-scale (1 channel image) that are computed in this procedure through the convertToGrayScaleFloat() function.

Parameters:

imgTarget Buffer of unsigned characters containing the target image where correlation match is to be found

nWI Width of target image

nHI Height of target image

nDepthI Pixel depth of target image

imgTemplate Buffer of unsigned characters containing the template image

nWT Width of target image

nHT Height of target image

nDepthT Pixel depth of target image

rnDx X position where the highest level of correlation match is found (top-left corner of the match)

rnDy Y position where the highest level of correlation match is found (top-left corner of the match)

method Determines the selected method to be used in the correlation process. The method is a globally defined enumeration. The available methods are:

- CROSS_CORR (cross correlation):

$$C(u,v) = \frac{\sum \{T(x,y) * I(x-u, y-v)\}}{\sqrt{\sum I(x-u, y-v)^2}}$$

- SUM_SQ_DIFF (sum of squared differences):

$$C(u,v) = \frac{\sum \{T(x,y) - I(x-u, y-v)\}^2}{\sqrt{\sum I(x-u, y-v)^2}}$$

- CORR_COEFF (correlation coefficient):

$$C(u,v) = \frac{\sum \{(T(x,y) - T_{avg}) * (I(x-u, y-v) - I_{avg})\}}{\sqrt{\sum (T(x,y) - T_{avg})^2 * \sum (I(x-u, y-v) - I_{avg})^2}}$$

multires Determines if multiresolution correlation should be applied, by making use of image pyramids. With multiresoltion, the correlation can be determined faster than direct correlation.

Returns:

a float array resulting from the conversion of the source image into an 8-bit gray-scale image.

Definition at line 262 of file qcorr.cpp.

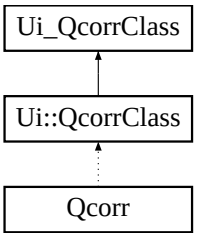
References convertToGrayScaleFloat().

The documentation for this class was generated from the following files:

- src/qcorr.h
- src/qcorr.cpp

7.5 Ui::QcorrClass Class Reference

Inheritance diagram for Ui::QcorrClass::



7.5.1 Detailed Description

Definition at line 260 of file ui_qcorr.h.

The documentation for this class was generated from the following file:

- ui_qcorr.h

7.6 TargetImgLabel Class Reference

Public Member Functions

- **TargetImgLabel** (QWidget ∗parent=0)
- void **setImage** (const QImage &labelImage)
- void **overlayImage** (const QImage &otherImage)
- void **drawEnclosedMatch** (const QPoint originPoint, const QSize rectSize)
- void **eraseEnclosedMatch** ()

Protected Member Functions

- void **paintEvent** (QPaintEvent ∗)

Private Attributes

- QImage ∗ **m_image**
- QImage ∗ **m_overlayImage**
- QPoint **m_originPoint**
- QSize **m_rectSize**
- bool **m_bHasCorrResults**
- bool **m_bHasImage**
- bool **m_bHasOverlayImage**

7.6.1 Detailed Description

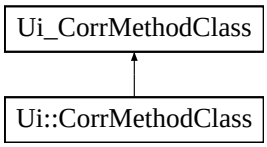
Definition at line 17 of file targetImgLabel.h.

The documentation for this class was generated from the following files:

- src/targetImgLabel.h
- src/targetImgLabel.cpp

7.7 Ui_CorrMethodClass Class Reference

Inheritance diagram for Ui_CorrMethodClass::



Public Member Functions

- void **setupUi** (QDialog ∗CorrMethodClass)
- void **retranslateUi** (QDialog ∗CorrMethodClass)

Public Attributes

- QFrame ∗ **dialog_Frame**
- QVBoxLayout ∗ **verticalLayout**
- QLabel ∗ **selectMethod_label**
- QGroupBox ∗ **methods_groupBox**
- QRadioButton ∗ **method3_radioButton**
- QRadioButton ∗ **method2_radioButton**
- QRadioButton ∗ **method1_radioButton**
- QDialogButtonBox ∗ **buttonBox**
- QSpacerItem ∗ **verticalSpacer**

7.7.1 Detailed Description

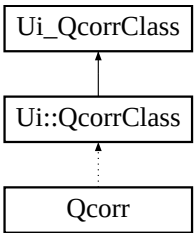
Definition at line 29 of file ui_corrmethod.h.

The documentation for this class was generated from the following file:

- ui_corrmethod.h

7.8 Ui_QcorrClass Class Reference

Inheritance diagram for Ui_QcorrClass::



Public Member Functions

- void **setupUi** (QMainWindow ∗QcorrClass)
- void **retranslateUi** (QMainWindow ∗QcorrClass)

Public Attributes

- QAction ∗ **action_Quit**
- QAction ∗ **action_Correlation_Map**
- QWidget ∗ **centralwidget**
- QFrame ∗ **main_frame**
- QVBoxLayout ∗ **main_verticalLayout**
- QSplitter ∗ **splitter**
- QWidget ∗ **layoutWidget**
- QVBoxLayout ∗ **left_verticalLayout**
- QHBoxLayout ∗ **leftImg_horizontalLayout**
- QLineEdit ∗ **leftImage_lineEdit**
- QPushButton ∗ **leftBrowse_pushButton**
- QScrollArea ∗ **leftImage_scrollArea**
- QWidget ∗ **scrollAreaWidgetContents_3**
- QWidget ∗ **layoutWidget1**
- QVBoxLayout ∗ **right_verticalLayout**
- QHBoxLayout ∗ **rightImg_horizontalLayout**
- QLineEdit ∗ **rightImage_lineEdit**
- QPushButton ∗ **rightBrowse_pushButton**
- QScrollArea ∗ **rightImage_scrollArea**
- QWidget ∗ **scrollAreaWidgetContents_2**
- QHBoxLayout ∗ **bottom_horizontalLayout**
- QPushButton ∗ **corr_pushButton**
- QLabel ∗ **corrResults_label**
- QSpacerItem ∗ **horizontalSpacer**
- QPushButton ∗ **quit_pushButton**
- QMenuBar ∗ **menubar**
- QMenu ∗ **menu_Menu**
- QMenu ∗ **menu_View**
- QStatusBar ∗ **statusbar**

7.8.1 Detailed Description

Definition at line 35 of file ui_qcorr.h.

The documentation for this class was generated from the following file:

- ui_qcorr.h

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