Person Attributes Classification

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Main Page

Note

This library will load data files located in the directory located at `../share/cva/PersonAttributes↩Classification/assets` relative to it. For correct operation, if the library is copied outside of the installation directory, the `assets` directory must be copied alongside it.

Chapter 2

Namespace Index

2.1 Namespace List

Here is a list of all namespaces with brief descriptions:

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3.1 Class List

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Namespace Documentation

5.1 cva Namespace Reference

Namespaces

- pac

5.2 cva::pac Namespace Reference

Classes

- class PersonAttributesClassifier

  A classifier that can estimate, for an image depicting a person, whether that person has certain attributes.

Functions

- CVA_AC_SHARED_LIBRARY_IMPORT ac::Version version ()

  Returns the version number of the library.

5.2.1 Function Documentation

5.2.1.1 CVA_AC_SHARED_LIBRARY_IMPORT ac::Version cva::pac::version ( )

Returns the version number of the library.

Chapter 6

Class Documentation

6.1 cva::pac::PersonAttributesClassifier Class Reference

A classifier that can estimate, for an image depicting a person, whether that person has certain attributes.

`#include <pac.hpp>`

Public Types

- enum { MAX_IMAGE_WIDTH = 4096, MAX_IMAGE_HEIGHT = 4096 }

Public Member Functions

- virtual ~PersonAttributesClassifier ()=default

  Virtual destructor.
- virtual void classify (ac::Span< const ac::ConstImageView > images, ac::Span< const ac::Span< int >> attrs_predictions)=0

  Classify `images`, filling `attrs_predictions`.

Static Public Member Functions

- static CVA_AC_SHARED_LIBRARY_IMPORT std::size_t numAttributes ()

  Returns the number of attributes the classifier knows.
- static CVA_AC_SHARED_LIBRARY_IMPORT const char * attributeDescription (std::size_t attr_index)

  Returns a text description for person attribute with index `class_index`.
- static CVA_AC_SHARED_LIBRARY_IMPORT std::unique_ptr< PersonAttributesClassifier > createCpu (std::size_t batch_size=1)

  Returns a pointer to a new object implementing PersonAttributesClassifier that uses the CPU for computations.
- static CVA_AC_SHARED_LIBRARY_IMPORT std::unique_ptr< PersonAttributesClassifier > createGpu (ac::Precision precision=ac::Precision::FP32, std::size_t batch_size=1)

  Returns a pointer to a new object implementing PersonAttributesClassifier that uses the GPU for computations.

6.1.1 Detailed Description

A classifier that can estimate, for an image depicting a person, whether that person has certain attributes.

The supported attributes are:

- `is_male`
- `has_hat`
- `has_longsleeves`
- `has_longpants`
- `has_longhair`
- `has_coat_jacket`

6.1.2 Member Enumeration Documentation

6.1.2.1 anonymous enum

Enumerator

MAX_IMAGE_WIDTH The maximal supported image width.

MAX_IMAGE_HEIGHT The maximal supported image height.

6.1.3 Constructor & Destructor Documentation

6.1.3.1 virtual cva::pac::PersonAttributesClassifier::~PersonAttributesClassifier ( ) [virtual], [default]

Virtual destructor.

6.1.4 Member Function Documentation

6.1.4.1 static CVA_AC_SHARED_LIBRARY_IMPORT const char* cva::pac::PersonAttributesClassifier::attributeDescription (std::size_t *attr_index*) [static]

Returns a text description for person attribute with index `class_index`.

Precondition

`attr_index` < numAttributes()

The return value is a pointer to a NUL-terminated non-empty string of printable ASCII characters. The string will remain valid for the entire lifetime of the library and must not be freed.

Examples:

main.cpp.

6.1.4.2 virtual void cva::pac::PersonAttributesClassifier::classify (ac::Span< const ac::ConstImageView > *images*, ac::Span< const ac::Span< int >> *attrs_predictions*) [pure virtual]

Classify `images`, filling `attrs_predictions`.

Precondition

`images.size() == attrs_predictions.size()`
For every `b`, `images[b].format()` is ImageFormat::RGB_8 or ImageFormat::BGR_8
For every `b`, `images[b].width()` <= MAX_IMAGE_WIDTH
For every `b`, `images[b].height()` <= MAX_IMAGE_HEIGHT
For every `b`, `attrs_predictions[b].size()` == numAttributes()

Postcondition

For every `b` and `i`, `attrs_predictions[b][i]` is 1 if the the person `images[b]` depicts is estimated to have the attribute with index `i`, and 0 otherwise.

6.1.4.3 static CVA_AC_SHARED_LIBRARY_IMPORT std::unique_ptr<PersonAttributesClassifier> cva::pac::PersonAttributesClassifier::createCpu (std::size_t *batch_size* = 1) [static]

Returns a pointer to a new object implementing PersonAttributesClassifier that uses the CPU for computations.

`batch_size` is the maximum number of images that classify() will be able to handle at once. If size of input for classify() is bigger then `batch_size`, there will be more than one inference call. Increasing this parameter will also increase the amount of memory used by the object.

Examples:

main.cpp.

6.1.4.4 static CVA_AC_SHARED_LIBRARY_IMPORT std::unique_ptr<PersonAttributesClassifier> cva::pac::PersonAttributesClassifier::createGpu (ac::Precision *precision* = `ac::Precision::FP32`, std::size_t *batch_size* = 1) [static]

Returns a pointer to a new object implementing PersonAttributesClassifier that uses the GPU for computations.

`precision` specifies precision of the model.

`batch_size` is the maximum number of images that classify() will be able to handle at once. If size of input for classify() is bigger then `batch_size`, there will be more than one inference call. Increasing this parameter will also increase the amount of memory used by the object.

Examples:

main.cpp.

6.1.4.5 static CVA_AC_SHARED_LIBRARY_IMPORT std::size_t cva::pac::PersonAttributesClassifier::numAttributes ( ) [static]

Returns the number of attributes the classifier knows.

Examples:

main.cpp.

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

- pac.hpp

Chapter 7

File Documentation

7.1 example.dox File Reference

7.2 mainpage.dox File Reference

7.3 pac.hpp File Reference

```
#include <cva/ac/api.hpp>
#include <cva/ac/image_view.hpp>
#include <cva/ac/span.hpp>
#include <cva/ac/precision.hpp>
#include <cstdint>
#include <cstdlib>
#include <memory>
```

Classes

- class cva::pac::PersonAttributesClassifier

  A classifier that can estimate, for an image depicting a person, whether that person has certain attributes.

Namespaces

- cva
- cva::pac

Macros

- #define CVA_PAC_EXPORT CVA_AC_SHARED_LIBRARY_IMPORT

Functions

- CVA_AC_SHARED_LIBRARY_IMPORT ac::Version cva::pac::version ()

  Returns the version number of the library.

7.3.1 Macro Definition Documentation

7.3.1.1 #define CVA_PAC_EXPORT CVA_AC_SHARED_LIBRARY_IMPORT

Chapter 8

Example Documentation

8.1 main.cpp

```
/*
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    and your use of them is governed by the express license under which they
    were provided to you (Intel Simplified Software License (Version April 2018))
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    This software and the related documents are provided as is, with no
    express or implied warranties, other than those that are expressly
    stated in the License.
*/

/*
    This example program classifies an image supplied by the user and prints
    the predicted atttributes.
*/

#include <cva/pac/pac.hpp>

#include <cva/ac/ocv/image_view.hpp>

#include <opencv2/core.hpp>
#include <opencv2/imgcodecs.hpp>
#include <opencv2/imgproc.hpp>

#include <algorithm>
#include <cstdlib>
#include <exception>
#include <iomanip>
#include <iostream>
#include <numeric>
#include <utility>
#include <vector>

namespace ac = cva::ac;

int main(int argc, char *argv[])
try
{
    // Parse the command line arguments using OpenCV.

    cv::CommandLineParser parser(argc, argv,
        "{ help h |        | print this message }"
        "{ @image | <none> | image to classify }"
        "{ impl   |  CPU   | classifier implementation to use. Possible values are CPU, GPUFP32, GPUFP16 }"
      );

    if (!parser.check())
    {
        parser.printErrors();
        return EXIT_FAILURE;
    }
```

```
    if (parser.has("help"))
    {
        parser.printMessage();
        return EXIT_SUCCESS;
    }

    if (!parser.has("@image"))
    {
        std::cerr << argv[0] << ": image parameter missing\n";
        return EXIT_FAILURE;
    }

    auto image_path = parser.get<cv::String>("@image");

    auto impl = parser.get<cv::String>("impl");
    if (impl != "CPU" && impl != "GPUFP32" && impl != "GPUFP16")
    {
        std::cerr << argv[0] << ": --impl must be either \"CPU\", \"GPUFP32\" or \"GPUFP16\"\n";
        return EXIT_FAILURE;
    }

    // Read the input image and verify it was correctly loaded and its dimensions
    // are suitable for the classifier.

    cv::Mat image = cv::imread(image_path);
    if (!image.data)
    {
        std::cerr << argv[0] << ": couldn't load image \"" << image_path << "\"\n";
        return EXIT_FAILURE;
    }

    if (image.cols > cva::pac::PersonAttributesClassifier::MAX_IMAGE_WIDTH
       ||
            image.rows > cva::pac::PersonAttributesClassifier::MAX_IMAGE_HEIGHT
      )
    {
        std::cerr << argv[0] << ": image size (" << image.cols << "x" << image.rows << ") "
            << "is greater than what the classifier supports (<= " <<
      cva::pac::PersonAttributesClassifier::MAX_IMAGE_WIDTH
            << "x" << cva::pac::PersonAttributesClassifier::MAX_IMAGE_HEIGHT
       << ")\n";
        return EXIT_FAILURE;
    }



    // Allocate space for the probabilities.

    std::vector<int> attr_preds(
      cva::pac::PersonAttributesClassifier::numAttributes());

    ac::ConstImageView image_view = ac::ocv::toImageView(ac::ImageFormat::BGR_8, image);
    ac::Span<int> attr_pred_span = ac::toSpan(attr_preds);

    // Create the classifier and perform the classification. Note that OpenCV
    // loads images in the BGR format.

    auto classifier = impl == "CPU" ?
      cva::pac::PersonAttributesClassifier::createCpu()
            : impl == "GPUFP32"
            ? cva::pac::PersonAttributesClassifier::createGpu
      (ac::Precision::FP32)
            : cva::pac::PersonAttributesClassifier::createGpu
      (ac::Precision::FP16);

    classifier->classify({&image_view, 1}, {&attr_pred_span, 1});

    // Print the predictions and the descriptions of the corresponding attributes.

    std::cout << std::fixed << std::setprecision(2);

    for (std::size_t i = 0; i <
      cva::pac::PersonAttributesClassifier::numAttributes(); +
      +i)
    {
        std::cout << std::setw(5) << attr_preds[i]
                  << " - " <<
      cva::pac::PersonAttributesClassifier::attributeDescription
      (i) << '\n';
    }

    return EXIT_SUCCESS;
}
catch (std::exception &e)
{
    std::cerr << argv[0] << ": " << e.what() << "\n";
```

```
    return EXIT_FAILURE;
}
catch (...)
{
    std::cerr << argv[0] << ": " << "unidentified error\n";
    return EXIT_FAILURE;
}
```