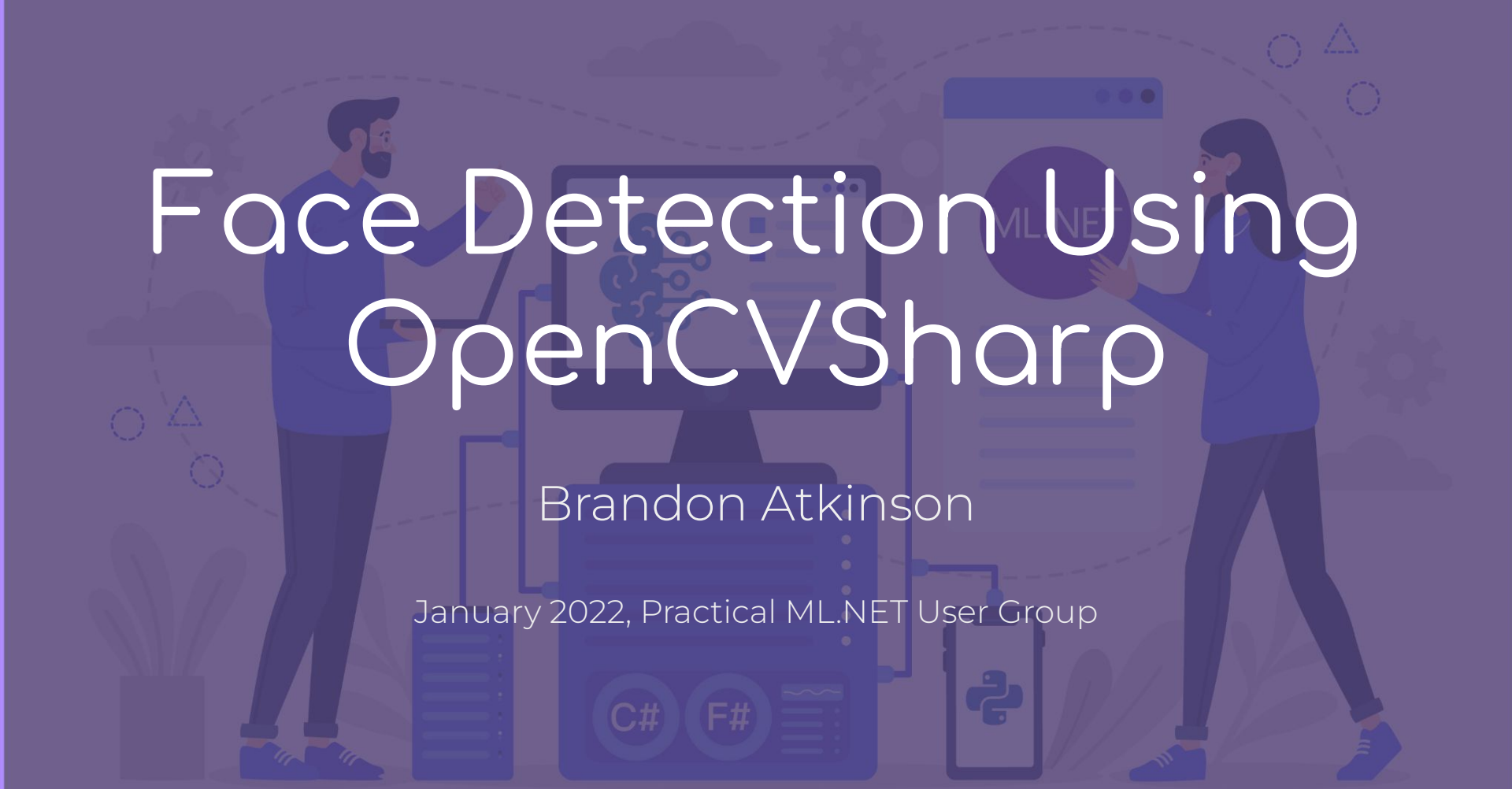
Face Detection Using OpenCVSharp



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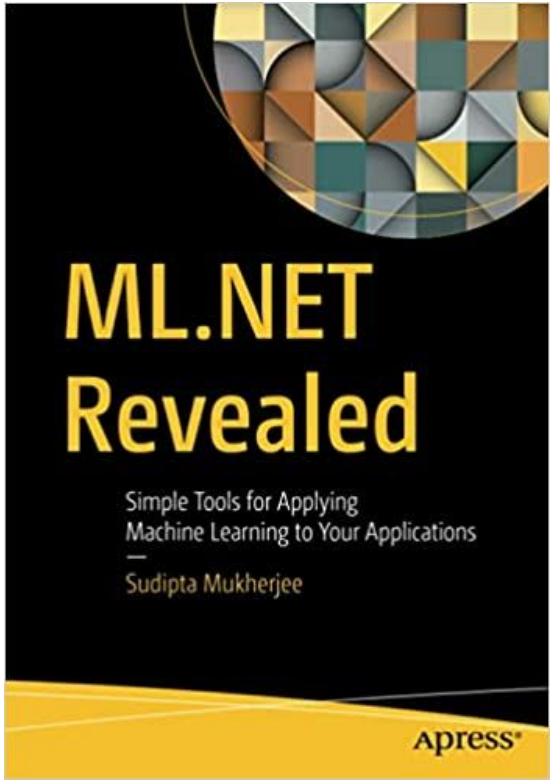

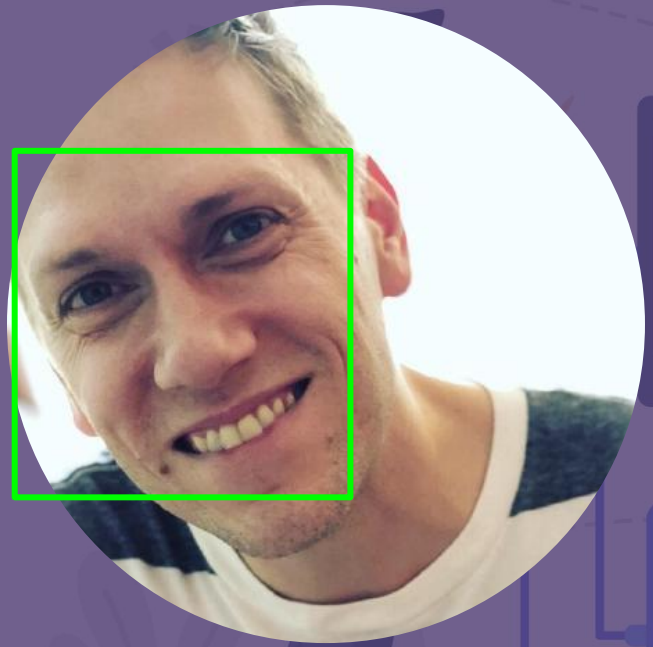

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Accomplished technology leader with over 15 years of industry experience encompassing analysis, design, development, and implementation of enterprise-level solutions. My passion is building successful teams and people as well as enterprise architecture that can transform businesses and alleviate pain points.

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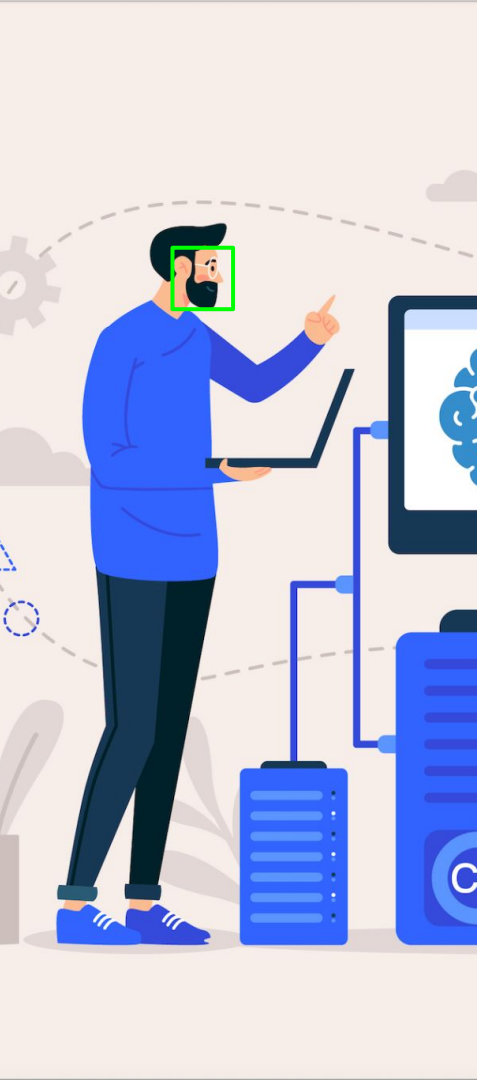


Topics

- What is OpenCVSharp
- Demos:
  - Performing face detection on an image
  - Performing face detection on a webcam stream
  - Placing text on the screen
  - Placing artifacts on the screen
- Closing Thoughts
- QA

What is OpenCVSharp?

What is OpenCVSharp?

- OpenCV is an open source computer vision and machine learning software library.
  - Image manipulation: resize, flip, rotations, etc.
  - OCR.
  - Barcode readers.
  - Train a face recognition model.
- Originally developed by IBM with an initial release in June of 2000 (20+ years old).
- OpenCVSharp is a wrapper for .NET, since 2013, 72 releases.
- Maintained by a user named ‘shimat’ with 58 contributors.
- OpenCvSharp is modeled on the native OpenCV C/C++ API style as much as possible.

Python vs. C#

Python

- cascade = cv2.CascadeClassifier("face.xml")
- image = cv2.imread("face.jpg")
- cv2.imshow('Window', image)
- cv2.waitKey(0)
- faces = cascade.detectMultiScale(gray, 1.3, 5)

C#

- var cascade = new CascadeClassifier(@"face.xml");
- var srcImage = new Mat("face.jpg");
- Cv2.ImShow("Window", image);
- int key = Cv2.WaitKey(0);
- var faces = cascade.DetectMultiScale(

```
        image: grayImage,
        minNeighbors: 2,
        minSize: new Size(30, 30)
    );
```

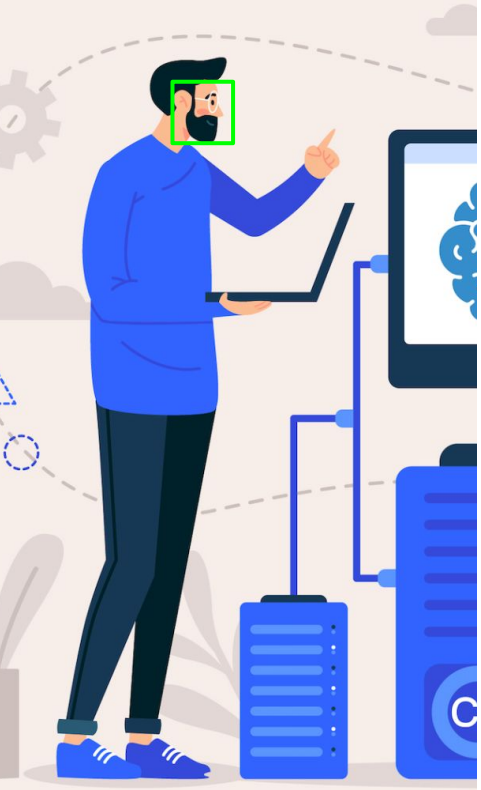
OpenCVSharp flavors

Managed libraries

Package	Description	Link
OpenCvSharp4	OpenCvSharp core libraries	nuget package 4.5.5.20211231
OpenCvSharp4.Extensions	GDI+ Extensions	nuget package 4.5.5.20211231
OpenCvSharp4.WpfExtensions	WPF Extensions	nuget package 4.5.5.20211231
OpenCvSharp4.Windows	All-in-one package for Windows (except UWP)	nuget package 4.5.5.20211231

Native bindings

Package	Description	Link
OpenCvSharp4.runtime.win	Native bindings for Windows x64/x86 (except UWP)	nuget package 4.5.5.20211231
OpenCvSharp4.runtime.uwp	Native bindings for UWP (Universal Windows Platform) x64/x86/ARM	nuget package 4.5.5.20211231
OpenCvSharp4.runtime.ubuntu.18.04-x64	Native bindings for Ubuntu 18.04 x64	nuget package 4.5.5.20211231
OpenCvSharp4.runtime.osx.10.15-x64	Native bindings for macOS 10.15 x64	nuget package 4.5.5.20211231
OpenCvSharp4.runtime.linux-arm	Native bindings for Linux Arm	nuget package 4.5.5.20211231
OpenCvSharp4.runtime.wasm	Native bindings for WebAssembly	nuget package 4.5.5.20211231



Demo

Closing Thoughts

Pros and cons of OpenCVSharp

Pros

- Easy to use wrapper for .NET
- Fairly easy to take examples from other languages
- Fast implementation
- Can use with .NET Interactive

Cons

- Not as heavily used as other versions
- Not a ton of examples online
- Long term support?

Q&A

References

- **OpenCVSharp** - https://github.com/shimat/opencvsharp
- **OpenCVSharp Sponsor (please sponsor!!)** - https://github.com/sponsors/shimat
- **Haar Cascades, Explained** - https://medium.com/analytics-vidhya/haar-cascades-explained-38210e57970d
- **OpenCV Bitwise AND, OR, XOR, and NOT** - https://www.pyimagesearch.com/2021/01/19/opencv-bitwise-and-or-xor-and-not/
- **Image Overlays in OpenCV (Python Example)** - https://rajathithanrajasekar.medium.com/opencv-series-8-virtual-makeup-augment-sunglasses-on-eyes-74147d85ff76
- **GitHub Repo** - https://github.com/atkinsonbg/face-detection-using-opencvsharp