Vision App

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Problem Statement : Open Innovation

Outline

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- ★ Technology Stack
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Problem Statement and Motivation

1. The barrier to entry in the field of image processing is very high. One should know Mathematics, Python, OpenCV, virtual environments, pip and 10 different libraries to master computer vision. In short, for a non engineer, it is practically very hard or infeasible.
2. A problem that comes with researchers **is replication of 100's of lines of code** to get the correct filter they want. If you are a researcher who is looking to isolate number plate from image, you need to know Canny Edge detection and 5
3. The **problem with children** is no familiarity with mathematics and python (advanced). Vision app makes impossible possible
4. **Problem with developers** is that they have to know the entire opencv framework and parameters that come along.
5. **Multi platform dependencies** resolution is very time consuming and expensive hence developers shy away from computer vision.

Solution Proposed

To overcome the problems discussed, we focused on creating Vision app.

Researchers can apply image processing filters with 0 lines of code. The GUI interface provides easy loading of images in one click. One click application of filters and research papers enables saving of several hours of code.

Students can learn image processing with 0 lines of code. No need to copy and paste code, one can learn algorithms and try out various modules.

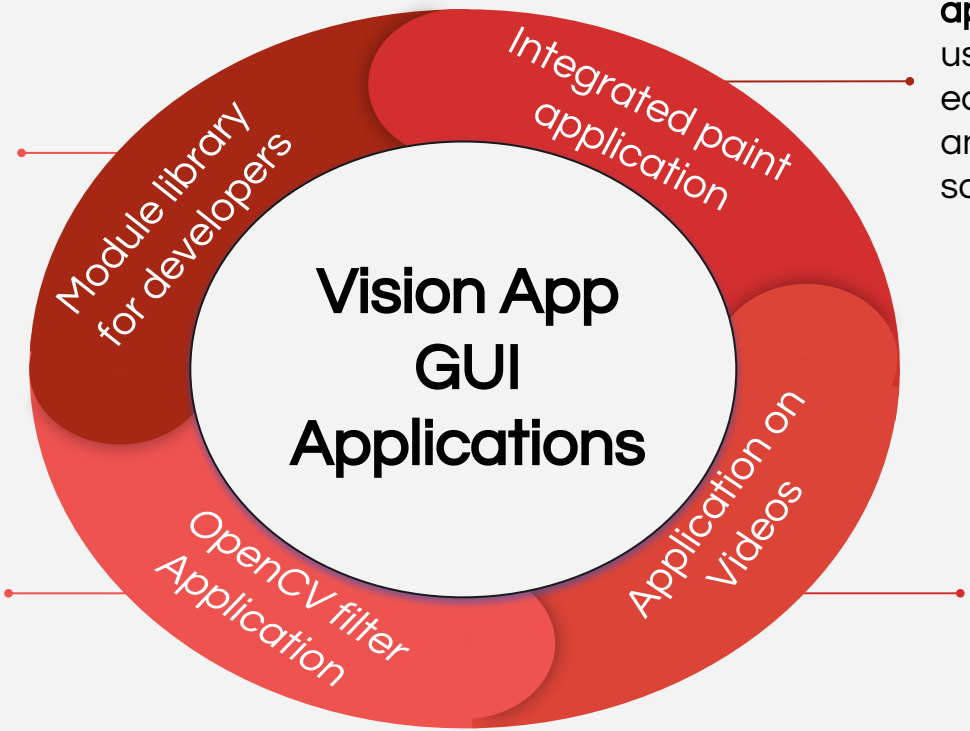
Modules based application helps developers to develop scripts that run on the top of Vision app, these scripts can be paid or open source and solve a use case in image processing. No need to code GUI for several hours.

Considering all these points we are confident that Vision App will revolutionize how we learn image processing forever.

Solution Proposed : Overview

1. Modules for developers to write scripts for complicated image processing routines and get paid.

2. OpenCV filter application in one click accessible to both students and researchers with real time and detailed code for copy



3. Integrated paint application algorithm using parallel pipeline for editing images on the go and not using premium softwares like photoshop

4. Application on videos for General Use to -
1. Apply filter on 100s of images
2. Go beyond premium image editing softwares

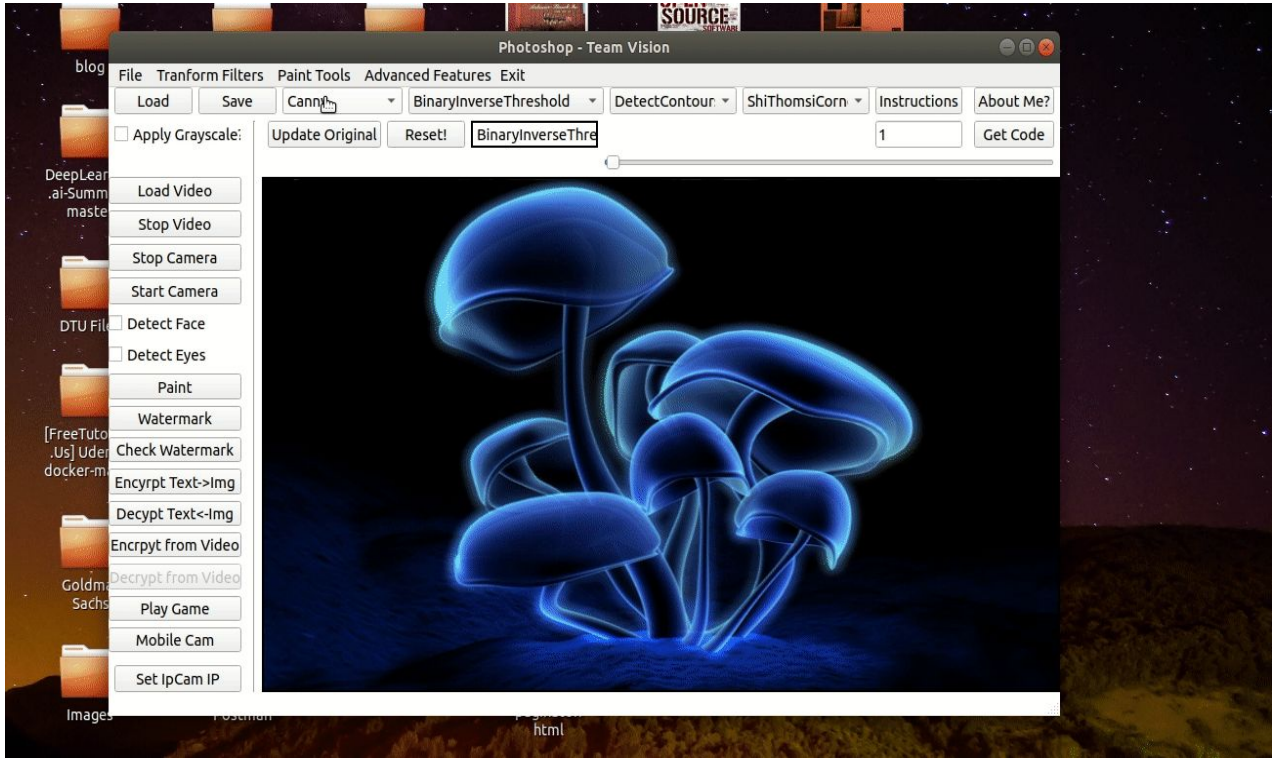
Solution Proposed

1. OpenCV filter application for computer vision tasks

The **filters of different types, categories, nature** of each are available along with an optional detailed description in information window

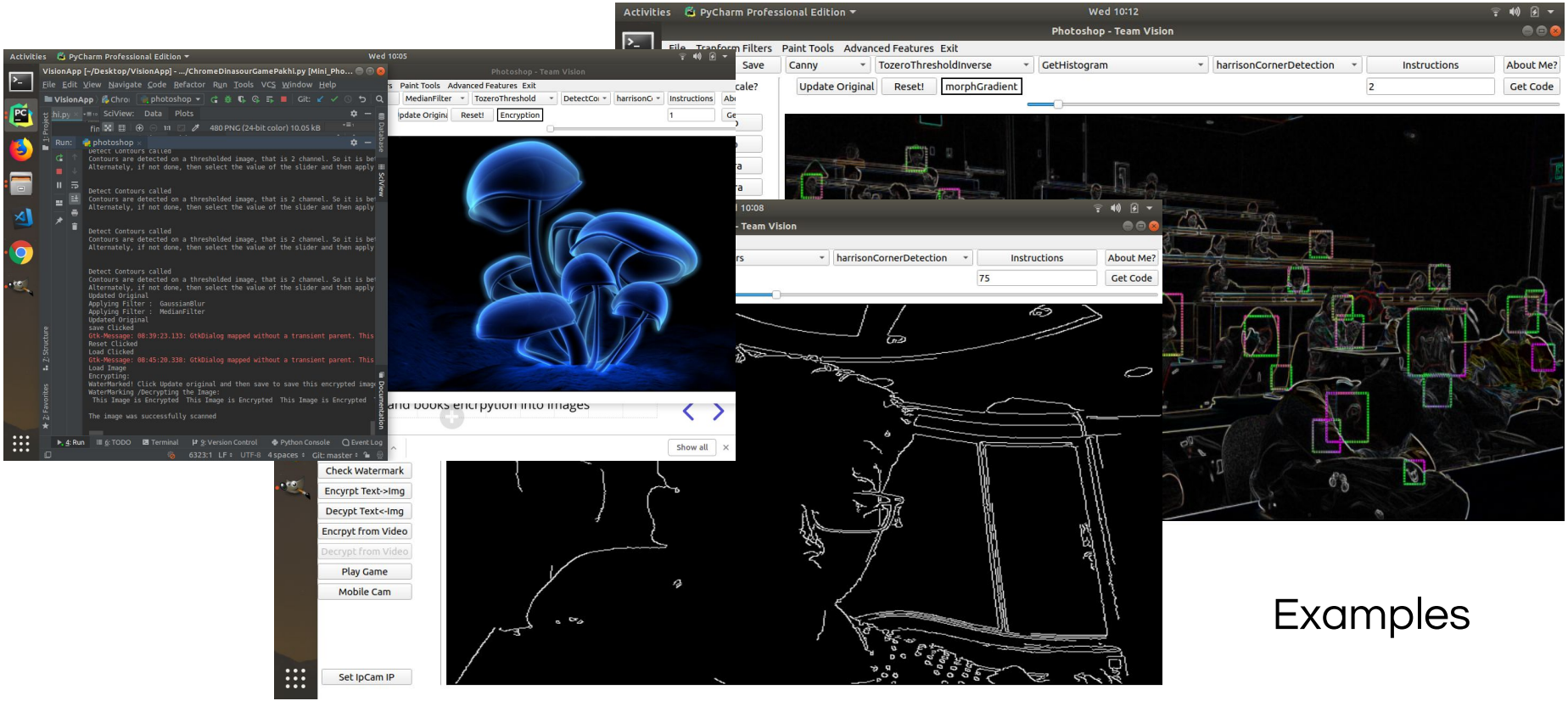
Each algorithm otherwise takes 100s of lines of code to execute. These algorithms are pre implemented.

Hence **even children can learn image processing**. Development **time is reduced by more than 1000%** since naming of algorithm with code is available on the go.



Solution Proposed

1. OpenCV filter application for computer vision tasks



Examples

Solution Proposed

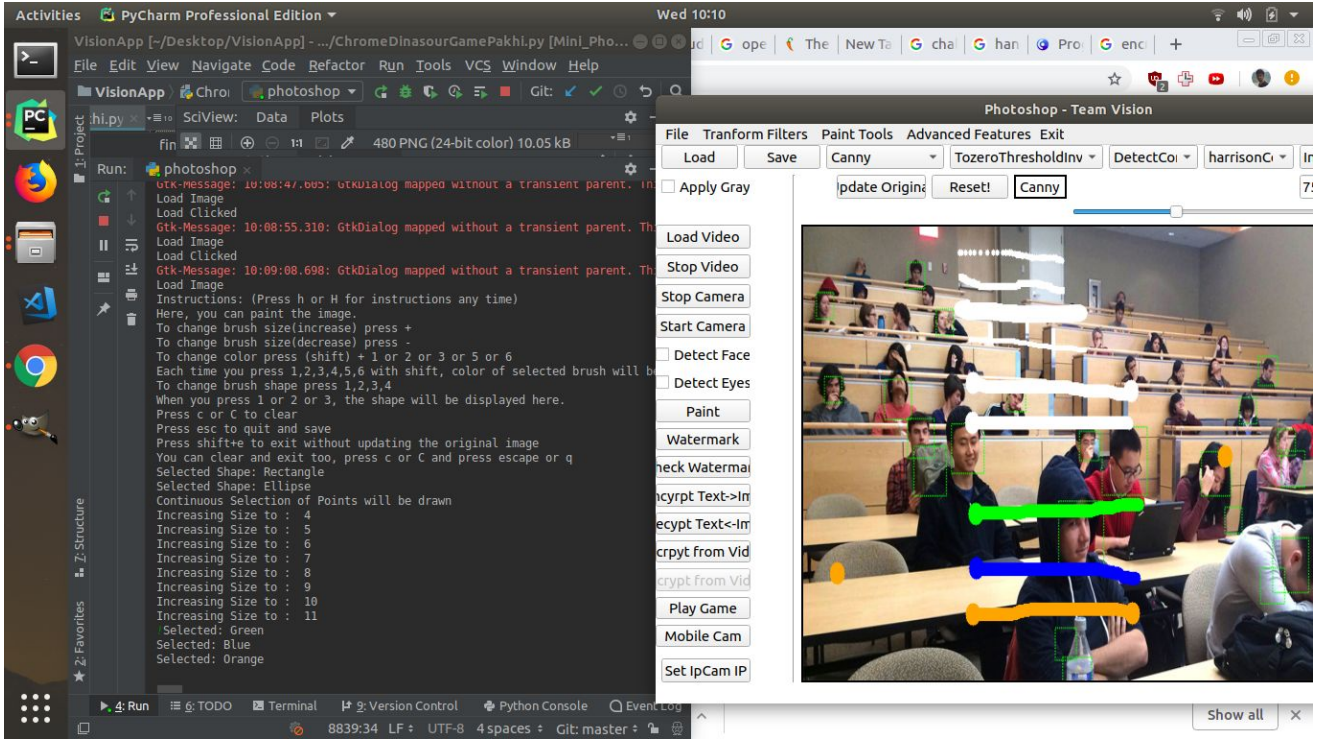
2. Integrated paint application

The paint application is integrated with

1) Multiple brush sizes
2) Multiple colors
3) Multiple shapes
4) Clear and save options

This calls for editing on the go and refining the selection to be used directly in models. For a researcher this is very helpful since earlier this work was done on photoshop.

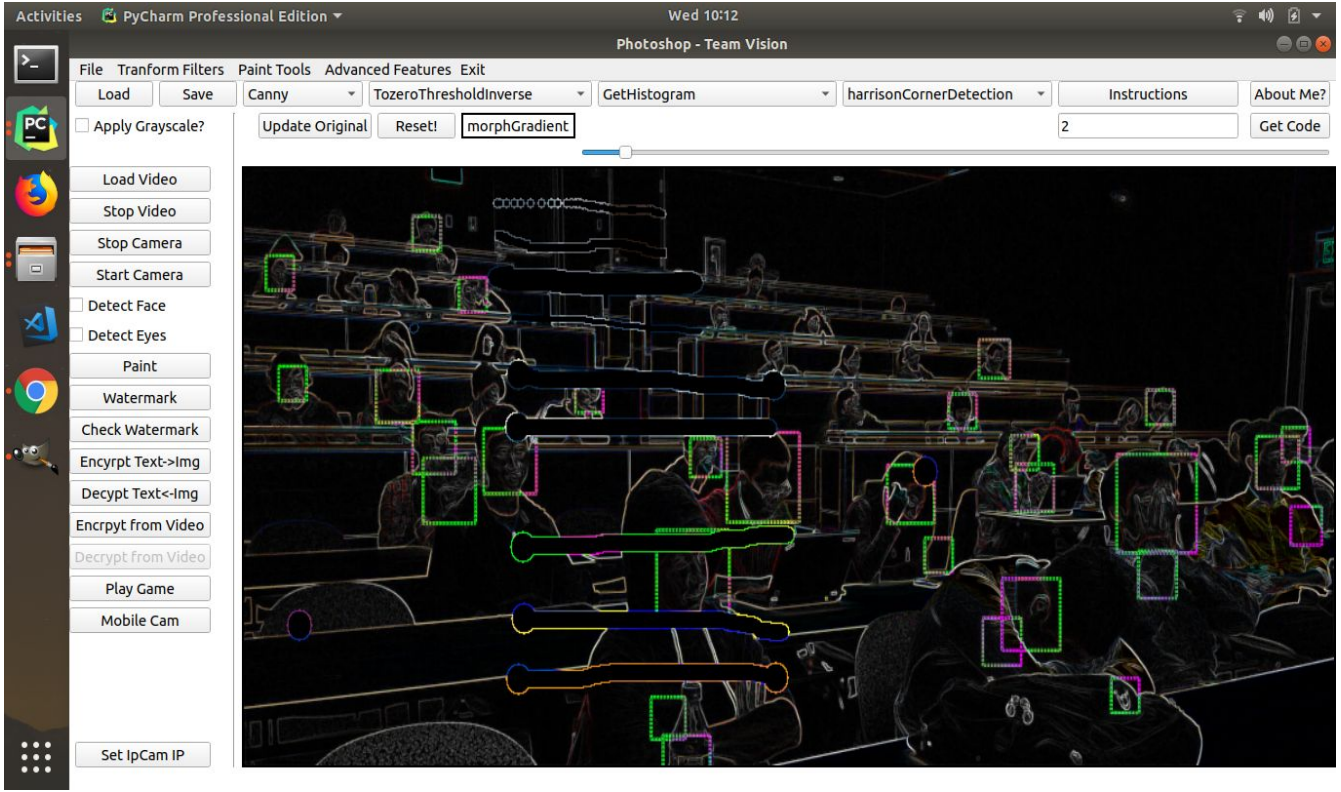
On the console all instructions are provided, hence the whole processes is intuitive.



Solution Proposed

2.1 Integrated paint application

Filters can be ready applied as seen in the right



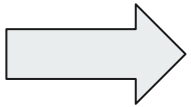
Solution Proposed

3. Application on videos

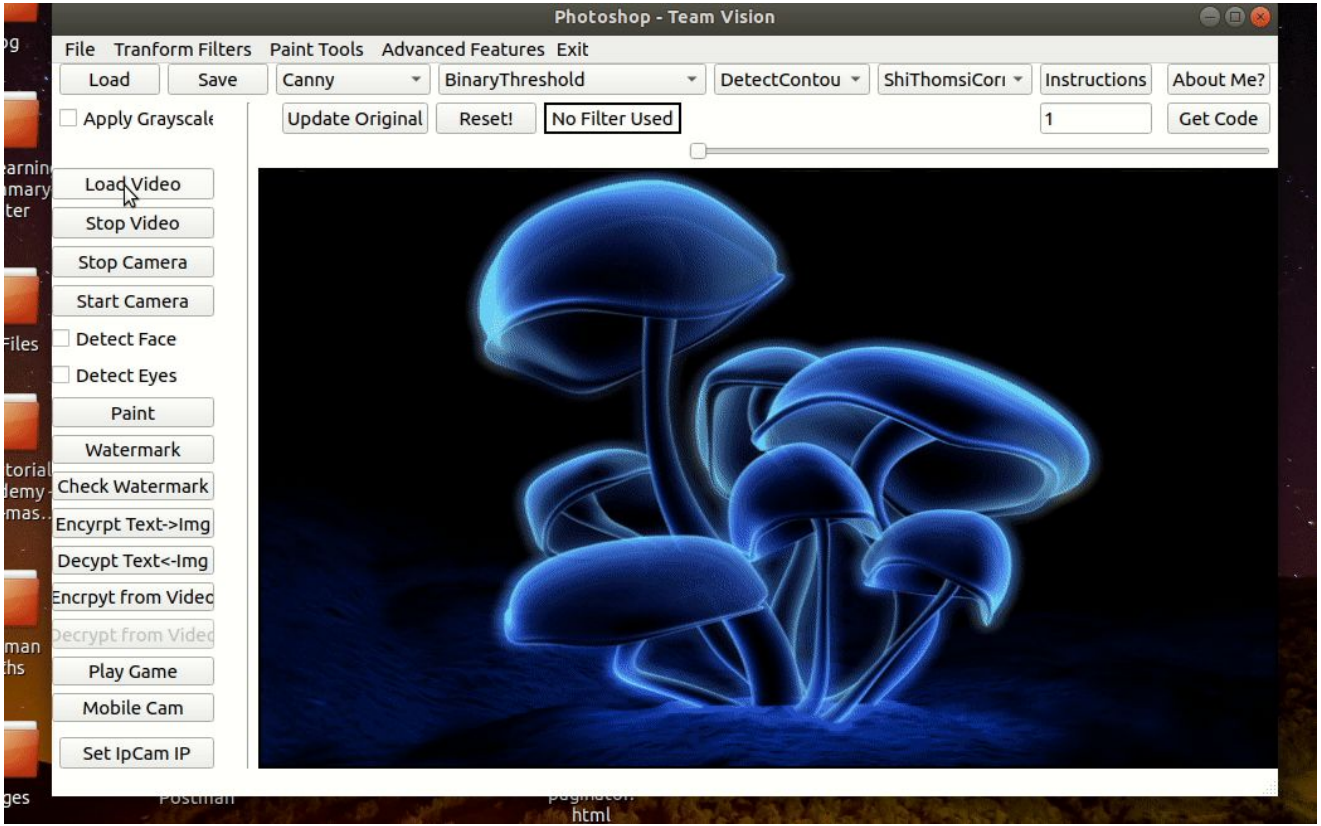
100s of images can be joined using simple video editing softwares and then the filters can be applied in real time

Commercially available packages line illustrator, GIMP do not provide this feature

We assume that a researcher wants to try the same algorithm on several use cases to see the whether an algorithm performs best in all the general use cases.



Original video is colored



Solution Proposed

4. Modules: The Eureka of personal software

Vision app is module oriented, just like android apps extend android, one can add code to Vision app like installing "Google Chrome" on windows. 3 lines of code and done! You can add any module. We have added 4 modules (just like apps on Google Play) to this application

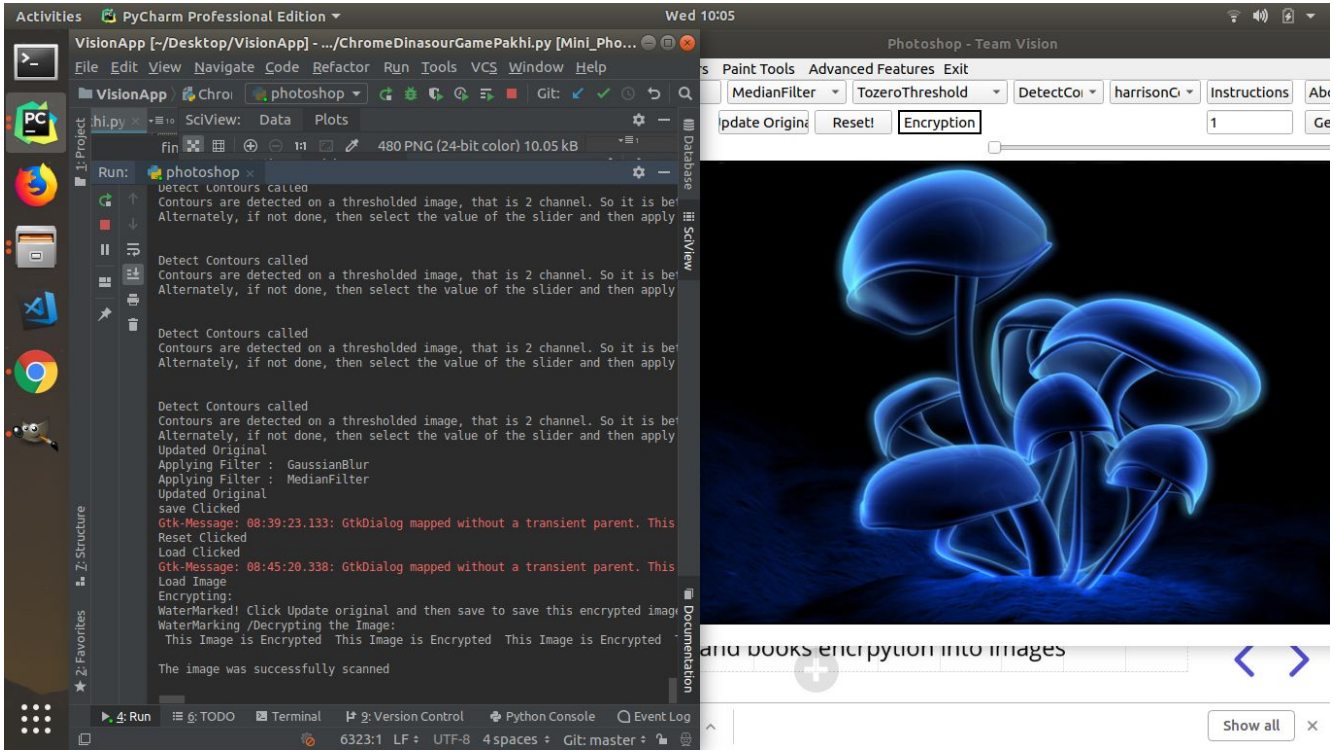
1. **Cryptography to input entire books into video of few seconds**. We encoded "harry potter and the sorcerer's stone book" in 0.2 seconds of video. For every 10 mb of video, one can add 2 mbs of books (10-20 books).
2. **IP Cam for applying filters from images in real time over a local server** using android, Cyanogen OS etc. So processing images does not required pushing images to cloud from phone and then downloading them to use filters. Filters are applied in real time.
3. **Get code** feature allows to get code for applied feature that can copied and run the same code that was applied. The students and even children under 15 years can easily code 100's of lines of complicated code with basic knowledge of python.
4. **Game using hand gesture recognition**. With one click, one can play Chrome dinosaur game using hands, right on the browser.

Solution Proposed

4.1 Image encryption

Passwords and large volume of images can be stored into image. The image you see on the right contains about the entire book “**Harry Potter and the sorcerer’s stone”** .

At first it is hard to believe, but beauty lies in cryptography and state of the art image steganography techniques.



Solution Proposed

4.2 Video encryption

100s of books can be downloaded into and from videos using video encryption button

A ~ 100 Mb video can keep upto 100-250 books that can be later read.

Yes, passwords, secret data files etc can also be stored.

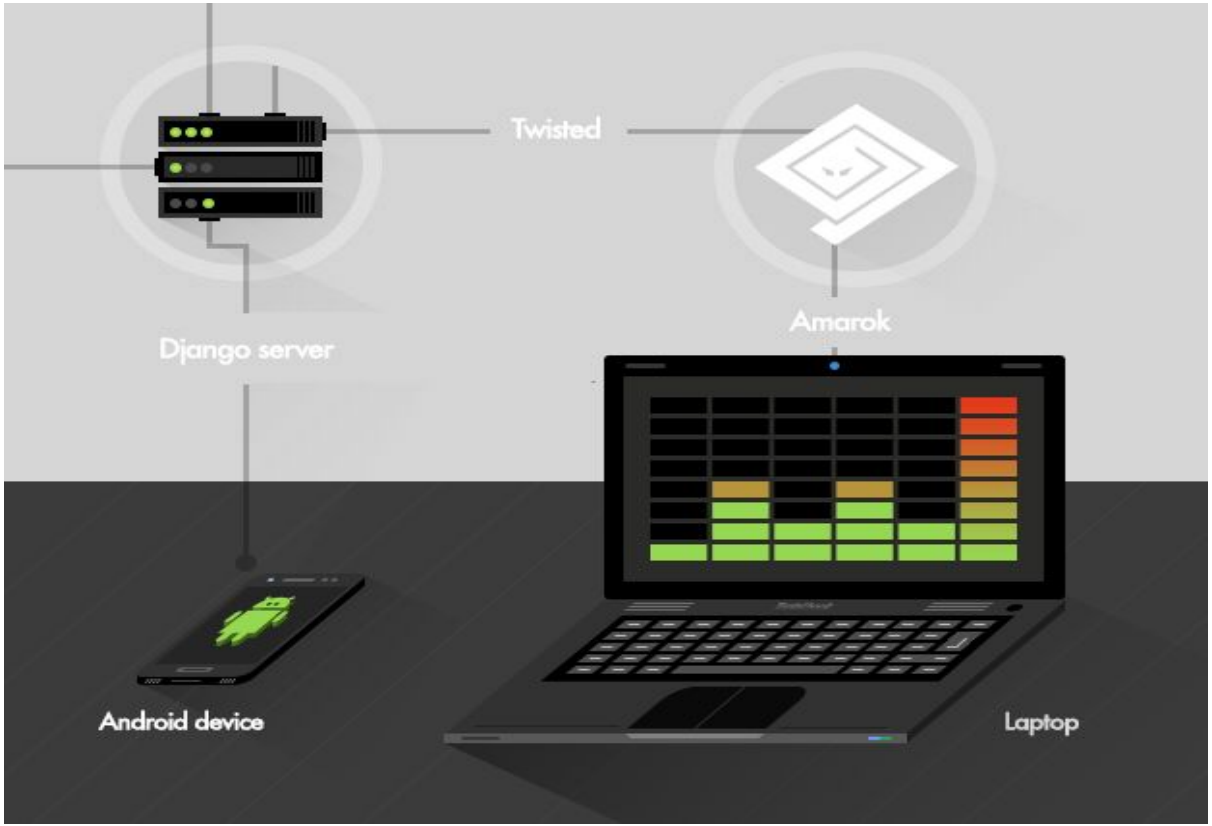
Solution Proposed

4.3 IP Cam module

IP Cam extension allows videos to be processed around the world.

You can be sitting in USA and some one can be applying image processing in real time using camera halfway around the world in real time, live.

One can even do video calling. Video calling is an indirect feature of Vision App.



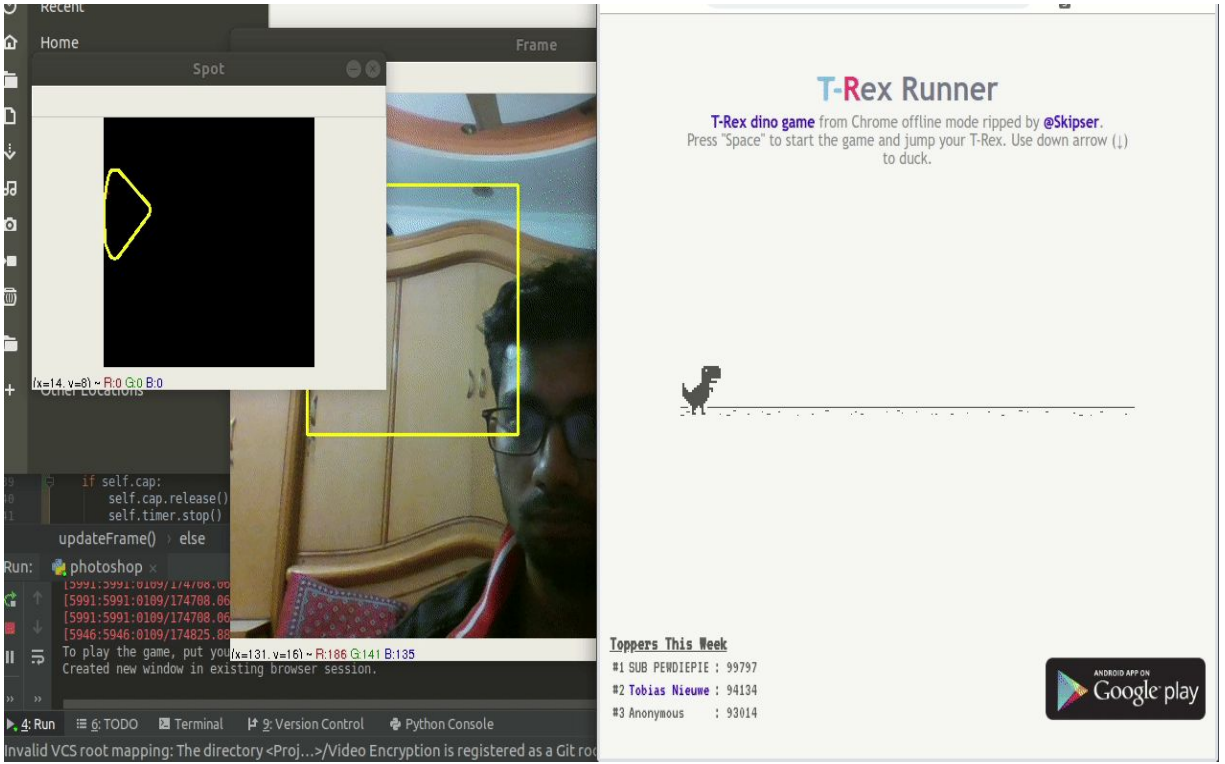
Solution Proposed

4.4 Hand gesture recognition game

A simple illustration of the module.

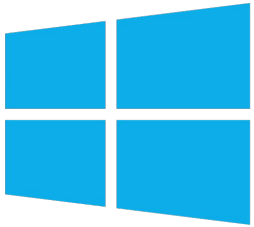
The module was written as a separate python file. Then the code was integrated using just 4-5 lines of code and some in app integrations.

In future, we hope to reduce that to 2 lines of code followed by no lines of code at all.



Runs across all platforms

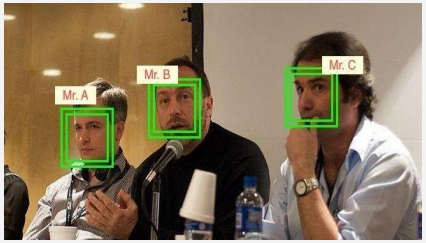
Linux



Windows

ABInBev

Use cases

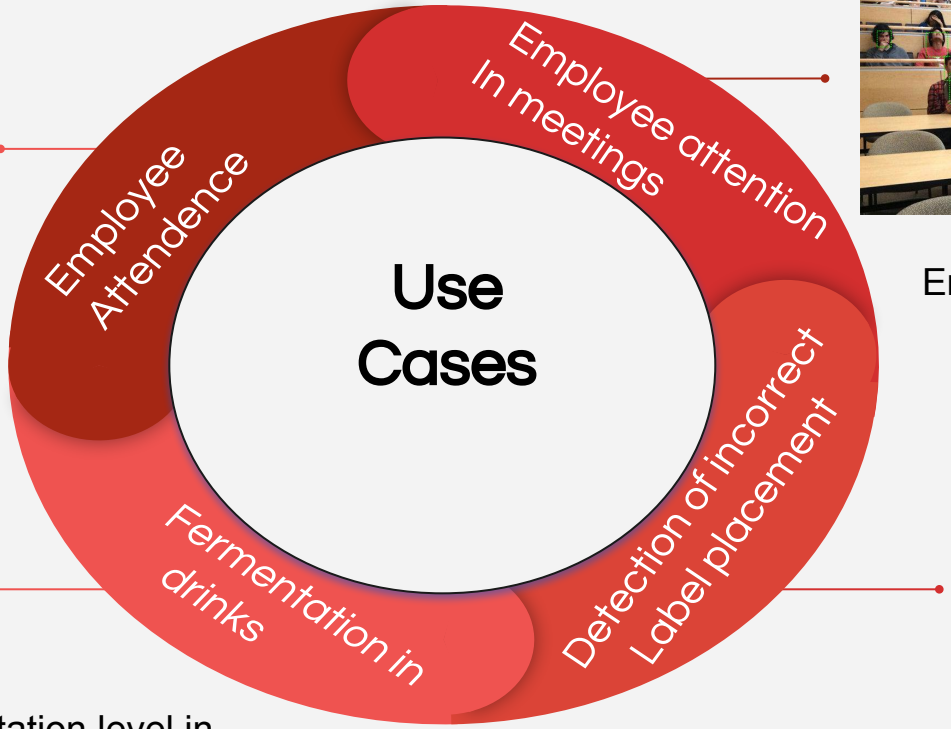


Auto report maker

Enhanced productinvity

Auto detection of fermentation level in beer before physical examination.

Auto detection of incorrectly placed labels on bottles



Further Use Cases

Gesture recognition gaming software or gesture commands in hospitals

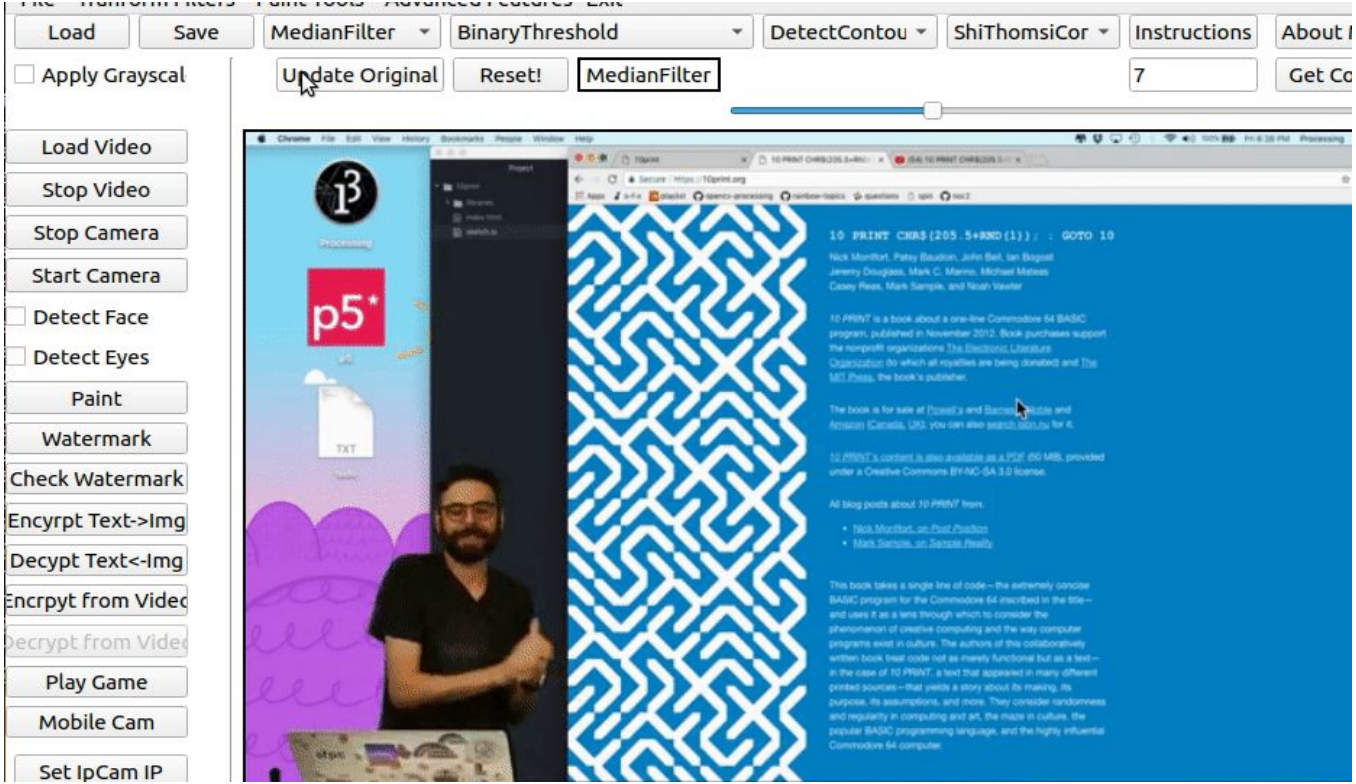
Very effective use case for hospital patients especially those who are:

1) Isolated
2) Paralysed but hands work fine

Further Use Cases

Researchers and students to learn art of Images(Get code method)

1) Image processing is very rigorous subject
2) Vision app can help even children learn.
3) No need to code
4) No mathematics needed
5) No knowledge of python needed.
6) Code available for copy and paste.



Technology Stack

- **GUI Application**

  Backend

  - **Programming Language** : Python 2/ Python 3(Both supported)
  - **Backend Stack** : C++ and C routines with python wrapper, Open CV, Machine Learning
  - Cryptography, IP Cam, OpenCV, Tensorflow, FFMPEG, urllib, numpy etc.

  Front end

  - **GUI framework** : QT, C++, PyQt, PyQt5, IP Cam

- **Documentation, license and code base**
  Github and Bitbucket, published using MIT license.

Conclusion

The original problem statement required us to build a innovative problem solver that has never been implemented before and we saw in it an opportunity to build a better future for our society and development culture that promotes working on the top of others

Through the platform of AbinBev, we desire to deliver an open source and yet very powerful solution capable of leading our world to a Artificial Intelligence powered place where learning is fun and easy.

Thank You for your audience.

-Team Vision