Virtual Augmentation

Enhanced Environmental Knowledge P.o.C.

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Enhancing Natural Abilities

Up to 50% more reality!

Instantaneous Feedback

Objectives

- **Augment your senses with data stored in a computer system**
- **Make data accessible at-a-glance**
- **Utilize AR technology to improve human interactions**

Project Structure

The user interface on the hololens is separated from the information processing, which runs on a remote server. The HoloLens's onboard processor is limited, but a fast network connection allows us to offload intensive tasks to a PC.

HoloLens
Unity Platform with C# scripts

HTTP

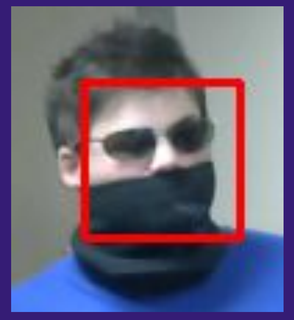
Server
- OpenCV face identification with C++
- Python face recognition

Code

Current Image is displayed, and a new image is taken of the environment via the HoloLens. The image is sent along to the server for processing.

Face Detection process and recognition

Server detects people's faces in the environment, and, if specified, performs recognition on them by comparing them to a database via machine learning.



The HoloLens is sent new information to display on the H.U.D. This includes number of faces in the room, names of specific individuals, and more.

```
class People{
  CascadeClassifier headDetector;
public:
  People(){
    //Loading the default haarcascade classifier for frontal based detection.
    headDetector.load("haarcascade_frontalface_default.xml");
  }

  vector<Rect> detectHead(InputArray img){
    vector<Rect> temp;
    headDetector.detectMultiScale(img, temp, 1.1, 8, 1);
    return temp;
  }
```

Resources

- Languages: Python, C++, C#
- HUD and User Interface: Unity Platform, Microsoft Mixed Reality Toolkit
- Facial Identification: OpenCV Libraries for C++
- Facial Recognition: OpenCV API for Python Provided by https://github.com/ageitgey/face_recognition
- Tools: Unity Editor, Microsoft Visual Studio, Version control with Git

Conclusions

- HoloLens development tools are still in their beginning stages. High level development on this and other embedded devices is still difficult.
- Hollywood-like heads-up displays are possible and could be of use to consumers as portable HMDs become more available
- The HoloLens and similar devices show promise to implement real-time information services based upon the present environment

https://github.com/pdemange/Virtual-Augmentation