Virtual Scavanger Hunt (education domain)

Team #1 — Thundercats

Bill Capps #6

Adam Carter #7

Jason Grebe #11

Project Goals and Objectives

Our project is to create a virtual environment where students can observe an area and attempt to locate items of educational value. An example would be to tour a cave and locate a stalagmite. Teachers would be able to add new images to the collection. Through deep learning, objects in the images could be identified reducing the time teachers need to spend preparing the images. It will also allow the system to give immediate feedback. The software can either confirm the student selected the correct object or told what object they selected instead.

Motivation

Our motivation is to provide students with the possibility of having first-hand experiences in places that they cannot physically visit. Caves, pyrmaids, the moon, and the ocean floor could be visited by students regardless of geography or income level. Scavenger hunts ensure that students are actively participating and focused on areas of educational importance.

Significance/Uniqueness

Many of the existing Google Cardboard products allow either interaction with a simulated environment or viewing of a real location. We are combining these products by allowing students to interact with real places. Our project is also unique in using deep learning to identify facts about the images that they can be quizzed on.

Objectives

Our objective is to create the Google Cardboard interface and the application for managing the images. We will also integrate deep learning to identify facts about the images. While it is not realistic for us to be able to create a system that can identify every object in any image, we can create a system that identifies several objects and demonstrates the proof-of-concept.

The system will analyze the images using Clarifai API, Spark, and Tensor Flow. While it is expected that Tensor Flow will produce the highest accuracy. We will collect various metrics such as accuracy, processing time, and bandwidth consumption to determine if there are any trade-offs that would make consider using a solution other than Tensor Flow.

System Features

The Google Cardboard interface will allow students to select which image they want to explore from a library. Once the image opens, they will be given a brief introduction and then told which items to locate. It is tempting to include additional educational information while the student is exploring; however, the purpose of this project is supplement teacher instruction and not replace it. The interface needs to remain minimalist so that the student can focus on exploring the new environment. When the

student believes that he or she has located the requested item and focused the cursor on it, the button on the top of the Google Cardboard device will be pressed. The system will then either congratulate the student and offer the next item to seek or tell the student what item the name of the object they selected and ask them to keep trying.

Current mobile phone technology allows teachers to capture 360° panoramic images. The image management interface will allow the educator to upload new images, delete existing images, add introductions, and select items for the scavenger hunt. Having the system use deep learning to identify objects in the image is part of adding a new image to the library.

Based on time constraints, optional features may be added as well. It would be nice to include login information so that teachers can track the progress of individual students. It would also be good to have several slave headsets controlled by a master headset operated by the teacher. This would allow the teacher to control what images the students are currently viewing and take them on a virtual field trip.

Related Work

Clay Middle School has a page of virtual field trips. [1] This is a collection of web pages that offer virtual tours of places with educational value. Google Cardboard Camera allows users to create their own VR photos. [2] NYT VR takes users on a journey to places of significance and includes information about the associated New York Times stories. [3] Titans of Space lets users explore our solar system using virtual reality. [4]

Backup Project

Our backup is a VR-based attendance program. Teachers can use their phones to capture a panoramic image of a classroom. Deep learning software will identify all the students in attendance. This will free time for lecturing instead of administration. The image can be viewed in the VR interface if a manual inspection of the calls is needed. The image could also be taken with one of the mounted cameras in the room. Then images taken during the lecture could answer questions like, “how many students were looking at the lecturer”, “how many students brought laptops”, or “was any student looking at another student’s test?”

Bibliography

[1] http://www1.ccs.k12.in.us/clm/media-center/fieldtrips

[2] https://play.google.com/store/apps/details?id=com.google.vr.cyclops&hl=en

[3] https://play.google.com/store/apps/details?id=com.im360nytvr&hl=en

[4] https://play.google.com/store/apps/details?id=com.im360nytvr&hl=en