

AR-TagBrowse: Annotating and browsing 3D objects on mobile devices

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Abstract

We report on the development of a novel interactive augmented reality app called AR-TagBrowse, built on Unity 3D that enables users to tag and browse 3D objects. Users upload 3D objects (polygonal representation and diffuse maps) through a web server. 3D objects are then linked to real world information such as images and GPS location. Users may optionally segment the objects into areas of interest. Such objects will subsequently pop up in the AR-TagBrowse app when one of these events is detected (visible location or image). The user is then capable of interactively viewing the 3D object, browsing tags or entering new tags providing comments or information for specific parts of the object.

Introduction

Augmented Reality (AR) intends to offer richer interactive user experiences by overlaying text, images, video or 3D objects over a scene rendered through a camera. Powerful mobile devices with advanced graphics hardware have recently enabled photorealistic interactive rendering of 3D objects or even of the entire 3D scene (see References).

AR-TagBrowse makes the following technical contributions:

- Presents a novel technique for efficiently visualizing object annotations.
- Provides practical solutions for 3D object processing, indexing and segmenting.
- Introduces a social media inspired crowd-sourcing paradigm for annotating 3D objects that can be used in museums, archaeological sites and other places of cultural interest.

Scanning 3D objects

We have used the ExaScan laser scanner with various techniques for placing targets for referencing. The object mesh has been decimated and a diffuse texture has been used on a UV-map for better visual results.



Handling Annotations

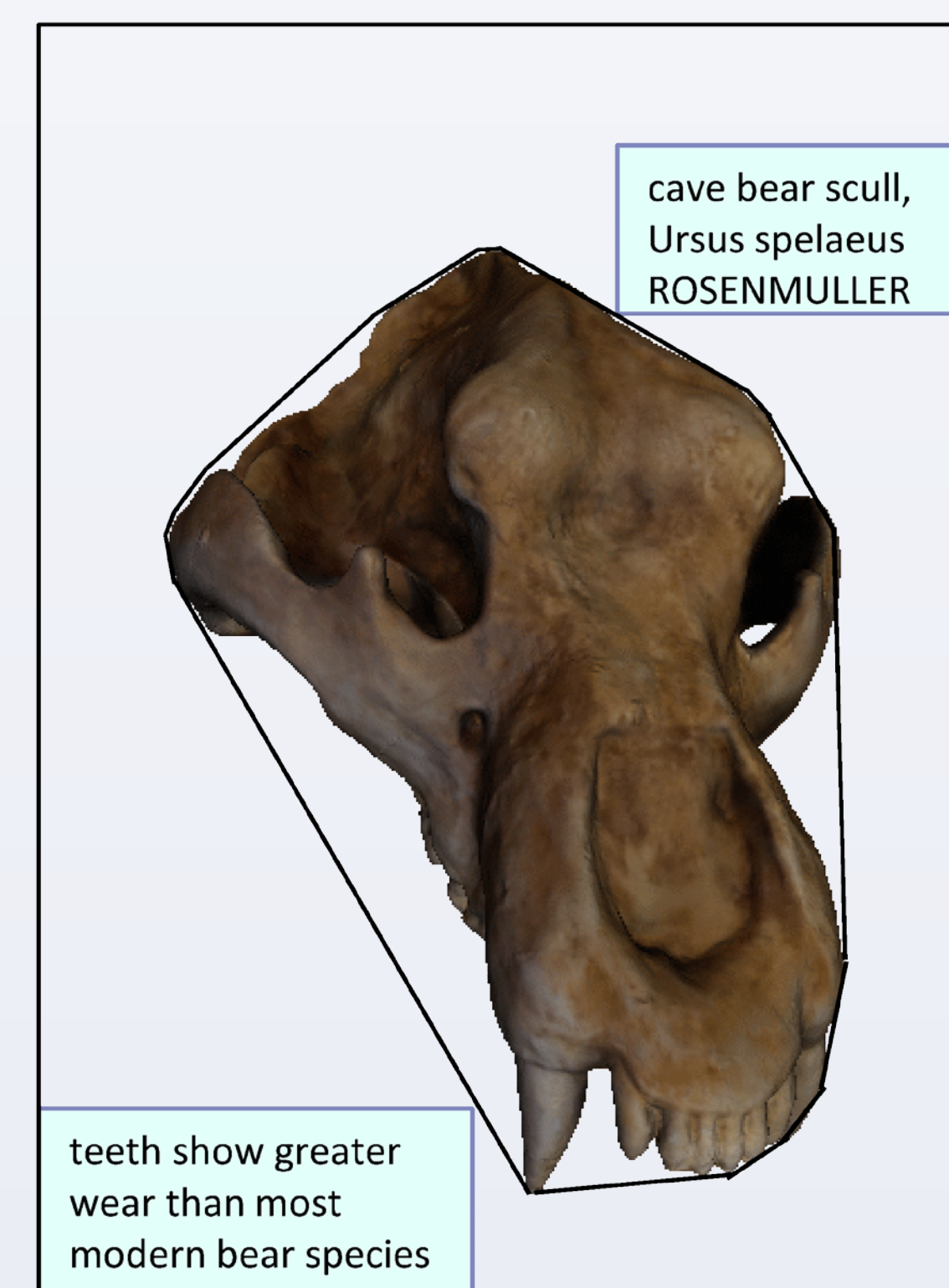
Tag visualization is performed through a simple process that can be summarized by the following rules:

- tags are placed one at a time as they are processed (according to the sorting criterion).
- a tag is placed as close as possible to its anchor point (the point to which it is related to).
- a tag may be placed anywhere outside the virtual convex hull of the pixels that render the object (this gives much more available space than axis aligned bounding boxes).
- if a tag cannot be placed then we attempt to place it first in the next batch of tags, if still it cannot be shown then we show a truncated summary of the tag.
- only tags that refer to visible parts are shown.

Placement is performed using a sophisticated algorithm that places the tag by sliding it around the convex hull by constraining one of its corners to touch the convex hull. This takes time $O(n)$, where n is the size of the convex hull.



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Conclusions

We have reported on the development of AR-TagBrowse, that introduces a novel paradigm for tagging and browsing virtual 3D objects in an AR setting.

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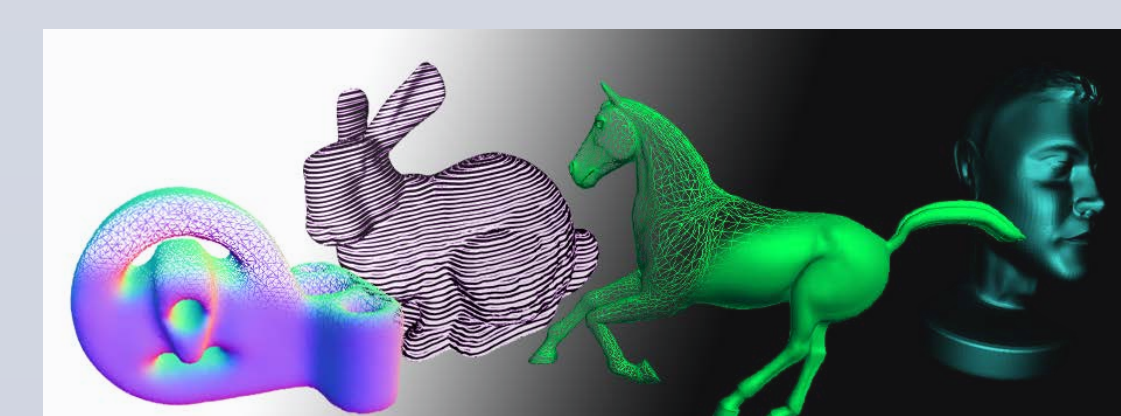
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