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Adjusting the rotation speed of a 3D object according to zoom level

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ABSTRACT

When a user attempts to rotate a 3D object in a 3D viewer while the object is scaled up at a high level of zoom, the speed of rotation can be too fast to allow the user to discern and focus on specific parts of the object at that size. This disclosure describes techniques to adjust the speed of rotation of an interactive 3D object depending on the scale at which the user is viewing the object. The dynamic adjustment of the speed of rotation make it possible for users to look at the details of the object at various scales while maintaining a smooth user experience (UX) for interacting with the object by scaling and rotating.

KEYWORDS

- 3D object
- 3D viewer
- Object rotation
- Object scale
- Rotation speed
- Rotation ratio
- Virtual reality (VR)
- Augmented reality (AR)

BACKGROUND

When interacting with a 3D object in a 3D viewer, users may engage in actions such as using a pinch gesture (or other input) to change the scale at which the object is displayed, using the drag gesture (or other input) to rotate the object, etc. When a user attempts to rotate an object while it is scaled up at a high level of zoom, the speed of rotation can be too fast to allow the

user to discern and focus on specific parts of the object at that size. Such fast rotation is problematic when the user wishes to examine the fine details of the zoomed-in 3D object while it is being rotated.

DESCRIPTION

This disclosure describes techniques to adjust the speed of rotation of an interactive 3D object in a 3D viewer based on the scale at which the user is viewing the object. The user can interact with the 3D object in a standard manner by using various gestures, such as pinch, swipe, drag, etc. For instance, the user can drag a finger up, down, left, or right to rotate the 3D object being viewed. The 3D object is then rotated in the direction corresponding to the direction of the dragging gesture. However, the speed at which the object is rotated is determined based on the current scale at which the user is viewing object.

For example, when a user has zoomed in on a specific part of the object by scaling it up prior to rotation, the speed of rotation is decreased based on the scale at which the object is displayed (zoom level). The slowed down rotation makes it possible for the user to discern and examine the details of the object at the zoomed-in scale even while the object is being rotated. In contrast, when a user tries to rotate an object while it is zoomed out and displayed at a size smaller than its usual size, the speed of rotation is increased. When the user wishes to rotate a 3D object displayed at its actual size without being scaled up or down, the rotation takes place at a default speed, without any adjustments.

The techniques described above are implemented by keeping track of the scale at which a 3D object is displayed. When a user provides input to rotate the object via a gesture, the tracked current scale of the object is utilized to adjust the rotation speed to the corresponding level prior to rotating the object in the direction specified by the user. Such dynamic adjustment of the

speed of rotation make it possible for users to look at the details of the object at various scales while maintaining a smooth user experience (UX) for interacting with the object by scaling and rotating.

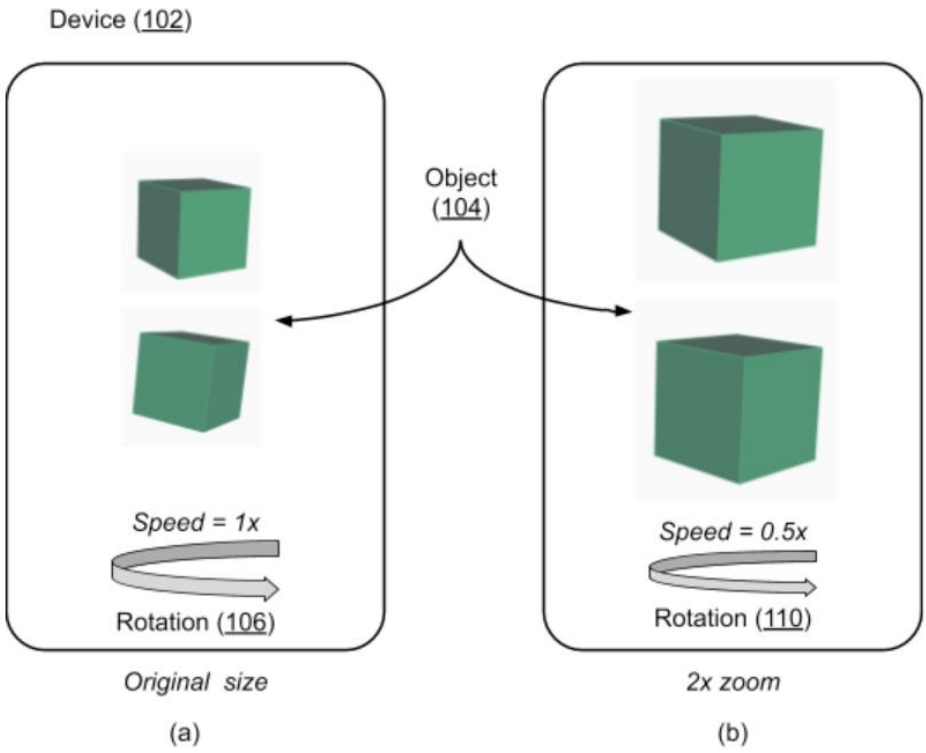

Fig. 1: Rotation speed adjustment based on zoom level 3D object

Fig. 1 shows an interactive 3D object (104) displayed in a 3D viewer on a device (102). In Fig. 1(a), the object (top cube) is displayed at a default size without the application of any scaling. When the user performs a rotation (106) of the object at its original size, no adjustments are made to the speed of rotation and the object is rotated at the default speed, e.g., 1x, as seen in Fig. 1(a) (bottom cube).

In Fig. 1(b), the object (top cube) is scaled up to twice the default size which allows the user to perceive specific details of the object. When the user rotates the object at this zoomed-in scale, the speed of rotation corresponding to the user input is slowed down to account for the

increase in the scale at which the user is viewing the object (bottom cube). As seen in the figures, when the user performs a similar gesture for rotation, the cube in Fig. 1(a) undergoes a greater degree of rotation than the cube in Fig. 1(b). For example, the change in rotation speed can be proportional to the change in zoom level, e.g., 0.5x rotation speed for 2x zoom. The described techniques are applicable even when zooming in results in only a part of the object being displayed, or zooming out results in multiple objects being displayed simultaneously.

The ratio of the scale of the object to the adjustment in rotation speed can be set to any appropriate value that provides a suitable user experience for interacting with the object. The ratio can be specified by the developers and/or set by the users. Alternatively, or in addition, the ratio can be adjusted dynamically according to the scale and type of the object such that different ratios are applied for different objects or at different scales of the same object.

The techniques described above can be applied in any setting that involve user interaction with 3D objects in a 3D viewer. For instance, the techniques can be implemented in online shopping websites or apps that allow users to examine models of a product being considered for purchase. Further, the techniques can improve user experience in user interfaces that involve the use of virtual reality (VR) or augmented reality (AR). The techniques can be implemented in various VR/AR devices, such as headsets, glasses, etc., and corresponding viewer applications.

CONCLUSION

This disclosure describes techniques to adjust the speed of rotation of an interactive 3D object depending on the scale at which the user is viewing the object. The dynamic adjustment of the speed of rotation make it possible for users to look at the details of the object at various scales while maintaining a smooth user experience (UX) for interacting with the object by

scaling and rotating. The techniques described above can be applied in any setting that involve user interaction with 3D objects in a 3D viewer.