Real-Time Anatomy Illustration Using Non-Photorealistic Rendering Styles

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Abstract

Since the beginning of medicine and medical practice, artistic illustrations have been used as a way to educate and inform people about the human anatomy. These illustrations are known to be easier to comprehend and study than other forms of medical imaging such as scans and photographs. It is also known, however, that these artistic illustrations often take a large amount of time to create and require very skilled artists with prior medical knowledge who know what they're doing. The illustrations produced by these artists are then specific to a particular person or model. In this paper, the challenges around generating these artistic illustrations from real-world 3D data such as MRI and CT scans are investigated. The approach will allow for automated illustrative renderings of a given scan while giving the user the option of modifying certain visualisation parameters in order to render the 3D model to suit their need and preference. The different non-photorealistic techniques that can be used to aid the user in creating useful illustrations will also be investigated. These techniques would apply effects such as emphasising the more important features of the dataset to provide a focus for the rendering and suppressing extraneous details while maintaining shape and structure to provide context. This will be achieved by providing the option of choosing from a number of different artistic styles and applying them to different parts of the dataset such as to the skull or skin. The user will also have the option of modifying certain visualisations parameters related to these styles thus adding another element of flexibility to the application. A transfer function would then be used to determine the colour and opacity values within the volume allowing the user to choose which parts of the volume are visible and which parts are not.