Efficient sketch-based character modelling with primitive deformer and detail generator

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Abstract

This paper proposes a new sketch-guided and ODE-driven character modelling technique and develops an easy-to-use and efficient character modelling system. Our system consists of two main components: primitive deformer and detail generator. With such a technique, we first extract 2D silhouette contours from an existing character sketch or draw 2D silhouette contours of a character model. Then, we select proper primitives and align them with the corresponding silhouette contours. After that, we develop a sketch-guided and ODE-driven primitive deformer. It uses ODE-based deformations to deform the primitives to exactly match the generated 2D silhouette contours in one view plane and obtain a base mesh of a character model consisting of deformed primitives. In order to add various 3D details, we develop a detail generator. It consists of a local shape creator and an image-based detail generator. The local shape creator uses sketches in different view planes to define a local shape and employs ODE-driven deformations to create a local surface passing through all the sketches.

The experimental results demonstrate that our proposed approach and developed system can create 3D character models with 3D details from 2D sketches easily and quickly. Apart from its high efficiency, our developed system is easy to learn and use.

CCS Concepts
•*Computing methodologies → Mesh model;*

1. Introduction

The main contributions made by our proposed approach are:

- We develop an efficient sketch-guided and ODE-driven primitive deformer to create a base mesh. It can deform primitives to exactly match the generated silhouette contours. Compared to the existing methods, it automates shape manipulation, avoids tedious manual operations, can deform primitives to match the generated silhouette contours quickly, and is powerful in achieving different shapes of a same primitive.
- We develop a detail generator to add 3D details to the base mesh. Our proposed sketch-guided and ODE-driven local shape creator can create a new local shape to match user?s drawn sketches in different views quickly. The image-based detail generator can automatically generate fine details from 2D images.
- We develop a complete character modelling system consisting of primitive deformer and detail generator. With our developed system, 3D character models with 3D details can be created easily and efficiently.

The rest of the paper is organized as follows. The previous related work is briefly reviewed in Section 2. The system overview of our proposed approach is presented in Section 3. Primitive deformer is examined in Section 4, and Detail generator is investigated in Section 5. Finally, the conclusions and future work are discussed in Section 6.

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`\ftpAddr {URL without leading 'ftp:'}`
  e.g. ftp://www.eg.org/EG/DL/ftpupload

`\URL {url}`
  e.g. http://www.eg.org/EG/DL/WS

`\MailTo {Email addr}`
  e.g. publishing@eg.org

`\MailToNA {emailName}{@emailSiteAddress}`
  e.g. publishing@eg.org

`\webLink{URL without hyperlink creation}`
  e.g.   http://www.eg.org/some_arbitrary_long/but_
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Our approach is compared against XXXX, which is the only method for XXX whose code is freely available.

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       -dAutoFilterGrayImages=false \
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```

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       -dAutoFilterColorImages=false \
       -dAutoFilterGrayImages=false \
       -dColorImageFilter=/FlateEncode \
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```
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INSTALLDIR\localtexmf\miktex\config\updmap.cfg
```

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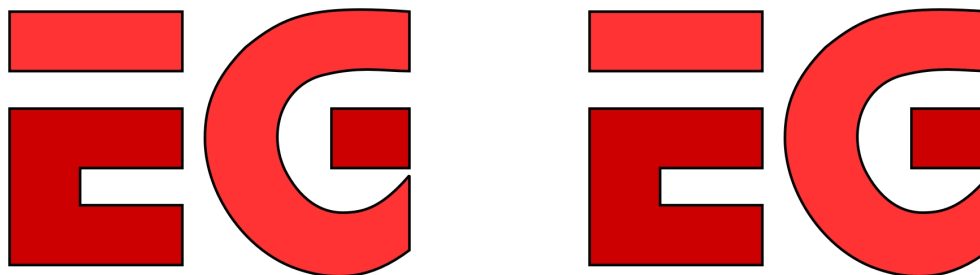Please direct any questions to the production editor in charge of these proceedings.

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