EUROGRAPHICS 2018 / D. Gutierrez and A. Sheffer
(Guest Editors)

Volume 37 (2018), Number 2

Generating Segmented Simplicial Meshes from Images on GPU

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Abstract

A digital image may contain objects that can be made up of multiple regions concerning different material properties, physical or chemical attributes, thus, segmented simplicial meshes are generated to represent the partitioned regions. Typical methods need a pre-processed image before the mesh generation, we propose an algorithm that generates the segmented simplicial quality mesh directly from a 2D or 3D image using almost the same approach, also we present its GPU-version.

CCS Concepts

•***Computing methodologies*** → ***Computer graphics;*** *Graphics processors; Mesh geometry models;*

1. Introduction

Please follow the steps outlined in this document very carefully when submitting your manuscript to Eurographics.

You may as well use the LaTeX source as a template to typeset your own paper. In this case we encourage you to also read the LaTeX comments embedded in the document.

2. Instructions

Please read the following carefully.

2.1. Language

All manuscripts must be in English.

2.2. Margins and page numbering

All printed material, including text, illustrations, and charts, must be kept within a print area 7 inches (17.7 cm) wide by 9.44 inches (24 cm) high. Do not write or print anything outside the print area. Number your pages on odd sites right above, on even sites left above, no page number on the first site. Do not use page numbering within the final version of your paper.

2.3. Formatting your paper

All text with the exception of the abstract must be in a two-column format. The total allowable width of the text area – including header and footer lines – is 177 mm (7 inch) wide by 245 mm (9.64 inch) high.

Columns are to be 84 mm (3.3 inch) wide, with a 8 mm (0.315 inch) space between them.

The space between the header line and the first line of the text body and between the last line of the text body and the footer line is 5 mm (0.196 inch) each.

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Wherever Times is specified, Times Roman may also be used. If neither is available on your word processor, please use the font closest in appearance to Times that you have access to. Only Type-1 fonts will be accepted.

MAIN TITLE. The title should be in Times 17-point, boldface type and centered. Capitalize the first letter of nouns, pronouns, verbs, adjectives, and adverbs; do not capitalize articles, coordinate conjunctions, or prepositions (unless the title begins with such a word). Leave two blank lines after the title.

AUTHOR NAME(s) and AFFILIATION(s) are to be centered beneath the title and printed in Times 9-point, non-boldface type. This information is to be followed by two blank lines.

The ABSTRACT ist to be in a one-column format. The MAIN TEXT is to be in a two-column format.

MAIN TEXT. Type main text in 9-point Times, single-spaced. Do *not* use double-spacing. All paragraphs should be indented 1 em (the length of the dash in the actual font). Make sure your text is fully justified – that is, flush left and flush right. Please do not place any additional blank lines between paragraphs. Figure and table captions should be 9-point Times boldface type as in Figure 2.

Long captions should be set as in Figure 1 or Figure 3.

Figures which need the full textwidth can be typeset as Figure 3.

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Figure 1: *'Empty' figure only to serve as an example of long caption requiring more than one line. It is not typed centered but aligned on both sides.*

Callouts should be 9-point Times, non-boldface type. Initially capitalize only the first word of section titles and first-, second-, and third-order headings.

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SECOND-ORDER HEADINGS. (For example, **2.1. Language**) should be Times 9-point boldface, initially capitalized, flush left, with one blank line before, and one after. If you require a third-order heading (we discourage it), use 9-point Times, boldface, initially capitalized, flush left, preceded by one blank line, followed by a period and your text on the same line.

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List all bibliographical references in 9-point Times, single-spaced, at the end of your paper in alphabetical order. When referenced in the text, enclose the citation index in square brackets, for example [Lou90]. Where appropriate, include the name(s) of editors of referenced books.

For your references please use the following algorithm:

- **one** author: first 3 chars plus year – e.g. [Lou90]
- **two**, **three** or **four** authors: first char of each family name plus year – e.g. [FH93] or [KSS97] or [LFTG97]
- **more than 4** authors: first char of family name from first 3 authors followed by a '*' followed by the year – e.g. [BFH*98] or [FvDF*93]

For BibTeX users a style file `eg-alpha.bst` is available which uses the above algorithm.

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To determine the optimum size (width and height) of an image, measure the image's size as it appears in your document (in millimeters), and then multiply those two values by 12. The resulting values are the optimum x and y resolution, in pixels, of the image. Image quality will suffer if these guidelines are not followed.

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Figure 2: *Here is a sample figure.*

Example 1: An image measures 50 mm by 75 mm when placed in a document. This image should have a resolution of no less than 600 pixels by 900 pixels in order to be reproduced faithfully.

Example 2: Capturing a screenshot of your entire 1024×768 pixel display monitor may be useful in illustrating a concept from your research. In order to be reproduced faithfully, that 1024×768 image should be no larger than 85 mm by 64 mm (approximately) when placed in your document.

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Please observe: as of 2003 publications in the proceedings of the Eurographics Conference can use color images throughout the paper. No separate color tables are necessary.

However, workshop proceedings might have different agreements! Figure 3 is an example for creating color plates.

2.9. Embedding of Hyperlinks / Typesetting of URLs

Due to the use of the package `hyperref` the original behavior of the command `\url` from the package `url` is not available. To circumvent this problem we either recommend to use the command `\httpAddr` from the included package `egweblnk` (see below) or to replace the command `\url` by the command `\webLink` – e.g. in cases where `\url` has been used widely in BibTeX-References. In the latter case we suggest to run BibTeX as usual and then replace all occurences of `\url` by `\webLink`

The provided commands for hyperlinks, in a nutshell, are:

`\httpAddr {URL without leading 'http:'}`
e.g. http://diglib.eg.org/EG/DL/WS

`\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_useless/URL`

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Adobe PDFWriter is *not* acceptable for use. Documents created with PDFWriter will be returned to the author for revision. `pdftex` and `pdflatex` (and its variants) can be used only if the author can make certain that all typefaces are embedded and images are not downsampled or subsampled during the PDF creation process.

Users with no access to these PDF creation tools should make available a PostScript file and we will make a PDF document from it.

The PDF file *must not* be change protected.

Configuration Notes: dvips / ps2pdf / etc.

`dvips` should be invoked with the `-Ppdf` and `-G0` flags in order to use Type 1 PostScript typefaces:

```
dvips -t a4 -Ppdf -G0 -o my.ps my.dvi
```

If you are using version 7.x of GhostScript, please use the following method of invoking `ps2pdf`, in order to embed all typefaces and ensure that images are not downsampled or subsampled in the PDF creation process:

```
ps2pdf -dMaxSubsetPct=100 \
       -dCompatibilityLevel=1.3 \
       -dSubsetFonts=true \
       -dEmbedAllFonts=true \
       -dAutoFilterColorImages=false \
       -dAutoFilterGrayImages=false \
       -dColorImageFilter=/FlateEncode \
       -dGrayImageFilter=/FlateEncode \
       -dMonoImageFilter=/FlateEncode \
       mypaper.ps mypaper.pdf
```

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```
ps2pdf -dPDFSETTINGS=/prepress \
       -dCompatibilityLevel=1.3 \
       -dAutoFilterColorImages=false \
       -dAutoFilterGrayImages=false \
       -dColorImageFilter=/FlateEncode \
       -dGrayImageFilter=/FlateEncode \
       -dMonoImageFilter=/FlateEncode \
       -dDownsampleColorImages=false \
       -dDownsampleGrayImages=false \
       mypaper.ps mypaper.pdf
```

Configuration Notes: pdftex / pdflatex / etc.

Configuration of these tools to embed all typefaces can be accomplished by editing the `updmap.cfg` file to enable inclusion of the standard (or base) 14 typefaces.

Linux users can run the `updmap` script to do this:

```
updmap -setoption pdftexDownloadBase14 true
```

Windows users should edit the `updmap.cfg` files found in their TeX installation directories (one or both of the following may be present):

```
INSTALLDIR\texmf\web2c\updmap.cfg
INSTALLDIR\localtexmf\miktex\config\updmap.cfg
```

Ensure the value for `pdftexDownloadBase14` is "true," and then follow the instructions found here: http://docs.miktex.org/manual/ to update your MikTeX installation.

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We recommend to use a Distiller job options file that embeds all typefaces and does not downsample or subsample images when creating the PDF document.

2.11. Exclusive License Form

You must include your signed Eurographics Exclusive License Form when you submit your finished paper. We MUST have this form before your paper can be published in the proceedings.

2.12. Conclusions

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

References

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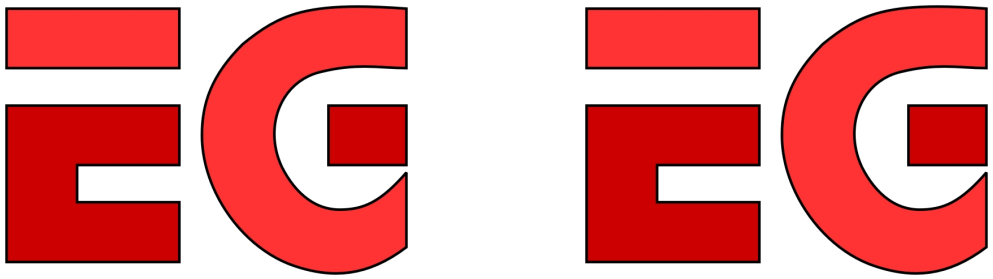

Figure 3: *For publications with color tables (i.e., publications not offering color throughout the paper) please **observe**: for the printed version – and ONLY for the printed version – color figures have to be placed in the last page.*
For the electronic version, which will be converted to PDF before making it available electronically, the color images should be embedded within the document. Optionally, other multimedia material may be attached to the electronic version.