

Interactive Manga Retargeting

Yusuke Matsui*

Toshihiko Yamasaki†
The University of Tokyo

Kiyoharu Aizawa‡

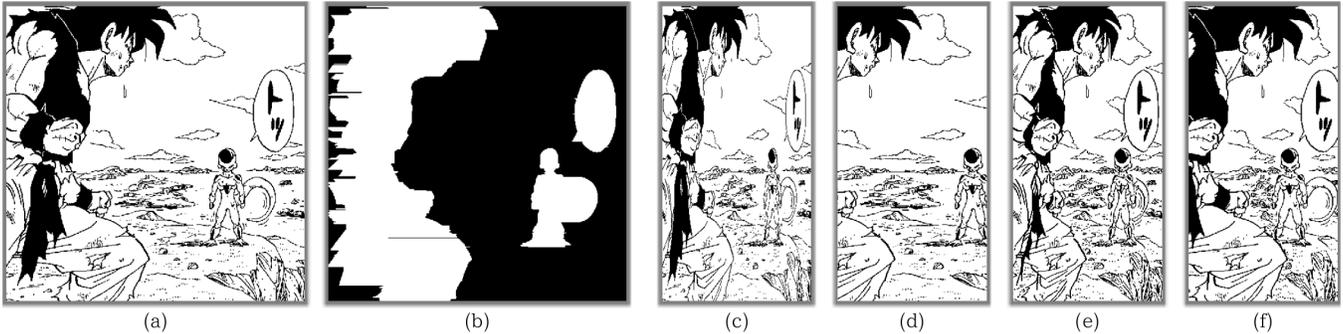


Figure 1: (a) source image, (b) selected regions, (c) scaling, (d) cropping, (e) seam carving, (f) proposed method ©Akira Toriyama / Shueisha

1 Introduction

The existing content aware image retargeting methods are mainly suitable for natural images, and do not perform well on line drawings. Such methods tend to regard homogeneous areas as less important. For line drawings, this is not always true.

We present a method for interactively retargeting black & white “Manga” drawings. The method extracts important areas of the image using scribbles by the user. It then computes candidate images using cropping and seam carving [Rubinstein et al. 2008]. Finally, the user interactively combines these two effects to create the best result. Our method forces the user to intervene, but creates a better retargeted result than existing methods.

2 Region Selection

We present a region selection method using mouse input and binary labeling. A character in Manga is usually drawn using several, connected, black lines. The user selects a region by left-click and dragging on a part of a character. The labeling algorithm runs and selects the lines that have the same labels as the part scribbled on. Similarly, right clicking and dragging is used to release excess regions. In general, a character can be selected using only two or three scribbles. The selected region is filled and used as an importance mask. Fig.2 illustrates an example of region selection. The red lines correspond to scribbles with left-clicks, and the blue lines to right-clicks. With these, the importance mask is created to guide the seam carving process.

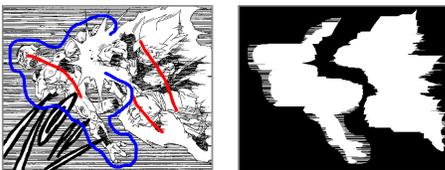


Figure 2: Object of interest selection ©Akira Toriyama / Shueisha

*e-mail: matsui@hal.t.u-tokyo.ac.jp

†e-mail: yamasaki@hal.t.u-tokyo.ac.jp

‡e-mail: aizawa@hal.t.u-tokyo.ac.jp

3 Interactive Retargeting

We propose an interactive retargeting method. If an image should be made K pixels narrower, the method first computes “candidate images” using this equation. $I'_{xyz} = SC_z(CR_y^R(CR_x^L(I)))$ s.t. $x + y + z = K$. CR_x^L and CR_y^R mean cropping the x leftmost columns and y rightmost columns of pixels. SC_z conducts seam carving with the importance mask created by region selection. After computing candidate images, a user creates the best retargeted image by interactively specifying x and y using two sliders (Fig.3). The seam carving algorithm automatically adjusts for the correct value of z .



Figure 3: Selecting Interface ©Akira Toriyama / Shueisha

4 Results and Conclusion

Fig.1 compares the proposed method with some other methods. Fig.1(a) is a source image. Fig.1(b) is the importance mask generated by region selection. Fig.1(c) and Fig.1(e) show images retargeted by scaling & seam carving, which are unnaturally shrunk. The cropped image in Fig.1(d) does not contain the balloon. Fig.1(f), created using our method, has not shrink or lost important regions.

It is evident that the proposed method achieves improved retargeting of black & white drawings. While the previous methods aim at automatic retargeting, we have shown that much better results can be obtained with minimal user intervention. Our future work is reducing the computational cost because the processing time increases in accordance with the number of variations of x and y .

References

RUBINSTEIN, M., SHAMIR, A., AND AVIDAN, S. 2008. Improved seam carving for video retargeting. In *SIGGRAPH 2008*, ACM.