Region Based Non-Uniform Scheme for Effective Retargeting

[1]Ethireddy Sasikala Reddy, [2]Y Swathi, [2]K Chandini, [2]S Swetha, [2]Ch Swapna
[1]Assistant Professor, Dept. of ECE, Gokula Krishna College of Engineering, Sullurpeta
[2]UG Scholar, Dept. of ECE, Gokula Krishna College of Engineering, Sullurpeta

Abstract—With the invent of displays of varied features like bendable displays, twistable displays and slant displays the feed of these displays need to be adjusted so that useful objects of the scene are not destroyed. In general, if we want to project a particular scene of specified size after capturing on the display of other dimensions, image resizing is done. In image resizing, the whole image will be converted into dimension of the target display. In the process the whole image, including all the objects may be expanded or squeezed depending on the size of the target display. But, in image retargeting, in addition to changing the size of the image to suit the target display, some additional intelligence will be added there by preserving or retaining useful objects and removing unnecessary background information. In this paper, the global significance map will drive the retargeting which is formed by merging the local significance maps. The local significance maps are derived after forming regions by considering the average intensity levels locally. The simulation results clearly show the superiority of the scheme proposed.

Index Terms— aspect ratio, image resizing, image retargeting, image wrapping, resolution.

1 INTRODUCTION

Image retargeting is a process of changing image dimensions with respect to specific target display and it has a close relation to the regular image resizing the basic difference between image resizing and image retargeting is that in image resizing the length and width of image will vary as per the requirement. For instance, if the number of rows need to be increased then additional rows will be added in corresponding to the existing rows. So, this operation will be performed in a uniform fashion. Similarly, if the number of rows need to be reduced then few rows will be removed in a regular fashion. Regular mean that uniform positions will be selected for removal of rows of pixel. So, image resizing is just changing the dimension of an image and image retargeting can be considered as a broader class image resizing [1]-[4].

In image retargeting, in addition to changing the dimension of an image some additional intelligence will be given to the process of changing the dimension in such a way that useful information will not be disturbed and if in case if the size needs to be increased additional rows or columns will be added in the region of interest. Generally, the region of interest will be where some useful objects are present in the image. For example, if we consider any image there will be fore ground as well as background regions. In background region there will be few objects which usually be rejected to be considered as a useful object whereas in the fore ground all the objects will be considered as useful objects and hence, they cannot be ignored [5]-[9].

The image free targeting mainly arises because of latest display units which can which can be folded bended or even twisted nowadays we have wearable display units which tends to change it appearance as well as size so because of these the images or videos which are being played or displayed on these display units need to get adopted to the dimensions of display units as and when they change date and appearance and shape [10]-[12].

The purpose of retargeting is when the display unit change its size and appearance the objects of the image should not change its significance in the process to identify useful objects or important objects in the image and also need to identify the region of image which can be ignored to some extent. So, this directly mean that the process involves in identifying two kinds of regions in the image one is significant other one is less significant [13].

2 BACKGROUND

Image resizing can be done in a regular way by simply changing the aspect ratio of the image. The aspect ratio can be changed by reducing the number of pixels in rows and columns as desired by the target display unit. The simplest technique is to suppress the pixels row or column-wise as depicted in Fig. 1 and 2. In Fig. 1, the columns are reduced by merging adjacent pixels. Similarly, in Fig. 2, the rows are reduced by merging adjacent pixels [14]. The problem with this scheme is that the merging takes place uniformly over the image are and doesn't consider the features and object characteristics in the image [15].

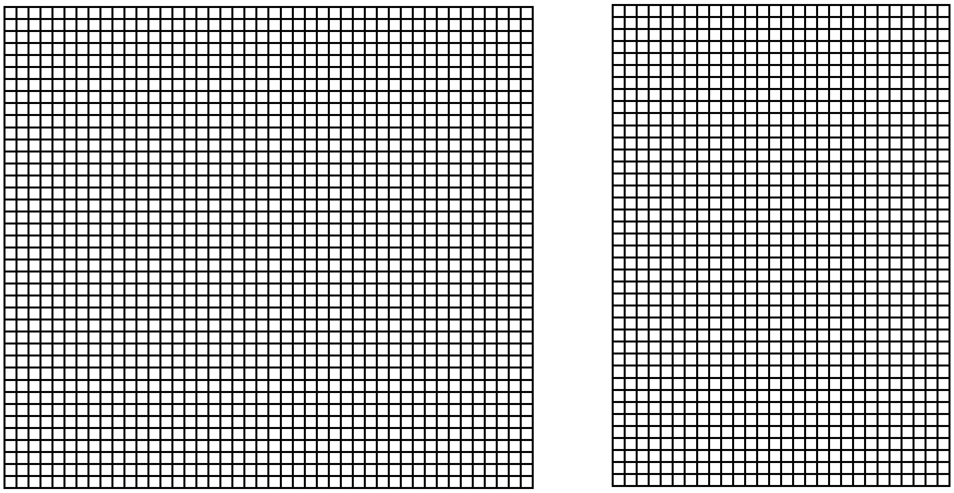

Fig. 1 Significance map of input image and uniformly horizontal resized image

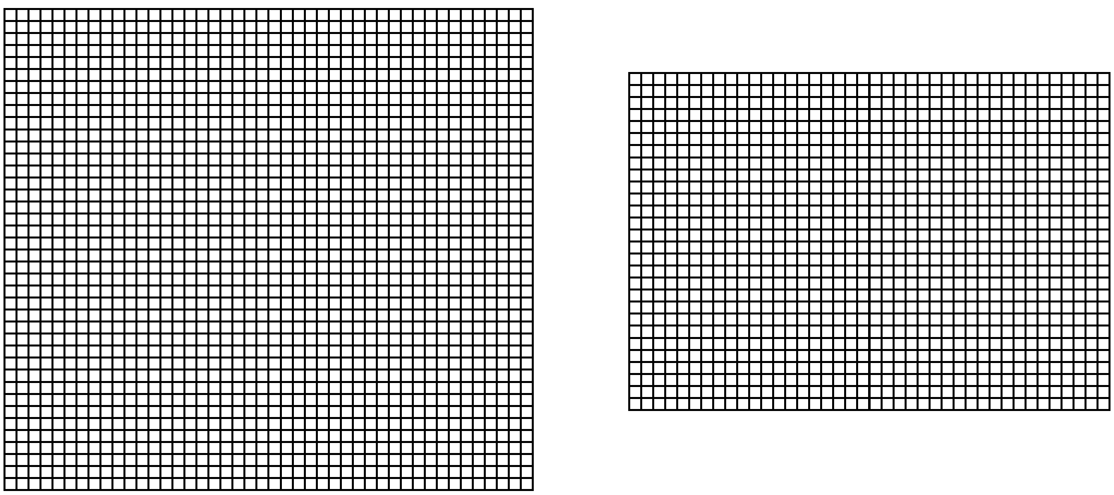

Fig. 2 Significance map of input image and uniformly vertical resized image

If this is the case, then the crucial objects in the image will undergo the squeezing or expanding effect which degrades the quality of the image. Example of such a case is shown in the Fig. 3.

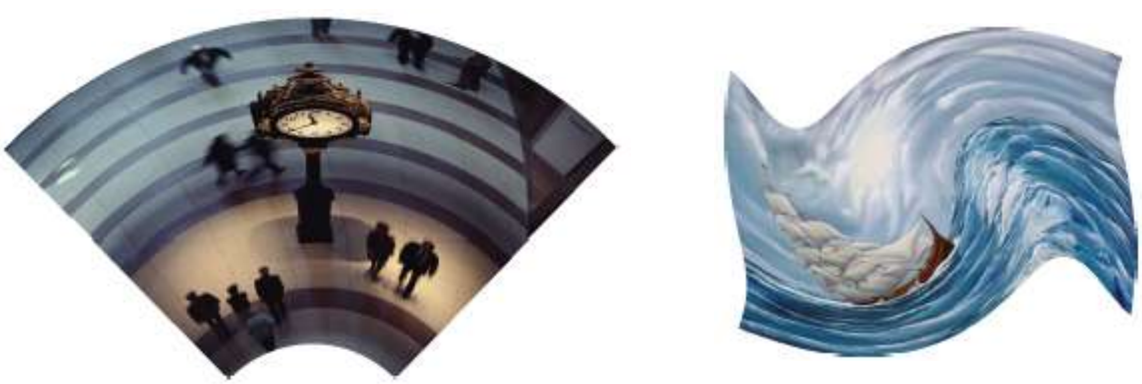

Fig. 3 Improper resizing and wrapping [11]

3 Proposed Scheme

The block the block diagram shows the complete process. The first step is to take the input the input will be given to localization block. Here the localization means identifying different or similar regions so this process is generally done by different functions or contours. Initially the contour will start to divide the image into regions and then the contour changes its shape and try to identify as many significant regions as possible. Region should not be very large in the sense the number of regions should be small to make it clearer. The number of regions should not be very small like dissimilar areas should not be mixed in a same region at the same time the number of regions should not be very large so if there are large number of regions, the processing will be difficult. Hence there is a trade-off at the total number of regions.

In the block diagram, the localization is placed in some sort of loop. So, this indicates that localization is not an autonomous process which cannot be done in a single shot. Localization is a repetitive process. After localization, calculation of significance map for individual local regions will be done. This is indicated in the block diagram. The main difference between the existing techniques and the proposed technique lies in the calculation of local maps for individual local regions. In the earlier techniques, there are no local regions. Correspondingly, there are no local maps. Hence there will be a single map for the whole image. So that's why in uniform retarding scheme, many useful pixels will be lost. So, in the proposed technique, significance maps are calculated for each local area separately and they are integrated in such a way that there are no visual artifacts in the process of merging these local significant maps.

After calculating local significance maps, these are integrated to generate global significance map. So, before generating the global significance map, as in the case of sparse coding, when the individual patches will be combined after pre-processing. Here also the individual local maps need to be mapped properly at the neighbours or boundaries and scaling will be done. So, after calculating local significance map to individual local regions scaling factor will be calculated. Then, after applying the scaling factor to individual local regions global significance map will be generated and when we apply this global significance map to the original image, we obtain retargeted image.

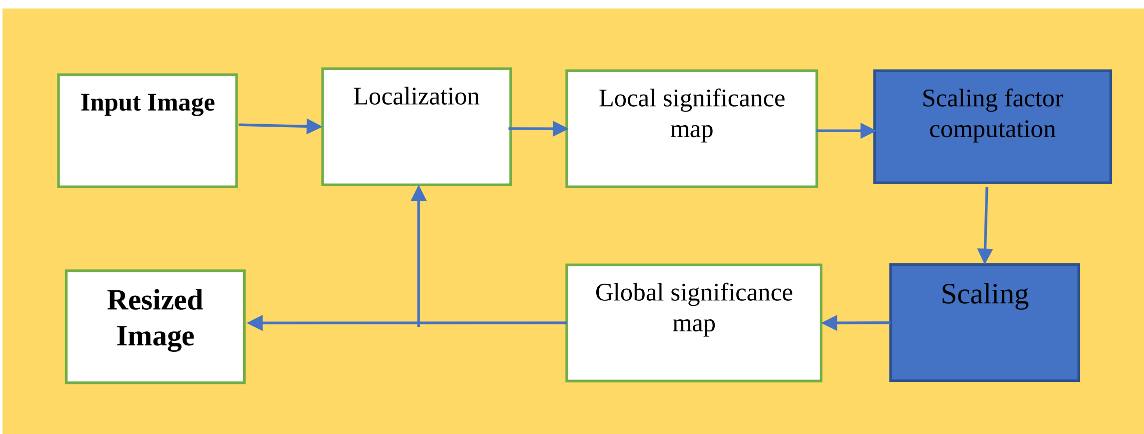

Fig. 4 Scheme of proposed method

Based on the localization, i.e., after identifying the useful objects, the significance map is computed. A sample map is shown in Fig. 5.

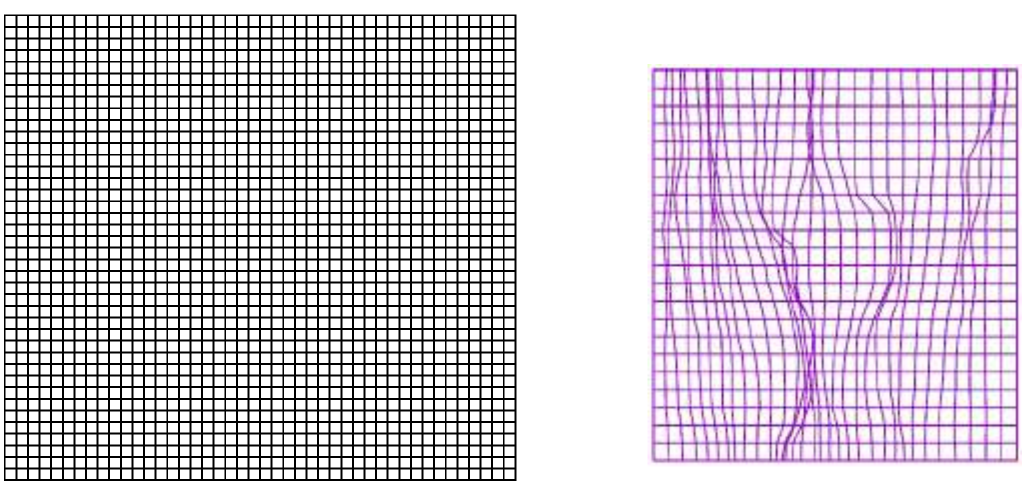

Fig. 5 Significance map of input image and non-uniformly resized image

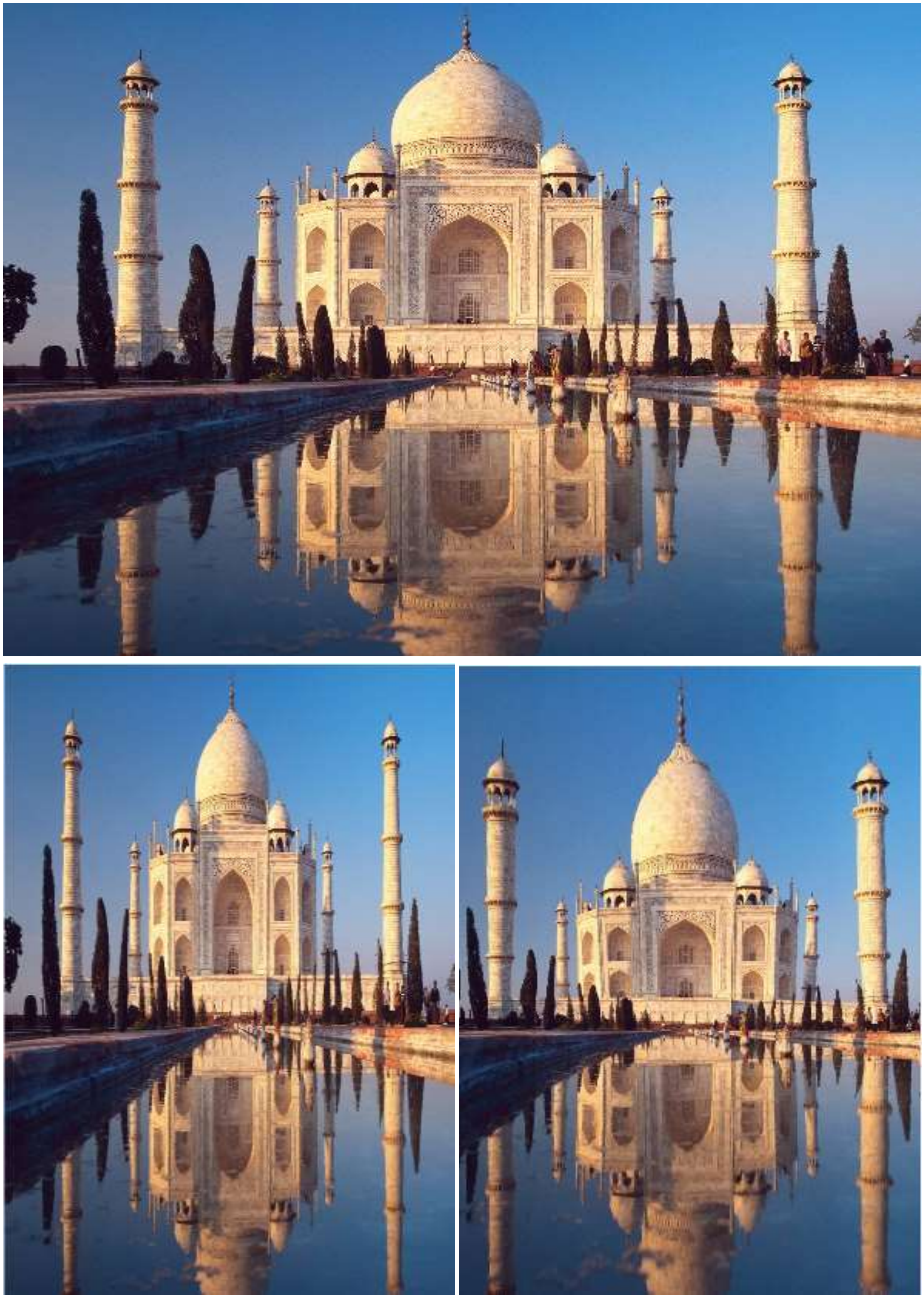

Fig. 6 Simulation result: Input image, resized image using homogeneous resizing and proposed method

Fig. 7 Simulation result: Input image, resized image using homogeneous resizing and proposed method (Another test image)

4 SIMULATION RESULTS

In this section the simulation results of the proposed technique are presented. As expected, the useful objects of the original image are retained in the retargeted image as shown in the Fig. 6 and Fig. 7. In the literature there are no objective design metrics for retargeting. The retargeting scheme is mainly analysed using subjective parameters. The subjective parameters include the perception with human intervention. Hence, in this work also only subjective performance analysis is carried. In comparison to the proposed scheme, the retargeted images using uniform retargeting clearly squeezes or expands the objects presented in the image which can be termed as a simple resizing. In contrast to this, in the proposal scheme as can be verified from the Fig. 6 and Fig. 7, the useful objects are retained and the background information was removed. Hence managing the required aspect ratio as well as required size.

5 CONCLUSIONS

In this paper, a non-homogeneous image resizing is proposed using a region based adaptive scaling factor. The scheme can be easily adapted to include efficient architectures of localization and object detection schemes. The distortion resulted in the process of resizing was well distributed over the areas of less importance while retaining maximum information of the regions of importance. The scheme is tested with many test images including those with large as well as less information. The simulation results verify that the important regions are almost unaltered. The results of first image clearly shows the superiority of the scheme, where the distortion was shifted to the area in shadow. That distortion can also be moved to other portions of the image by changing the termination condition.

REFERENCES

[1] Y. Amit, D. Geman, and K. Wilder, “Joint induction of shape features and tree classifiers”, IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 19, no. 11, November 1997.

[2] Jaya Krishna Sunkara, Uday Kumar Panta, Nagarjuna Pemmasani, Chandra Sekhar Paricherla, Pramadeesa Pattasani, Venkataiah Pattem, “Region Based Active Contour Model for Intensity Non-uniformity Correction for Image Segmentation”, International Journal of Engineering Research and Technology, vol. 6, no. 1, pp. 61-73, 2013.

[3] K. Sung and T. Poggio, “Example-based learning for view-based face detection,” in IEEE Patt. Anal. Mach. Intell., volume 20, pages 39–51, 1998.

[4] Jaya Krishna Sunkara, E Navaneethasagari, D Pradeep, E Naga Chaithanya, D Pavani, D V Sai Sudheer, “A New Video Compression Method using DCT/DWT and SPIHT based on Accordion Representation”, I.J. Image, Graphics and Signal Processing, pp. 28-34, May 2012.

[5] V. V. Satyanarayana Tallapragada, B. Bhaskar Reddy, V. Ramamurthy and Jaya Krishna Sunkara, “Effective Compression of Digital Images Using SPIHT Coding with Selective Decomposition Bands”, in First International Conference on Advances in Electrical and Computer Technologies, Springer, Coimbatore, India, pp. 651-655.

[6] Paul Viola and Michael Jones, “Rapid Object Detection using a Boosted Cascade of Simple Features,” in Conference on Computer Vision and Pattern Recognition 2001.

[7] Itti, L., Koch, C., and Neibur, E. 1999, “A model of saliency based visual attention for rapid scene analysis,” PAMI 20, 11, 1254–1259.

[8] Avidan, S., and Shamir, A. 2007, “Seam carving for content aware image resizing,” ACM Trans. Graph. 26, 3, 10.

[9] Jaya Krishna Sunkara, Purnima Kuruma, Ravi Sankaraiah Y, “Image Compression using Hand Designed and Lifting Based Wavelet Transforms”, International Journal of Electronics Communications and Computer Technology, vol. 2 (4), 2012.

[10] Jaya Krishna Sunkara, E Navaneethasagari, D Pradeep, E Naga Chaithanya, D Pavani, D V Sai Sudheer, “A New Video Compression Method using DCT/DWT and SPIHT based on Accordion Representation”, I.J. Image, Graphics and Signal Processing, pp. 28-34, May 2012.

[11] Gal, R., Sorkine, O., and Cohen-Or, D. 2006, “Feature aware texturing,” in Proceedings of Eurographics Symposium on Rendering, 297–303.

[12] Robert E. Schapire, Yoav Freund, Peter Bartlett, and Wee Sun Lee, “Boosting the margin: A new explanation for the effectiveness of voting methods,” in Proceedings of the Fourteenth International Conference on Machine Learning, 1997.

[13] F. Liu and M. Gleicher, “Video retargeting: automating pan and scan,” in ACM Multimedia, 2006.

[14] J. Meng, Y. Juan, and S.-F. Chang, “Scene change detection in an MPEG-compressed video sequence,” in Digital Video Compression: Algorithms and Technologies, 1995.

[15] V. V. Satyanarayana Tallapragada, N. Ananda Rao and Satish Kanapala, “Leaf Disease Detection using Combined Feature of Texture, Colour and Wavelet Transform”, International Journal of Control Theory and Applications, vol. 10, No. 21, 2017, pp. 159-167.