Seam Carved Vectorization

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I. PROJECT EXPLANATION

This image-processing project is a content-aware resizing algorithm. It takes an RGB image as input, either specified by the user or using a default one. This serves as input for the ResNet50 model which performs object recognition and the GradCam method which generates a class activation map (CAM) that visually explains the model's decisions. The CAM can be made of a class of choice or simply the one with the highest score. Next, the Midas model estimates the depth map of the image, after which the depth map and CAM are combined in one heatmap. The user can specify a ratio to balance the significance of each map. In addition, the final heatmap can be adjusted by the user with a painting tool to make sure all salient parts are marked. The modified heatmap is input for the SeamCarver script to apply seam carving (content-aware resizing). How much is being carved can be chosen by the user. Then, the carved image is then vectorized and the vectors are "uncarved" to their original positions, which means they will be stretched in parts where seams were carved. The ColorInterpolator fills in the uncarved vectorized image with interpolated colors and converts it to a rasterized format. Finally, the rasterized image is saved and displayed.

II. VISUALIZATIONS

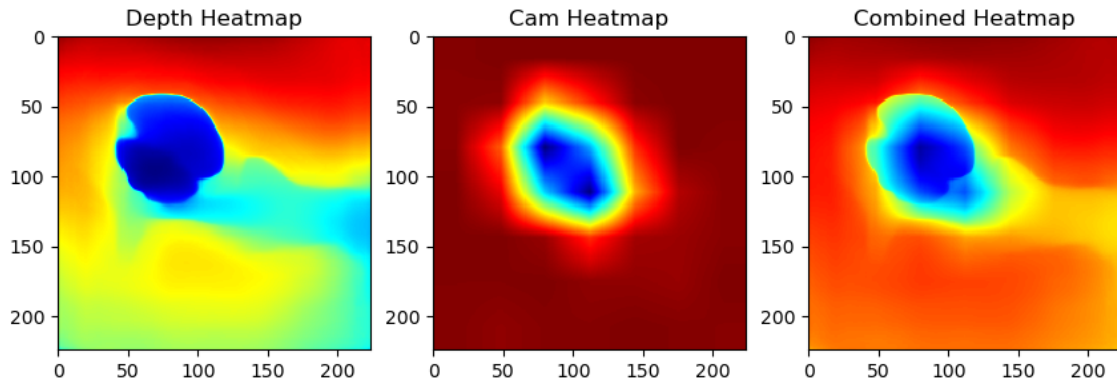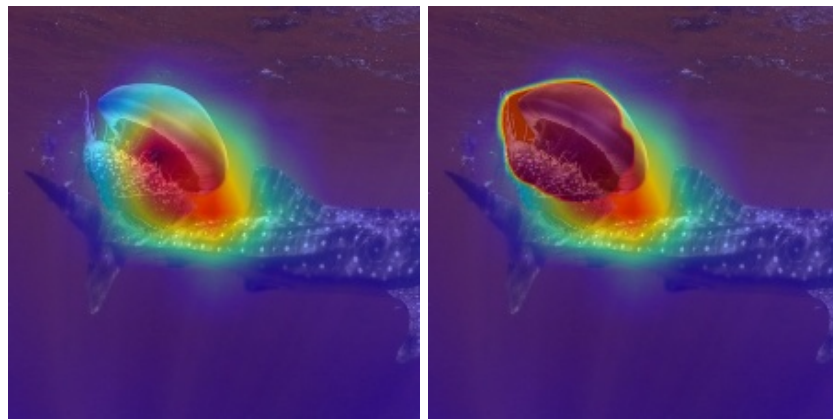Fig. 1: Raw Image with Jellyfish and Tigershark

Fig. 2: Feature Maps

(a) Original

(b) Adjusted with Painting
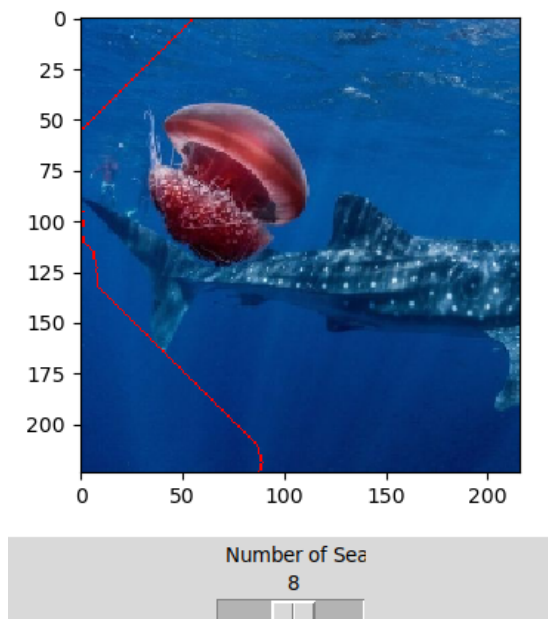
Fig. 3: Combined Heatmap On Raw Image

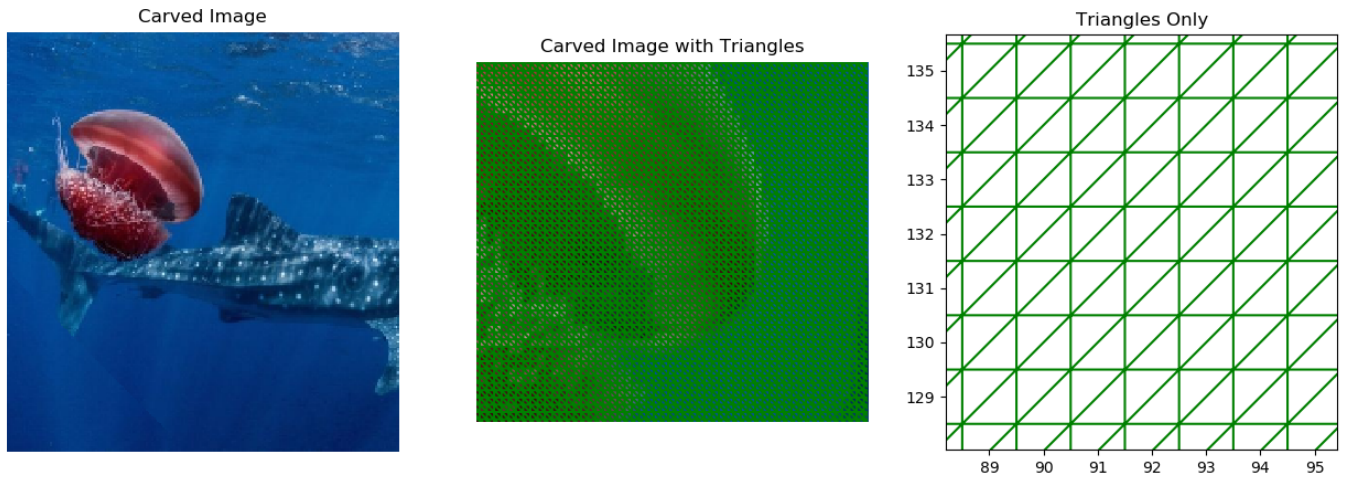Fig. 4: Seam Carving GUI *(slider at 8 seams removed)*

Fig. 5: Carved image, with 15 Seams Carved *(left)* and Zoomed In Vectorization *(middle and right)*
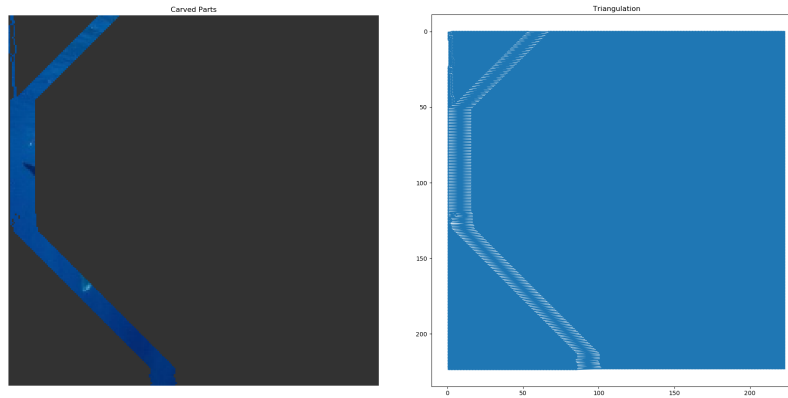

Fig. 6: Carved Part of the Image *(left)* and Uncarved Vectors *(right)*

Fig. 7: Rasterized Image with Color Interpolation for Carved Parts (see Figure 6)