

Initial Plan – Photo Montage

Project Title: Photo montage

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Module Number: CM3203

Module Title: One Semester Individual Project

Credits Due: 40

Project description:

Photomontage is a technique to make a composite photograph by cutting, cropping, joining, rearranging and overlapping a number of other photographs. The aim of this project is to devise and implement a photomontage system that can automatically combine parts of a set of photographs into a single composite seamless picture.

The project we consider can be separated into four steps. The first step of my project will be region detection to maximise visible visual information, this will require me to determine which regions of each image are informative or salient. Thus, in this project, a rectangle image enclosing the most salient regions will be extracted.

The second step will be image arrangement, this will require me to pack the regions of interest together with different rectangular sizes. After roughly building the whole system, I will research and try to implement other methods of images arrangement (e.g. summary extracted regions into a single image using similarity) rather than roughly paste them together.

The third step is to fill in any holes using exemplar-based inpainting technique. Because of the different sizes of selected rectangular regions, some holes are left after image arrangement. To address this problem, a novel algorithm which combines advantages of “texture synthesis” algorithm and “inpainting” techniques will be used.

The final step is to refine the image to make it more coherent, and also, resize the image if required. The aim is of this step to reconstruct an image that optimises the bidirectional similarity measure and produces visually coherent small-sized summaries.

Using java and OpenCV as my programming languages of choice I will build my system based on these two paper: A. Criminisi, P. Perez, K. Toyama, "Object Removal by Exemplar-Based Inpainting" and D. Simakov, Y. Caspi, E. Shechtman and M. Irani, "Summarizing Visual Data Using Bidirectional Similarity".

Project Aims and Objectives:

Aim: Create a graphical user interface and program for effective image processing, system testing and evaluation.

Objectives:

- Use Java programming language to produce a simple GUI.
 - Add the OpenCV library to support basic image treatment (brightness, contrast, threshold, ...) and object detection (face, body, ...) etc.
 - The program structure should be modular to allow for rapid prototyping and easy extension.
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Aim: Extract salient regions and arrange them.

Objectives:

- Extract rectangles from each image which enclosing the most salient region by computing the salient map which can be represented as multiple weighted rectangles.
 - Output a summary image with selected regions roughly alignment.
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Aim: Generate a seamless image.

Objective:

- Use exemplar-based inpainting technique to fill in any holes.
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Aim: Image refinement and image resizing.

Objective:

- Reconstruct an image using bidirectional similarity and produce visually coherent small-sized summaries.
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Aim: System refinement.

Objectives:

- Research other methods of images arrangement (e.g. summary extracted regions into single image using similarity) rather than roughly paste them together
 - System testing and debugging.
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Aim: Conduct a user study to indicate that if my system can create a satisfactory photomontage with a high efficiency.

Objective:

- Some volunteers are asked to create photomontage by themselves using 3 to 5 groups of images with numbers 10-50.
- Answer some questions after operating on each group of images.

Work Plan:

Supervisor Meetings:

Meetings have been scheduled to take place on Thursday every week at 11 am to discuss project status.

Week 1 (25/01/2016): Perform project research and develop an initial Plan

Week 2 (01/02/2016):

- Create a basic user interface for inputting images and outputting results
- Research and implement salient regions extraction techniques

Week 3 (08/02/2016):

- Continue implement regions extraction techniques

Week 4 (15/02/2016):

- Continue implement regions extraction techniques

Week 5 (22/02/2016):

- Finish salient regions extraction technique.
- Implement image arrangement (roughly align them)
- Research and implement holes filling algorithm (exemplar-based inpainting technique)

Week 6 (29/02/2016):

- Continue research and implement exemplar-based inpainting technique

Week 7 (07/03/2016):

- Continue research and implement exemplar-based inpainting technique

Week 8 (14/03/2016):

- Finish holes filling algorithm.
- Research and implement summarization algorithm using bidirectional similarity to achieve refinement and resizing

Easter (21/03/2016):

- Research and implement summarization algorithm using bidirectional similarity to achieve refinement and resizing
- Roughly complete the building of the whole system
- Research other methods of images arrangement (e.g. summary extracted regions into single image using similarity) rather than roughly paste them together

Week 9 (11/04/2016): Perform bug fixes

Week 10 (18/04/2016): User testing and evaluation of results

Week 11 (25/04/2016): Produce the final report

Week 12 (02/05/2016): Submit final report **(06/05/2016: Hand in Date)**

