Image Deblurring - Methods and Plans

Group 8

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1 Introduction

For our project we decided to participate in the 2017 Huawei competition on image deblurring. The competition focuses on deblurring images of license plates, to make them readable by an OCR system. We will be provided with a data set consisting of 4000 clear and 100 blurred and labelled images of license plates as training data. We intend to use ML techniques to infer the blur type and then image processing tools to produce a clear image.

Our approach to this project is to wrap the core code needed for the competition inside a user-oriented product. At the beginning, this will be a website where users will be able to upload a blurred picture of a license plate and get the deblurred version of it.

2 Methods

We chose Scrum as our agile method as most of our group members have had previous experience with it during their summer internships. Our delegated ScrumMaster, A. Papadopoulos, will ensure we keep an up-to-date work backlog of prioritized items and tasks. We will use Github for version control, Trello as our task board and Slack as our communication tool. We have decided to have our sprints coincide with the project checkpoints.

Before each sprint we will have a sprint planning session in which our ScrumMaster will pick relevant items from the product backlog and we will identify and detail the required tasks that are required for each item.

Our team will hold a daily stand up meeting in Huxley at 10am on weekdays. However, due to conflicting schedules, we have designated a channel on Slack where we expect to see the daily check in from everyone (present in the meeting or not). This message will include the work done on the previous day, the work expected to be done that same day and any issues that have arisen. We will mostly be doing pair programming, however we will also ensure that the team works together as a whole.

Furthermore, we will hold a sprint review and retrospective at the end of each sprint so that we can analyse the sprint's success and devise actions that will improve our work flow in the subsequent sprint.

3 Planning

The following plan is the release plan which gives high level overview of each project iteration. To estimate achievable progress in each iteration, we had an initial meeting and adjusted the goals to the competition and the project deadlines.

Sprint	**Objectives**
09/10 - 20/10	· Meet with the Huawei competition organisers and obtain the data set. · Research existing technology for classifying image blur types. · Research existing technology for image deblurring. · Ascertain which resources are required. · Experiment with some basic image (de)blurring techniques. · Set up our continuous integration tools and servers. · Build a simple website to output our results.
23/10 - 03/11	· Implement a deblurring algorithm using the methods learnt. · Introduce our own deep learning network. · Generate training data from the provided image set. · Enhance the website.
06/11 - 17/11	· Gather performance metrics. · Gather user feedback through user testing to ensure that the interface is easy and intuitive to use. · Improve the working deblurring algorithm. · Test our code and do some final changes before submitting it for the competition.
20/11 - 01/12	· Gather final performance metrics. · Gather final user feedback. · Work on the project documentation to deliver a rigorous explanation of the algorithm. · Extend our product (for instance by adding video processing).

By following this plan, we should be able to have a working product for the competition by the end of the third sprint, which is 3 days before the competition deadline. The last iteration has unclear requirements; some proposed goals are to extend the deblurring algorithm from images to videos. Regardless of what our extension is, the main focus of the last sprint will be to deliver a usable product, as explained in the introduction.

4 Risk Management

4.1 Technical Risks

- Using new technologies such as Tensorflow. This is a risk since we might be delayed by having to familiarize ourselves with the technology first. We will mitigate this by allocating a few hours for getting familiar with the library during the first sprint.

- Implementing new methods. For instance some mathematical models for Machine Learning. To solve this, we will read research papers and books on image deblurring. Also, most of the team members are taking Data Science and Computer Vision modules in the first term.

- Lack of access to the potentially needed resources. We discuss it on the first sprint so that if we need to request access to use some specific service, we have the time to do so. If that is not possible, we will find less computationally expensive methods of implementing our algorithms since we will have enough time to change our approach.

4.2 Non-technical Risks

- Dependency on Huawei for the dataset. We have already contacted Huawei and we are expecting to get the data set during the first half of the first sprint. Alternatively, some of our team members can dedicate some time to build our own data set, which could be useful to use in addition to the one we are provided.

- Potential illness or special circumstances of team members. The platforms we use allows our team members to work from home (Github, Trello and Slack). We will also avoid having just one person responsible for any critical piece of the code base.

- Time restriction due to coursework and interviews for the placement (all members are on the MEng program). This is solvable only through planning of time allocated to the project and the other modules as they are of equal importance.