Total Variation Based Image Inpainting

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Summary (English)

The goal of the thesis is to ...

Summary (Danish)

Målet for denne afhandling er at ...

Preface

This thesis was prepared at DTU Compute in fulfilment of the requirements for acquiring an M.Sc. in Engineering.

The thesis deals with ...

The thesis consists of ...

Lyngby, 2015

Ulrik Veirup Groth

Acknowledgements

I would like to thank my....

Contents

Chapter 1

Introduction

The following text is a message to the student and should be removed during the writing process.

Please note the following instructions regarding an MSc thesis outlined in the study handbook:

"During the first month, the student is to submit a project plan outlining the objective of the thesis and justification for same to his/her supervisor. In the project plan, the student is also to take into account the overarching learning objectives listed above. When submitting the thesis, the student is to enclose a separate document presenting the original project plan and a revision of same, where appropriate. In addition, the document is to include a brief auto-evaluation of the project process."

To learn more about the rules for an MSc thesis, please consult the rules for your own MSc programme at `http://sdb.dtu.dk`.

1.1 Project plan

We note that the contents of the project plan is also something we would like to see in the introductory chapter of your thesis. In fact, you can reuse your final project plan (possibly extended) as the introduction. If you prefer to write an introduction from scratch, it is, of course, important that it is consistent with the final project plan.

1.2 The "separate document"

It is also important to note that the separate document containing

- original project plan
- possibly revised project plan.
- brief self-evaluation

mentioned above will be passed on to the external examiner and since it contains the learning goals and the objectives for your thesis, it will be taken into account when your thesis is assessed.

Chapter 2

Getting Started

$$\frac{\partial u}{\partial t} = \nabla \frac{\nabla u}{|\nabla u|} + \lambda_e \left(u - u_0\right) \tag{2.1}$$

$$\frac{\partial u}{\partial t} = \nabla \frac{\nabla u}{|\nabla u|} \tag{2.2}$$

$$\hat{D} = \frac{1}{|\nabla u|} \tag{2.3}$$

$$\hat{D} = f\left(|\nabla u|\right) \tag{2.4}$$

$$\hat{D} = \frac{g\left(|\kappa|\right)}{|\nabla u|} \tag{2.5}$$

$$g(s) = s^p, \quad s > 0, p \geq 1 \tag{2.6}$$

$$\kappa = \nabla \cdot \frac{\nabla u}{|\nabla u|} \tag{2.7}$$

$$\nabla \cdot \mathbf{j}_{(0,0)} \simeq \frac{\mathbf{j}^1_{(\frac{1}{2},0)} - \mathbf{j}^1_{(-\frac{1}{2},0)}}{h} + \frac{\mathbf{j}^2_{(0,\frac{1}{2})} - \mathbf{j}^2_{(0,-\frac{1}{2})}}{h} \tag{2.8}$$

$$\mathbf{j} = (\mathbf{j}^1, \mathbf{j}^2) = -\frac{g(|\kappa|)}{|\nabla u|}\nabla u = -\frac{g(|\kappa|)}{|\nabla u|}(u_x, u_y) \tag{2.9}$$

$$\mathbf{j}^1_{(\frac{1}{2},0)} = \left[-\frac{g(|\kappa|)}{|\nabla u|} \cdot u_x\right]_{(\frac{1}{2},0)} \tag{2.10}$$

$$\begin{aligned} \kappa &= \nabla \cdot \left[\frac{\nabla u}{|\nabla u|}\right] = \frac{\partial}{\partial x}\left[\frac{u_x}{|\nabla u|}\right] + \frac{\partial}{\partial y}\left[\frac{u_y}{|\nabla u|}\right] \\ &= \frac{\partial}{\partial x}\left[\frac{u_x}{\sqrt{u_x^2 + u_y^2}}\right] + \frac{\partial}{\partial y}\left[\frac{u_y}{\sqrt{u_x^2 + u_y^2}}\right] \end{aligned} \tag{2.11}$$

$$\kappa_{(\frac{1}{2},0)} \simeq \frac{\left[\frac{u_x}{\sqrt{u_x^2+u_y^2}}\right]_{(1,0)} - \left[\frac{u_x}{\sqrt{u_x^2+u_y^2}}\right]_{(0,0)}}{h} + \frac{\left[\frac{u_y}{\sqrt{u_x^2+u_y^2}}\right]_{(\frac{1}{2},1)} - \left[\frac{u_y}{\sqrt{u_x^2+u_y^2}}\right]_{(-\frac{1}{2},1)}}{2h} \tag{2.12}$$

$$u_{x(\frac{1}{2},0)} = \frac{u_{(1,0)} - u_{(0,0)}}{2h} \tag{2.13}$$

Appendix A

Stuff

This appendix is full of stuff ...