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Multi Image Bilirubin Estimation Vision Document

Revision <1.0>

Revision history

Date	Version	Description	Author
05.02.2021	<1.0>	First draft of the vision document	Kristoffer Vanebo

Content

1.Introduction

This document is for documenting the problem domain and goals of this bachelor thesis. The thesis is a research project for Picterus AS into multi image processing machine learning models. It is part of Picterus' research into viable machine learning models for the estimation of bilirubin values in newborns, which again is a part of their development of a mobile application which will be used for measuring bilirubin values in newborns.

2. Summary of problem and product

2.1.Problem

The problem is the necessity of an easy way to measure bilirubin levels in newborns, especially for some of the poorer regions of the world where many deaths occur due to extreme bilirubin values in newborns which don't get the needed treatment. Therefore Picterus are in development of a mobile application for estimating bilirubin values, and are looking into possible machine learning models to achieve this task. The results of this product will possibly be part of the application developed by Picterus.

2.2.Product

The product will be the resulting thesis and models produced by the research into multi image processing machine learning models, which have the goal of estimating bilirubin levels in images of newborns. It will also be crucial to measure the accuracy and efficiency of these models as compared to existing models for estimation.

3.Overview of stakeholders and users

3.1.Summary stakeholders

Name	Description	Role during development
Picterus AS	Picterus is developing a mobile app for bilirubin estimation, and are looking into machine learning models to accomplish this task. Whilst they are working on some approaches, I will be looking into the specific task of multi image processing models. The created models may be used as part of their system if they provide any advantages over other approaches to this same task.	Will have an assisting role by providing dataset, workspace in form of gitlab and other needed assistance for research and result analysis.

3.2.Summary users

Name	Elaborated description	Role during development	Represented by
Picterus AS	Is the owner and creator of the application, which the product created by this project may become a part of.	May provide feedback on progress, as well as assistance in researching the issue, creating the model and analyzing the data produced.	Themselves

3.3.User environment

The user environment is a mobile application in development, with the purpose of estimating bilirubin values in newborns from images taken by the smart phone. As part of this, the system needs a model to estimate bilirubin from the taken and processed images. Currently physics models are used for this case, but Picterus AS are researching machine learning models which may take over this task.

3.4.Summary user needs

Need	Priority	Affects	Current solution	Suggested solution
Methods for estimating bilirubin	High	The apps ability to estimate bilirubin levels	Physics models	Multi image processing machine learning methods.

3.5.Alternative products

Alternative products will be competing models for bilirubin estimation. This includes current physics models and other machine learning approaches. Currently physics models are in use, but other machine learning models are also in consideration for this task of estimating bilirubin levels.

4.Product overview

4.1.Product role in user environment

The role of this product will be as an alternative to current models for estimation, and other machine learning approaches. It is therefore necessary for it to be evaluated in comparison to other models. The results of the thesis, will bring light to what the capabilities of multi image processing machine learning models may achieve in this setting.

4.2.Conditions and dependencies

The conditions surrounding this product, is that the created models must process a set of images as one and do an estimation based on this, not based upon single image estimation.

4.3.Requirements

The requirements of the product will be the delivery of machine learning models based upon multi image input estimation. It will also be required to deliver the thesis written on the back of the created models.