

# Progress Report 1

## Nested Data Parallelism for Image Processing Algorithms

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### 1 Leading question

**How can we implement this high-level irregularly-parallel algorithm such that it compiles to efficient machine level code?**

#### Subquestions

- How much faster is a parallel variant against the sequential one?
- How much faster is a compiled variant to human-written low-level parallel code?

### 2 What I have done

I have read further papers on how Nested Data Parallel works. I have also decided to manually transform/vectorize the program, because the generated program is hard to read/too long... and sometimes GHC can't compile. (NDP is still work in progress!)

I have chosen Histogram-Balancing as my algorithm. The algorithm has sufficient opportunities to demonstrate the powers of NDP and is small enough to be manually transformed - as opposed to ShortestPaths, Connected Components Labeling, etc...

### 3 What I will do next

I will test my implementation and complete the transformations. This will take a while. Then I am ready to do the other two (easier) implementations  $P_s$  and  $P_m$ .

### 4 Progress

80% Read more papers on Nested Data Parallel Haskell

60% Read more papers on Analysis of Parallel Programs

100% Decide on an algorithm (Histogram Balancing)

50% Program Transformation:

100% Desugar

50% Vectorization  
 0% Inlining & Fusioning (means Optimization)

0% Implement sequential variant  
 0% Implement manually-parallelized variant  
 0% Answer first subquestion  
 0% Answer second subquestion  
 ?% *stuff*  
 0% Written thesis  
 0% Colloquium

## 5 Time Table

Table 1: Time table

Current Week	CW	monday	thesis work
now	17	20.04	reading remaining papers, reading parallel complexity theory
	18	27.04	deciding on an algorithm
	19	4.05	<i>implementing <math>P_{np}</math>, vectorizing and optimizing <math>P_{np}</math></i>
	20	11.05	implementing $P_{np}$ , vectorizing and optimizing $P_{np}$
	21	18.05	implementing $P_s$ and $P_m$
	22	25.05	analysis & comparison
	23	1.06	<i>puffer</i>
	24	8.06	<i>puffer</i>
	25	15.06	Begin to write down, prepare for exams
	26	22.06	Writing..., prepare for exams
	27	29.06	Writing..., prepare for exams
	28	6.07	Prepare Colloquium, Writing..., exams week 1
	29	13.07	Prepare Colloquium, Finalize writing, exams week 1
	30	20.07	Colloquium and Release
	31	27.07	Last week for Colloquium and Release
	32	3.08	Fin :D