MPI Image Reconstruction

Introduction

MPI image processing demo by reconstructing original image from its edge image.

Prerequisite

To get, build and install this project, following dependencies are required :

- MPI implementations

Project Structure

- main.c : entry of this program
- defs.h : macro definition for working flow control
- arraytool : simple array tool for 2d continuous array allocation and deallocation
- boundary : sawtooth boundary value generator for top and buttom of the image with halo
- pgmio : simple pgm file IO library
- imgprocessing.h : abstracted image processing flow
- serial_imgprocessing.c : serial implementation for image processing in this program
- parallel_imgprocessing.c : parallel implementation with MPI for image processing in this program

Build

To build this project, you can open your terminal and type:

```
make
```

This will build the parallel version of this program. To build the serial version, type:

```
make serial
```

Corresponding program with name parallel/serial will appear under current working directory.

Usage

To run this program, type:

```
mpirun -n {n_processes} ./{program} {input} {output}
```

where:

- n_processes : number of processes running this program
- program : executables for this program, can be "parallel" or "serial" in this case
- input : path to the input file in pbm/pgm format
- output : path to the output file after reconstruction

Demo

Assumed that user has already build the program.

Firstly, type the corresponding command:

```
mpirun -n 4 ./parallel img/edgenew192x128.pbm
img/parallel192x128.pbm
```

After execution, output file parallel768x768.pbm will appear under current working direcotry. We will get the results illustrated below.

edgenew192x128.pbm

parallel192x128.pbm

Test

You can type following command to test:

```
make test
```

This command will run tests on the given 4 images and check the results by comparing the output images from parallel command with the results

obtained from serial version. Command **diff** is used for pbm file comparasion. Test procedure can be found in the test script.