Digital Image Processing
HW#1

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Outline

- Flow Chart
- Introduction to Bitmap File
- Homework Details
  - Extract Header File
  - Calculate Gray-Level Histogram
  - Power-Law Transformation
  - Get Original Image
- Grading
- Due Date & Demo Schedule
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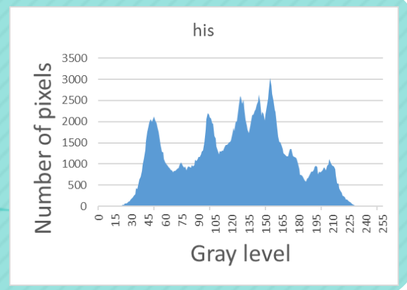
- Reference

Flow Chart

Fig.1



512 pixels

512 pixels

Extract Header Information

Extract Pixel Information

Calculate Gray-Level Histogram

Power-Law Transformation

$C = 1$
$\gamma = 0.5$

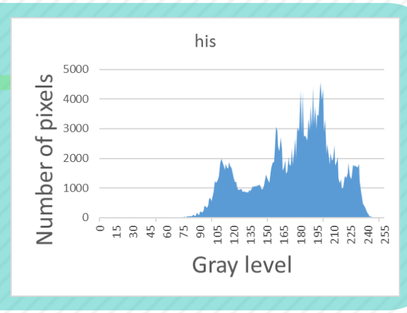


Fig.2-1

Fig.2-2

$C = 1$
$\gamma = 2.0$

Get Original Image

$C = 1$
$\gamma = 4.0$

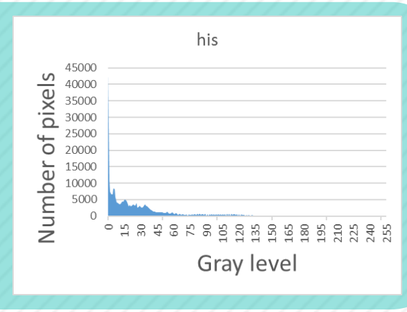


Fig.3-1

Fig.3-2

$C = 1$
$\gamma = 0.25$

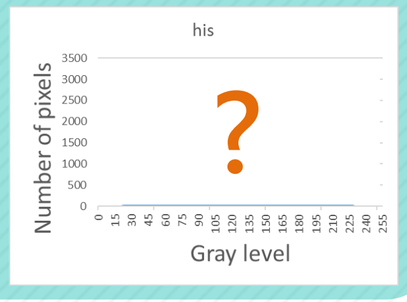
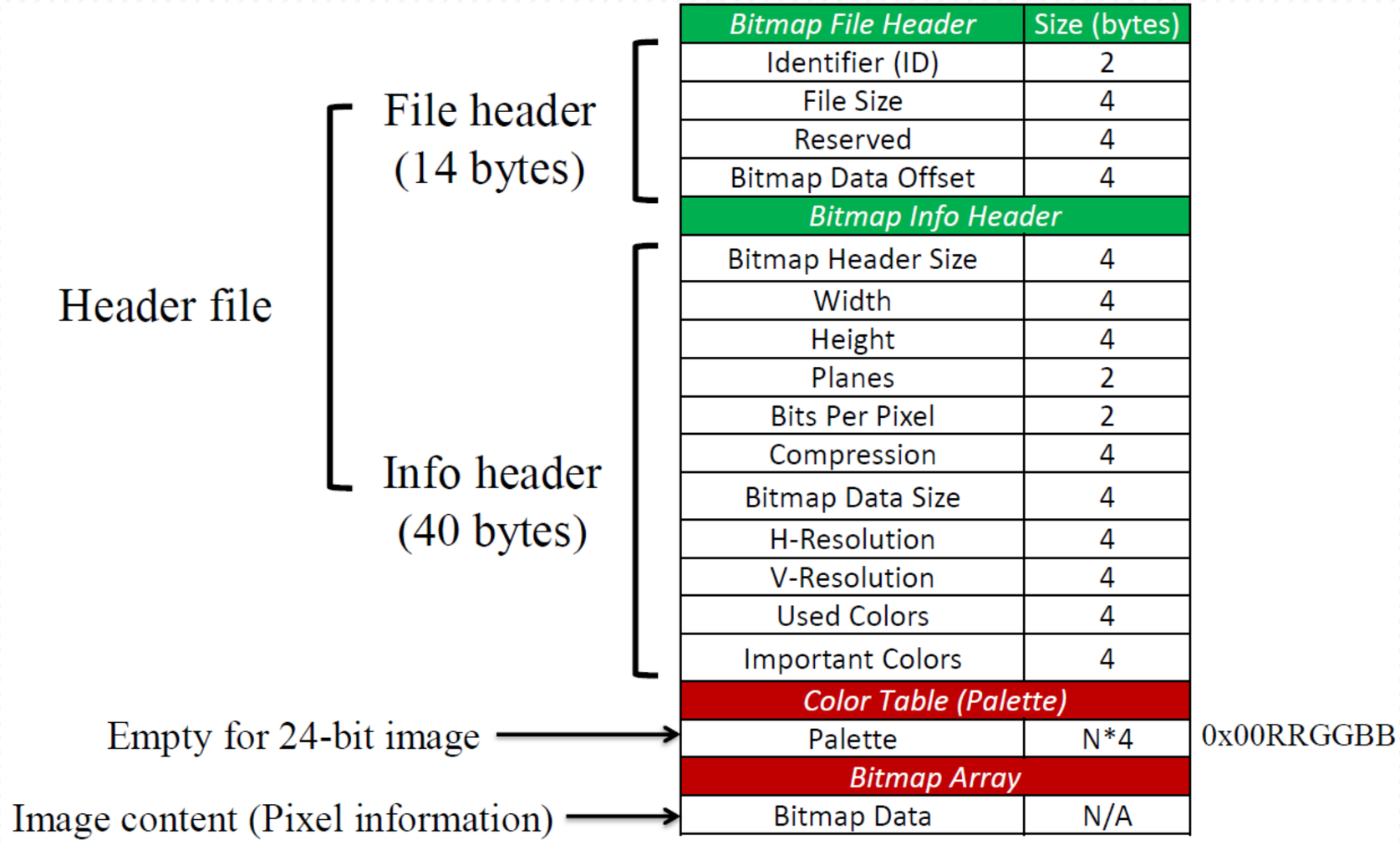


Fig.2-3
Fig.3-3

Fig.2-4
Fig.3-4

Introduction to Bitmap File (1/2)



Bitmap File Header	Size (bytes)
Identifier (ID)	2
File Size	4
Reserved	4
Bitmap Data Offset	4
Bitmap Info Header	
Bitmap Header Size	4
Width	4
Height	4
Planes	2
Bits Per Pixel	2
Compression	4
Bitmap Data Size	4
H-Resolution	4
V-Resolution	4
Used Colors	4
Important Colors	4
Color Table (Palette)	
Palette	N*4
Bitmap Array	
Bitmap Data	N/A

http://crazycat1130.pixnet.net/blog/post/1345538#mark-11

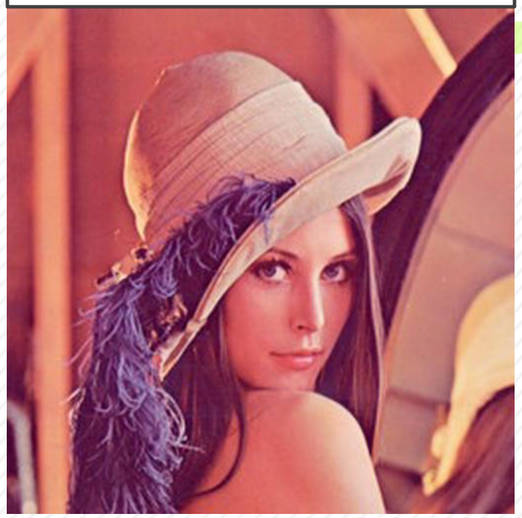
Introduction to Bitmap File (2/2)

$spatial\ resolution: 512 \times 512$

54 bytes

Header

Image content



24-bit Lena

$spatial\ resolution: 512 \times 512$

54 bytes + 1024 bytes

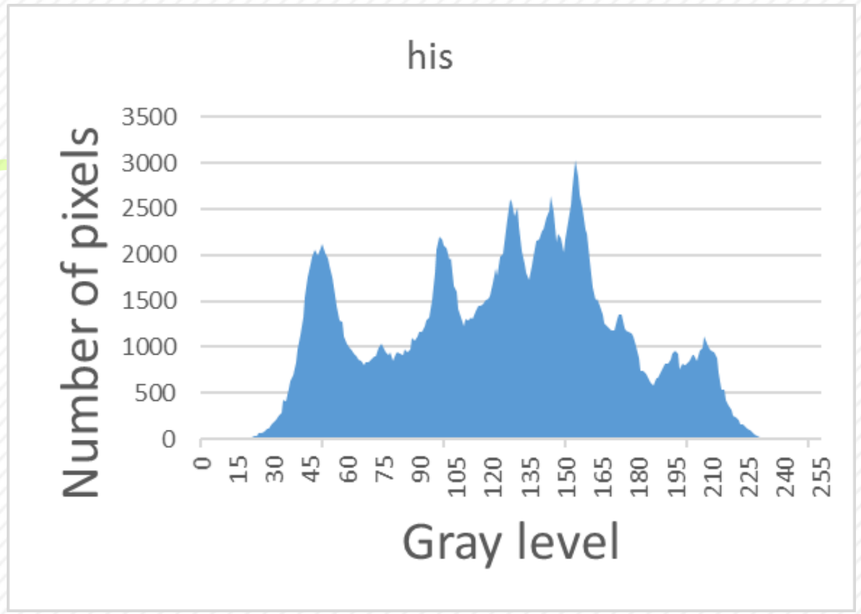
Header + Color palette

Image content

8-bit Lena

Calculate Gray-Level Histogram

8-bit Lena



Gray-level histogram

Gonzalez, Rafael C., and Richard E. Woods, “Digital image processing, ” Prentice Hall, 2007

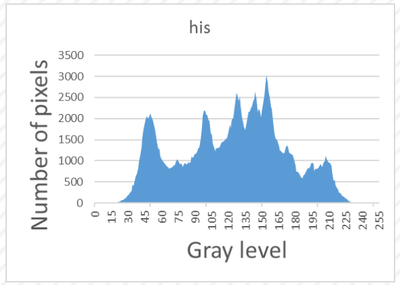
Power-Law Transformation

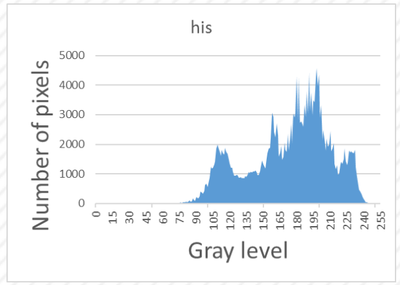
Formula ： $s = cr^{\gamma}$

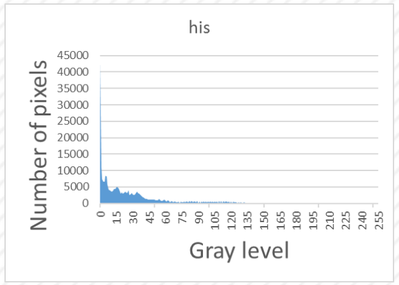
Original image

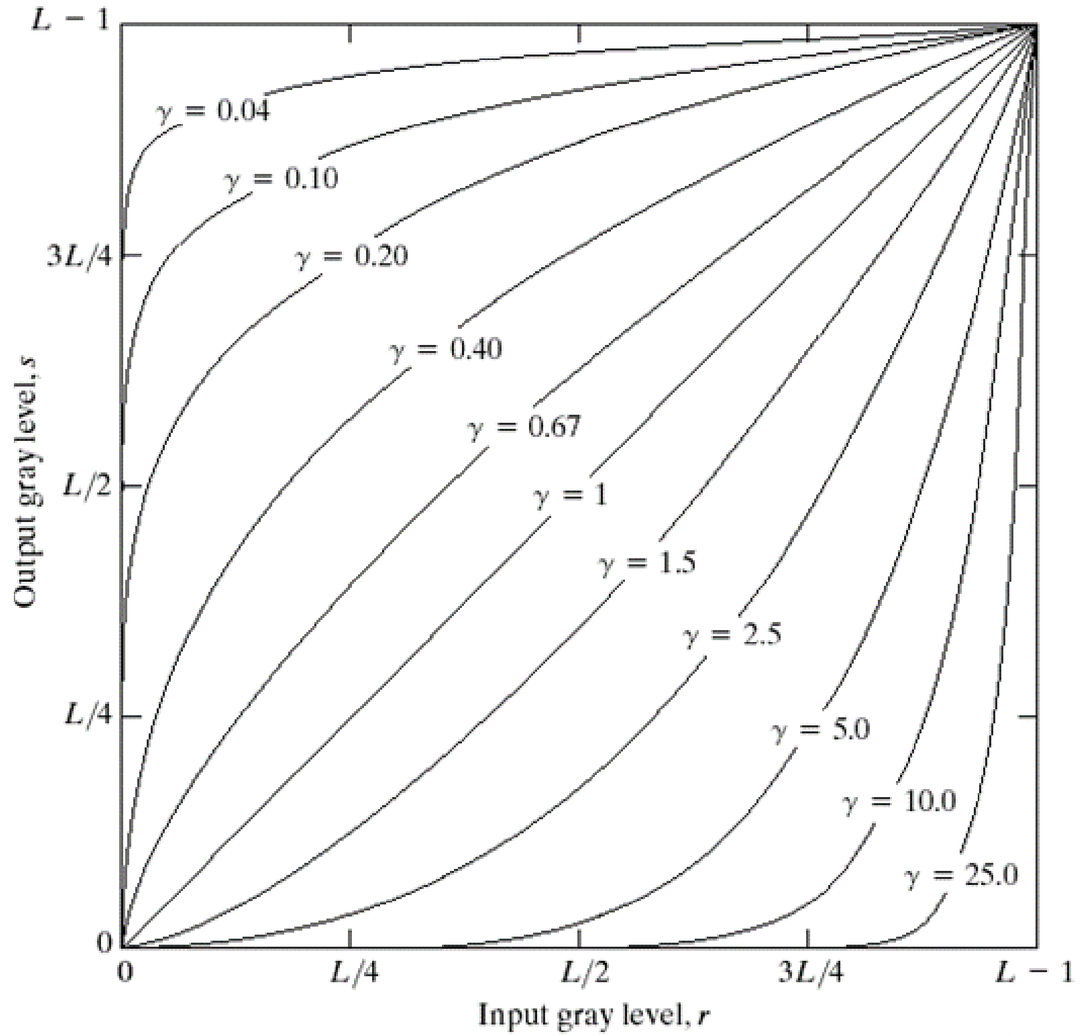
$C = 1$
$\gamma = 0.5$

$C = 1$
$\gamma = 4.0$









Get Original Image

Formula ： $s = cr^{\gamma}$

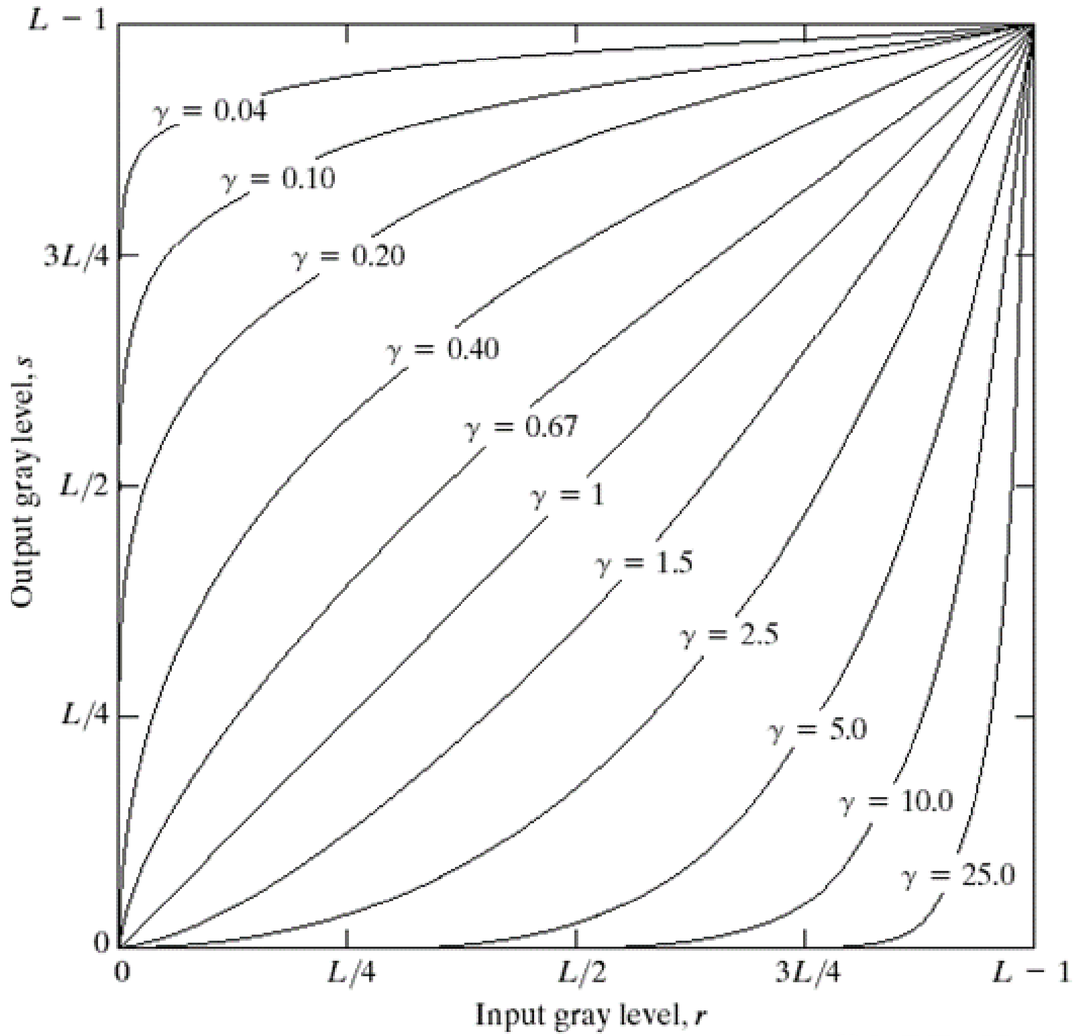
$C = 1$
$\gamma = 0.5$

$C = 1$
$\gamma = 4.0$

$C = 1$
$\gamma = 2.0$

$C = 1$
$\gamma = 0.25$

Original image ?



Grading

- Demo Code(70%)
  - Extract Header File (20%)
  - Calculate Gray-Level Histogram
    (Fig.1: 10%)
  - Power-Law Transformations
    (Fig.2-1: 5% , Fig.2-2: 5%)
    (Fig.3-1: 5% , Fig.3-2: 5%)
  - Get Original Images
    (Fig.2-3: 5% , Fig.3-3: 5%)
    (Fig.2-4: 5% , Fig.3-4: 5%)

- Report (30%)
  - Flow Chart (10%)
  - Experiment Results (10%)
  - Discussions (10%)

- Using the C/C++ only. Matlab or OpenCV is not allowed.

Due Date & Demo Schedule

Demo Date：Monday Oct.15 or Tuesday Oct.16
Demo time：13:30 ~ 17:30.

- The domo schedule will be announced at the TA webpage.
- You should send your project and report to LMS before Oct.15, 13:00.
- No delay. (If you have special case, please send email tell us early.)
- You will get a zero when you delay or fail to operation in demo(code and demo part),but you can still get points in report part.

Note

The details will be announced on our course website.
(http://140.115.154.40/vclab/html/course/DIP2018.html)

- Do it yourself.
- The TA will use another image to test your code.
- If you have a notebook, please bring your own notebook. Otherwise, some people may not be able to execute the code during the demo.
- Cannot use 『Remote Connection』.

Reference

- Gonzalez, Rafael C., and Richard E. Woods, “Digital image processing, ” Prentice Hall, 2007.
- 8 bits Lena.bmp download ： https://www.ece.rice.edu/~wakin/images/
- Power-Law Transformations：
  - http://blog.xuite.net/viplab/blog/307263602-Image+Enhancement+in+the+Spatial+Domain
- BMP Format website:
  - httpen.wikipedia.org/wiki/BMP_file_format
  - http://crazycat1130.pixnet.net/blog/post/1345538#mark-11

Any Questions?