Image Resolution for Genealogists
(How much is enough)

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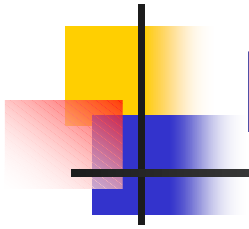
How much Image Resolution - Depends on Output Media

- Display (Web or CD-ROM)
- Laser Printers & Ink Jets
- Commercial Printers
- High End Specialty Printers
- Electronic Archival Preservation



Display (Web or CD-ROM)

- Common Display Sizes
  (15, 17, 19, 21 inch)
- Common Maximum Resolutions
  (1,024 x 768; 1,280 x 1,024;
  1,856 x 1,392; 2,048 x 1,536)
- 75 DPI to 150 DPI common

Calculating Display Resolution

- Most displays are 4:3 ratio
- $(\text{Diagonal})^2 = (x)^2 + (1.33\ x)^2$
- CRT Actual x 1.33x height width

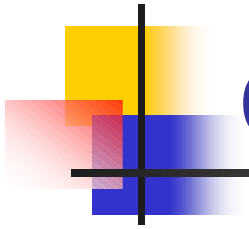
CRT	Actual	x	1.33x	height	width
15”	13.8”	8.3”	11.0”	1,024	1,280
17”	16.0”	9.6”	12.8”	1,392	1,856
19”	18.0”	10.8”	14.4”	1,536	2,048
22”	22.2”	13.3”	17.7”	2,400	3,840

Calculating Display Resolution

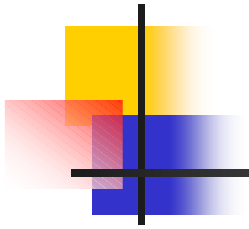
- Highest Resolution – Viewsonic Displays
- Highest LPI ratings for displays
- CRT Actual height width height width

CRT	Actual	height	width	height	width
15”	13.8”	1,024	1,280	123	116
17”	16.0”	1,392	1,856	145	145
19”	18.0”	1,536	2,048	142	142
22”	22.2”	2,400	3,840	180	216

Image Resolutions - Conclusions for Displays

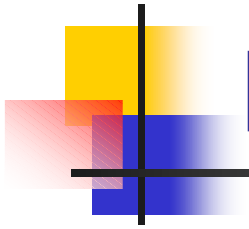


- Most common is 75 DPI (19 inch – 1,024 x 768)
- Many common displays are 150 DPI (19 inch – 2,048 x 1,536)
- Most displays are set much lower (images become huge)
- Always scan as images as displays are pixel oriented (1 bit image are huge)



Images for Laser Printers

- Lasers are not grayscale or 24 bit color
- Halftones used to simulate grayscale
- 600 and 1,200 DPI are common
- 300 and 2,400 DPI are also present
- True grayscale not done (16 x 16)
- Grayscale down-sampled to 8 x 8, etc.



Laser Printer – Grayscale ?

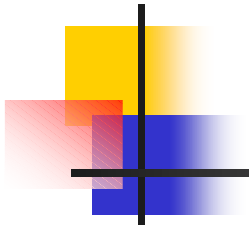
- 16 x 16 box simulates 256 grayscale
- Laser printers use 33 & 53 grayscale
- Halftone generation down-samples
- Otherwise, 300 DPI would be 18.75 LPI
- Box size & type chosen printer driver
- LPI = DPI / (Square root of Grayscale)
- DPI required is 1.5 to 2.0 times LPI

Typical LPI for various lasers

DPI Prtr	No. of Gray	LPI real	LPI 256	Image PPI Required
300	33	53	18.75	106
600	53	85	37.5	170
1,200	81	133	75.0	266
2,400	81	266	150.0	532
3,000	100	300	187.5	600

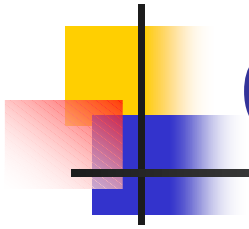
Image Resolutions - Conclusions for Laser Printers

- 300 DPI is bad & 600 is average
- 1,200 DPI is pretty good (book quality)
- Scan at 300 DPI, 256 Grayscale
- 600 DPI for very high end printing
- 300 DPI is acceptable for printers
- LPI & Grayscale both important



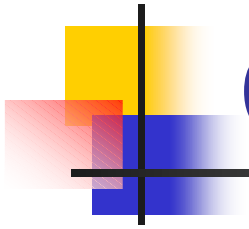
Ink Jet Printers (Color)

- Generally for color prints
- Extra colors (vs. B&W) helps quality
- Same requirements as B&W lasers
- Color not feasible for book printing
- A lot more scanning tricks for color
- Color Ink Jet prints fade - heat / light
- Color great for displays



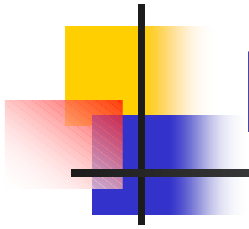
Commercial Printers

- Same issues as Laser Printer
- Most printers are 133 LPI or 150 LPI
- Most printers used 1,200 & 2,400 DPI
- 150 LPI has much more grayscale
- 300 DPI scans probably OK
- 600 DPI could help on some printers and some high quality photographs



Commercial Printers

- Print-on-demand print directly to paper
- Traditional printers print to plates and use lithography
- All printers are subject to halftone generation which simulates grayscale



High End Specialty Printers

- Glossy magazines use 150 to 200 LPI
- Some color printers are continuous tone
- 2,400 DPI lasers are specialty now
  (commonly available in few years)
- Some print-on-demand are 1,200 DPI
  (106 LPI – photographs will suffer)

Electronic Archival

- Not practical via CD-ROM, DVD-ROM
- Never use any JPEG (TIF is standard)
- Master copy always with no loss
- 300 and 600 grayscale common
- Direct conflicts for accessibility
  (ten images per CD-ROM not practical)
  (your hard drive or CD-R won’t do it)

National Archives Guidelines

- Text (master) – 300 dpi grayscale (TIFF uncompressed)
- Photographs (master) – 300 dpi (TIFF uncompressed)
- Greater than 11x17 inches – 200 dpi
- GIF for access files (not JPEG ?)

Other digitization conversions

- Many are stated as DPI – grayscale
  California Digital Library – 600 dpi
  JIDI (?) – 600 dpi
- Many are stated in pixels (not DPI)

  Library of Congress – 3,000 to 5,000
  NARA – 3,000 long side
  Colorado Digitization Project – same as Library of Congress

Preservation for Text Documents

- All use grayscale - TIFF
- All are either 300 or 600 dpi
- Practical experience of mine to date shows grayscale usually better
  1) If background shaded, dark areas
  2) Image mode used by copier machine
  3) Need very high quality to use 1 bit

Negatives and Prints better

- Negatives have more content than prints (if original photograph)
- Human eye can discern more than prints (continuous tone printers)
- Imperfect scanning techniques can lose important content
- Questionable life of genealogist digital media (CD-R, CD-ROM)

Summary – Image Resolution

- Output media is driving factor
- You can’t do it all (Internet & Archive)
- Spend time determining your goals
- Write down your objectives & update
- A lot of different opinions that differ
- Survival issues of digitization (submit photographs to institutions)