Digital Images Demystified

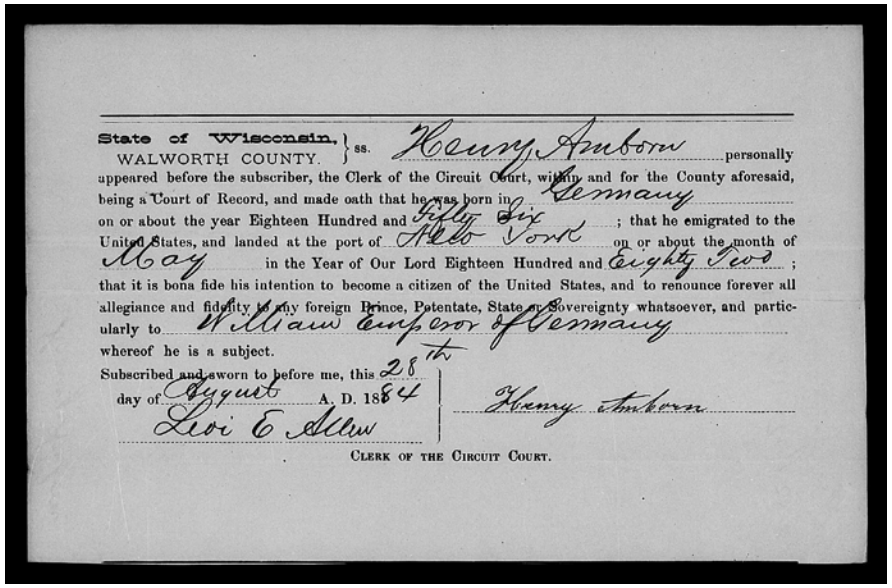
Tony Hanson

Objectives

- Introduce common terms and concepts related to digital images
- Explain how digital images are created
- Learn the differences between the major image types
- Understand the relationship between image size and image resolution
- Know the strengths and weaknesses of commonly used file types
- Understand how Metadata is created and used

Digital Image: Definition

- A **digital image** is a numeric representation, normally binary, of a two-dimensional **image**.



State of Wisconsin, } ss.
WALWORTH COUNTY. }

Henry Amborn personally appeared before the subscriber, the Clerk of the Circuit Court, within and for the County aforesaid, being a Court of Record, and made oath that he was born in Germany on or about the year Eighteen Hundred and Fifty Six; that he emigrated to the United States, and landed at the port of New York on or about the month of May in the Year of Our Lord Eighteen Hundred and Eighty Two; that it is bona fide his intention to become a citizen of the United States, and to renounce forever all allegiance and fidelity to any foreign Prince, Potentate, State or Sovereignty whatsoever, and particularly to William Emperor of Germany whereof he is a subject.

Subscribed and sworn to before me, this 28th day of August A. D. 1884

Levi E Allen — Henry Amborn

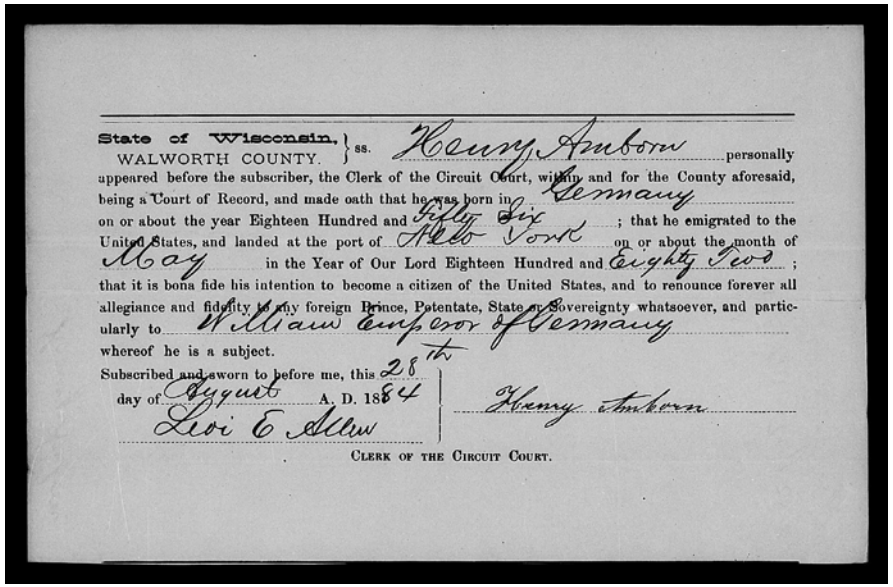
Clerk of the Circuit Court.

Wikipedia
https://en.wikipedia.org/wiki/Digital_image
Accessed 5 Aug 2019

Creating Digital Images

2-Dimintional Document → Scanner → Digital Representation → Digital File → View (Display), Print

Digital File ↔ Graphical Editing Software



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CLERK OF THE CIRCUIT COURT.

3-D Image

Digital Camera

2-Dimintional Document

Scanner

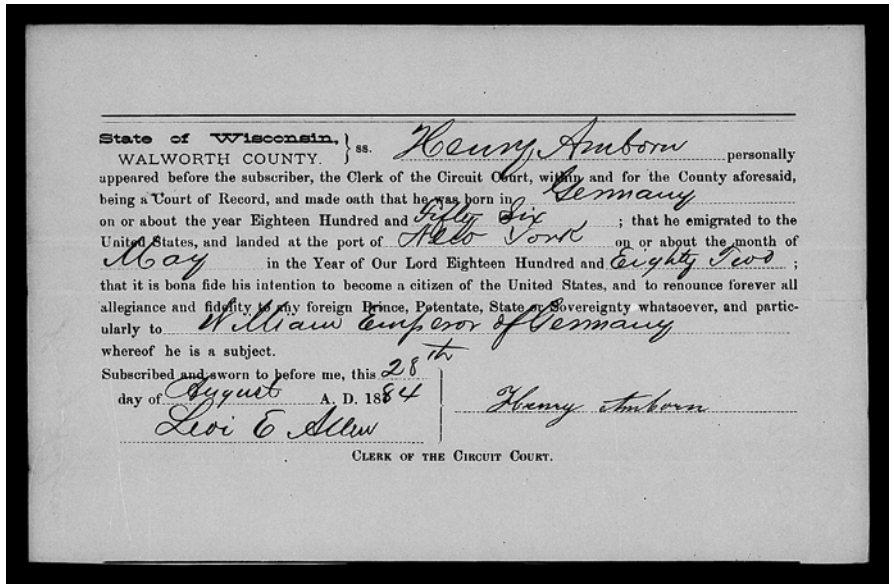
Digital Representation

Digital File

View (Display)

Print

Graphical Editing Software



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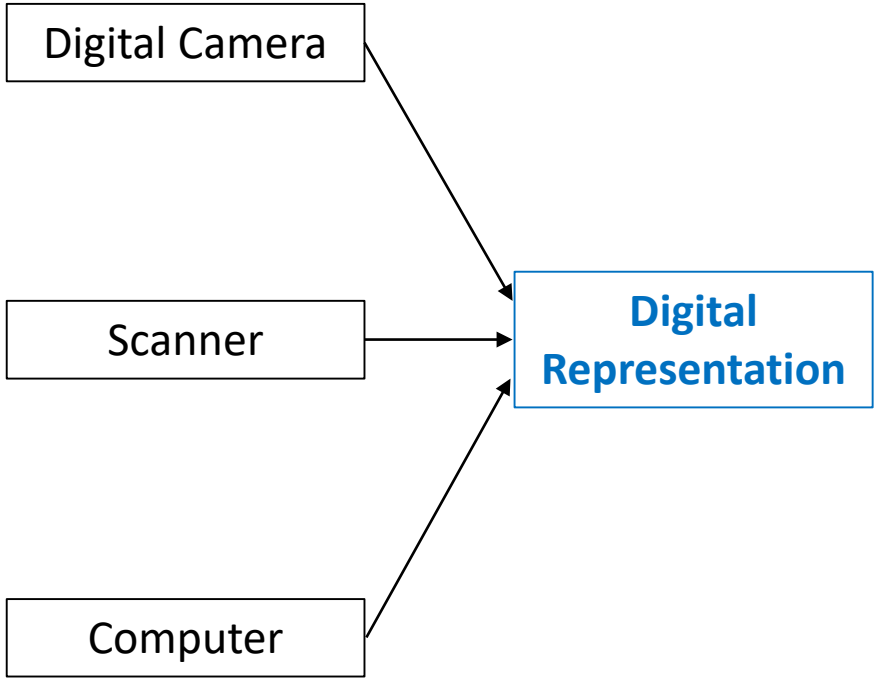
Subscribed and sworn to before me, this 28th day of August A. D. 1884

Levi E Allen

Henry Amborn

CLERK OF THE CIRCUIT COURT.

“Born Digital”

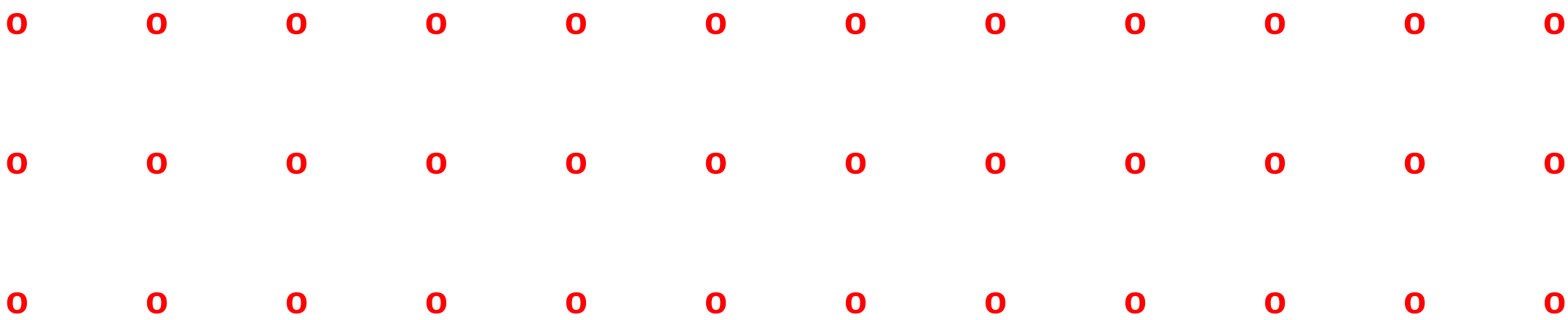

Digital Camera
Scanner
Computer
Digital Representation

*fram til år 1800**

* - Norwegian: “Until the year 1800”

Each dot is referred to as a **Picture Element**

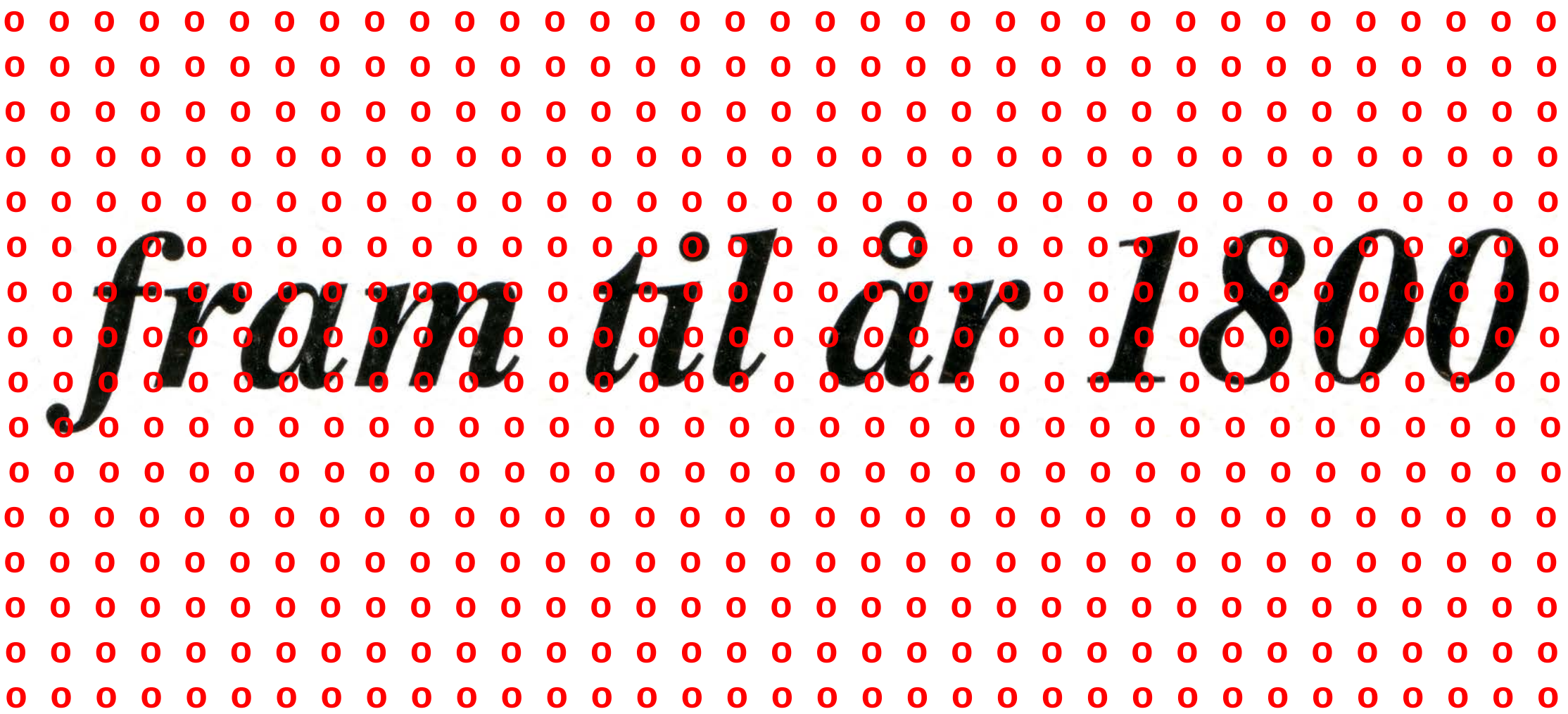
a.k.a. **Pixel**



The number of Pixels determines the

Resolution of the image

Fewer Pixels => **Low Resolution**

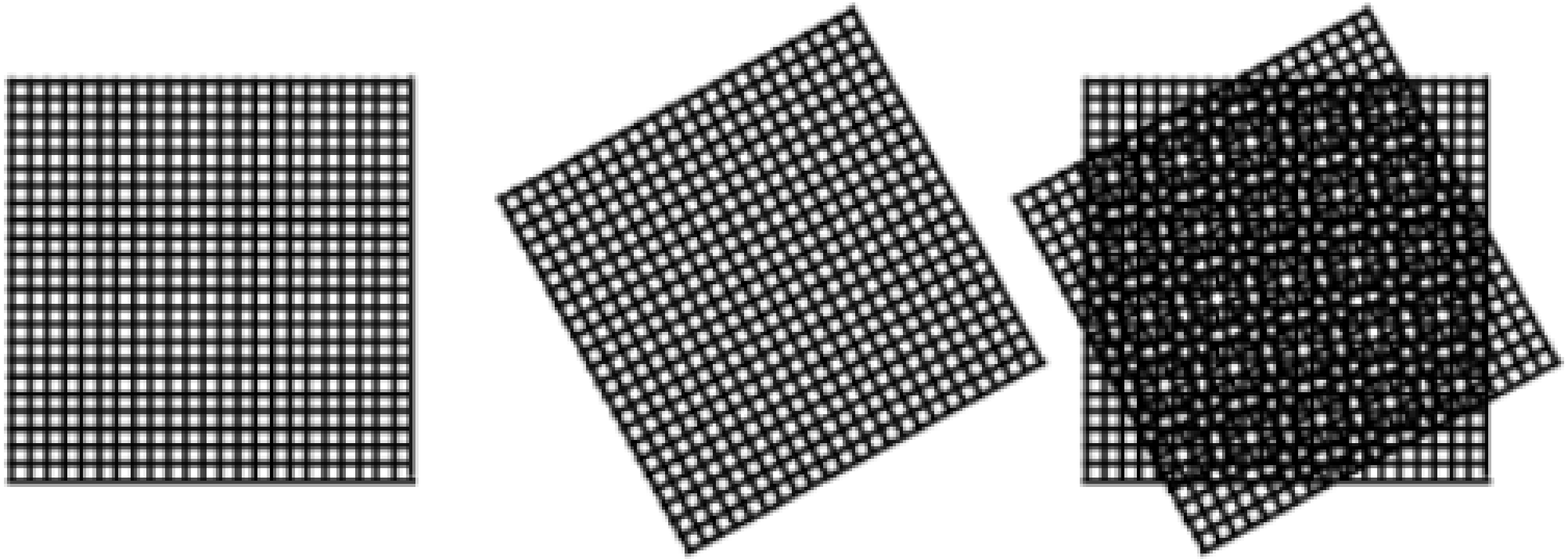


Lots of Pixels => **High Resolution**

Moiré Pattern

- A visual perception that occurs when viewing a set of lines or dots superimposed on another set of lines or dots.
- This is a common problem encountered when scanning images from newspapers, magazines and pictures created on a printer.

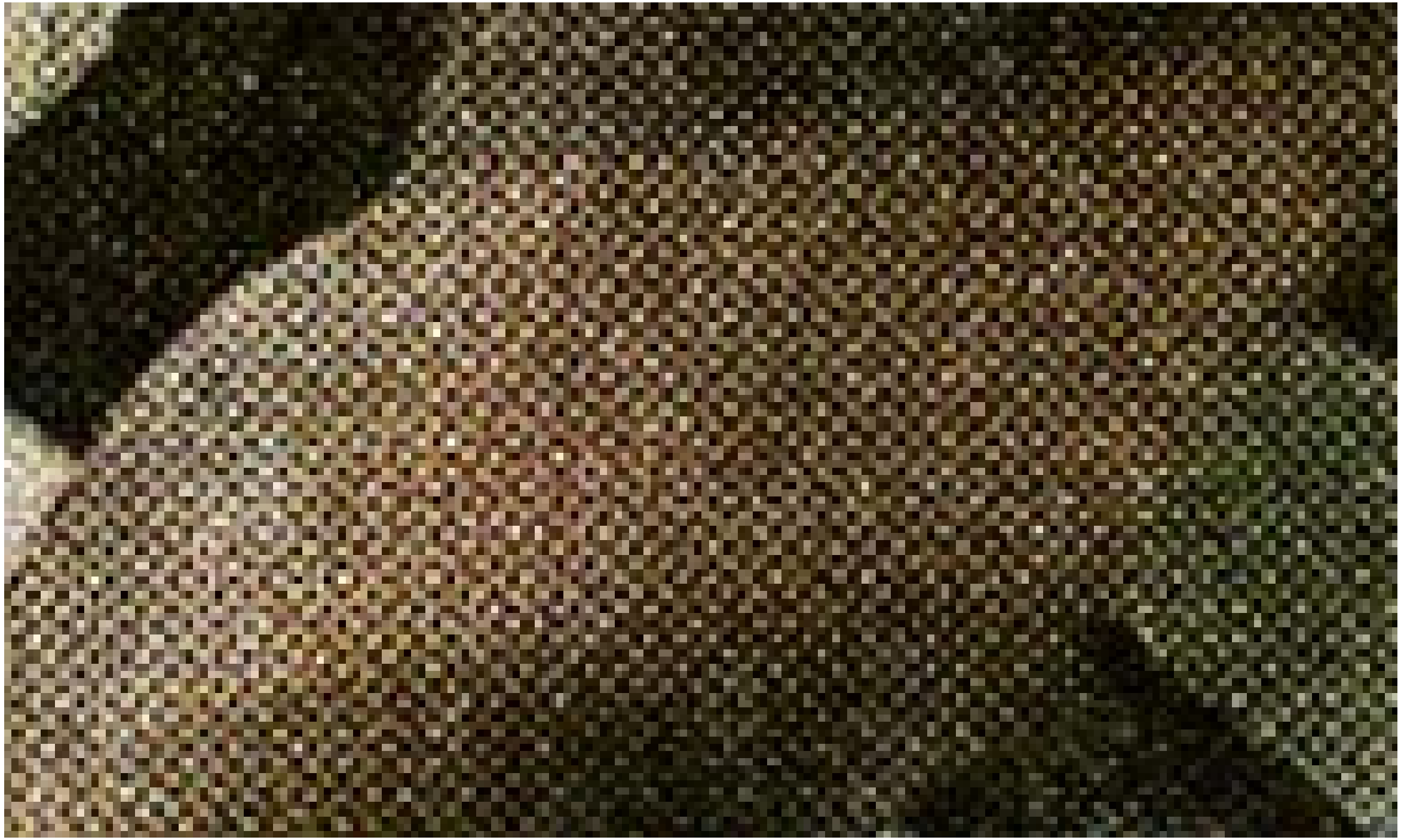
Moiré Pattern



Pattern 1 Pattern 2 Moiré


COOPER
19


COOPER
10



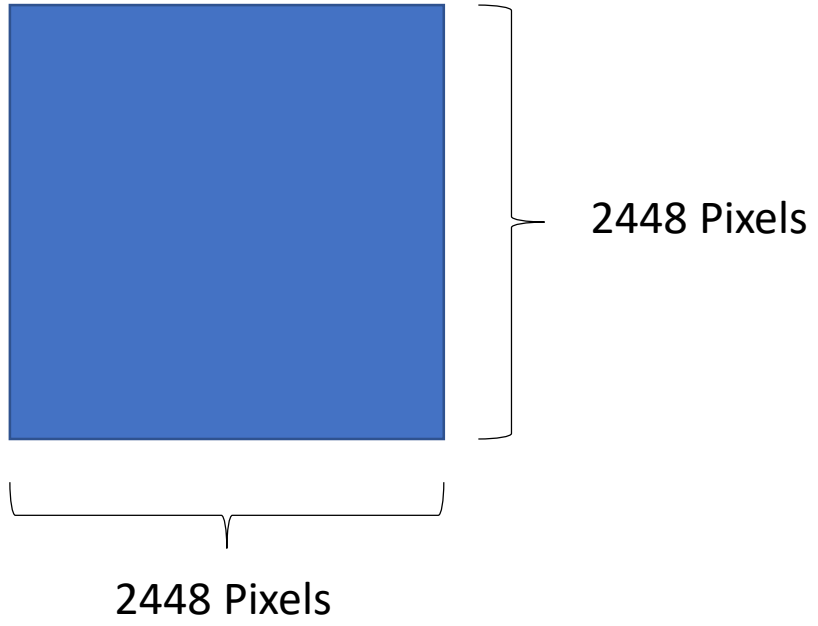
Aspect Ratio

The Ratio of the **Width** versus the **Height** of an image

Aspect Ratio

The Ratio of the **Width** versus the **Height** of a digital image

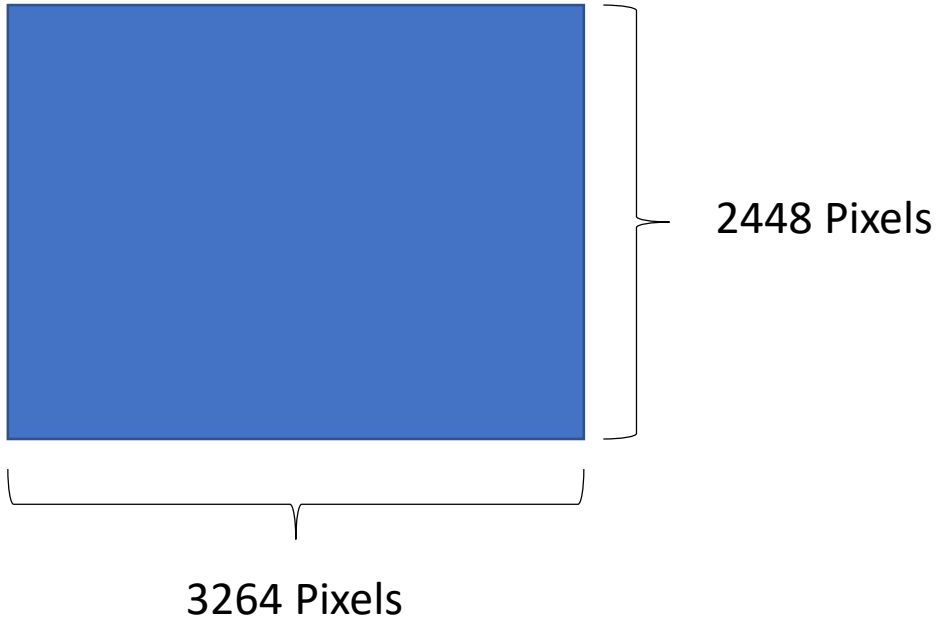
- 2448 x 2448 pixel image
  - 2448 / 2448 = **1 : 1**



Aspect Ratio

The Ratio of the **Width** versus the **Height** of a digital image

- 3264 x 2448 pixel image (iPhone 6)
  - 3264 / 2448 = **1.33 : 1**



Aspect Ratio

The Ratio of the **Width** versus the **Height** of a digital image

- 3456 x 2304 pixel image (Cannon Rebel)
  - 3456 / 2304 = **1.5 : 1**

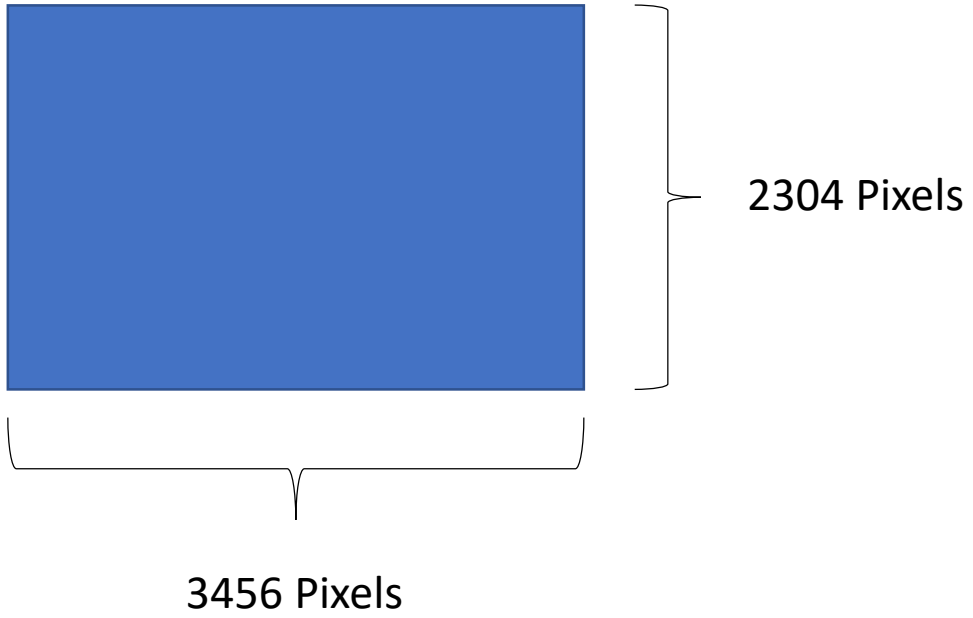


Image Types

- Black and White
- Color
- Gray Scale

Image Type: **Black and White**

The digitizing device examines each Pixel:

- If there is **something** there, it is recorded as a **Black** value
- If there is **nothing** there, it is recorded as a **White** value

Bygdebok for Nesna, bind 1

NESNA SOGN

fram til år 1800

ØYVIND JENSSEN

NESNA 1996

EPSON Scan

Mode: Professional Mode

Settings

Name: Current Setting

Save | Delete

Original

Document Type: Reflective

Document Source: Document Table

Auto Exposure Type: Document

Destination

Image Type: Black & White

Resolution: 1200 dpi

Document Size: W 8.50 H 11.70 in.

Target Size: Original

Adjustments

Threshold: 110

Bygdebok for Nesna, bind 1

NESNA SOGN

fram til år 1800

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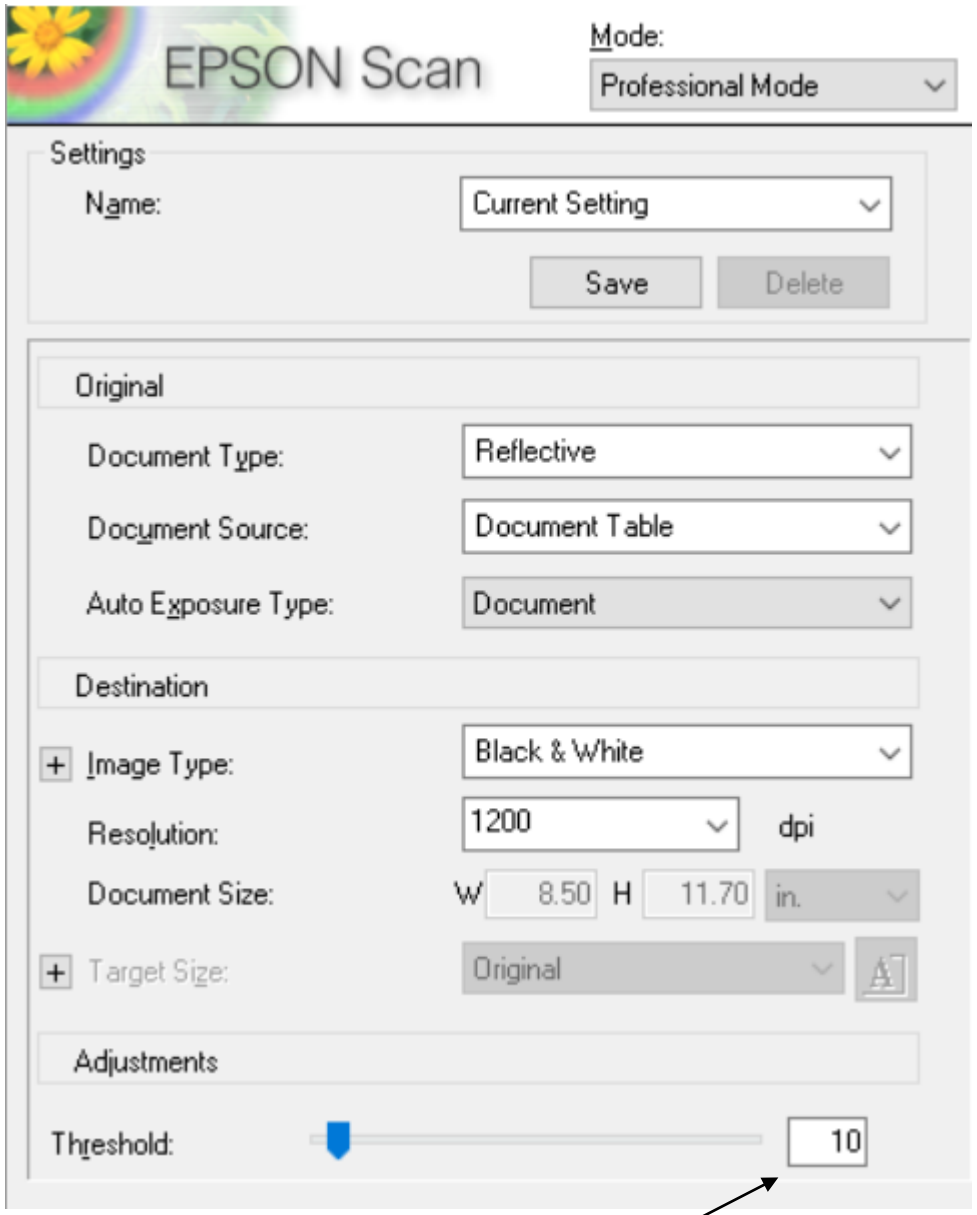
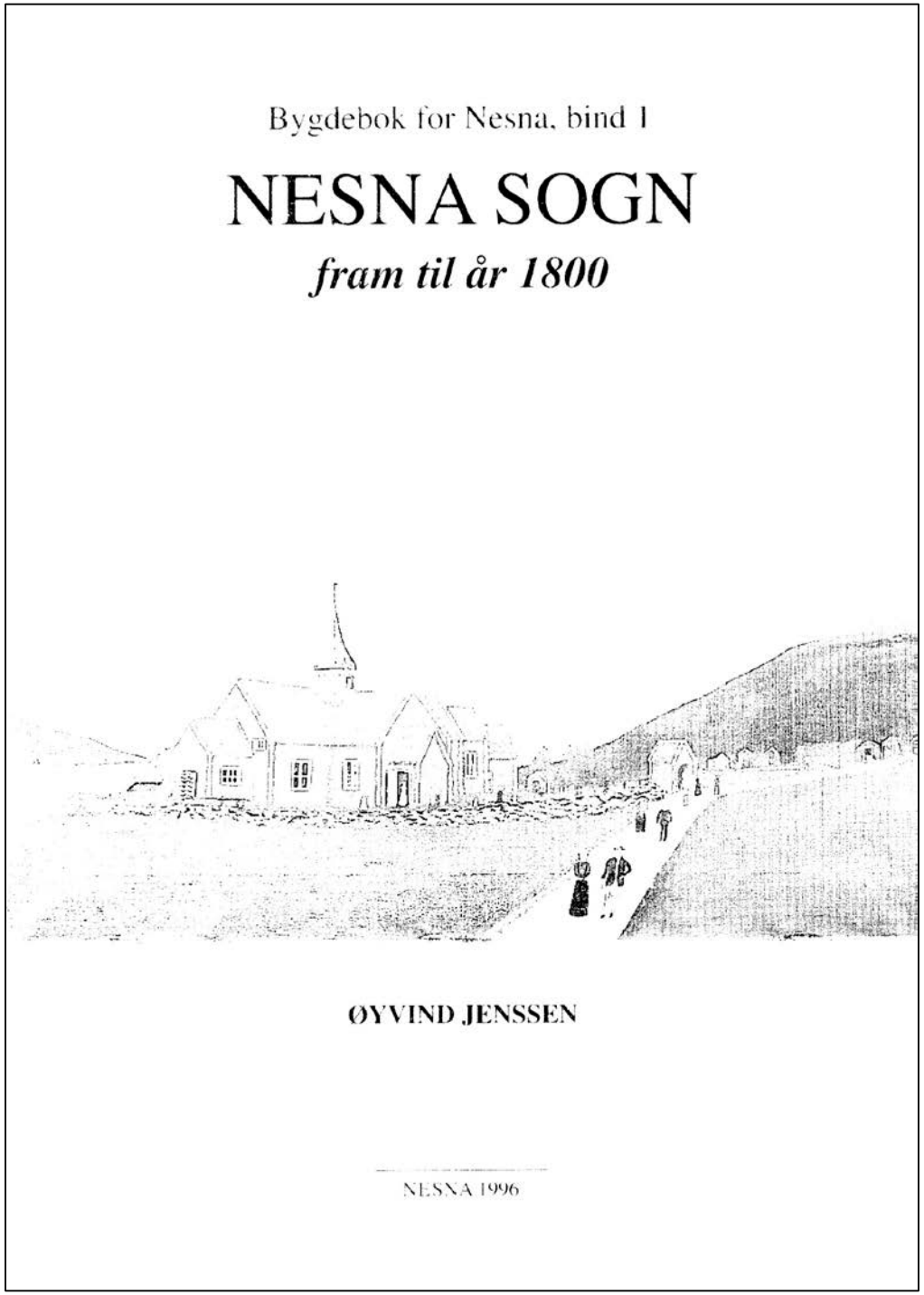
NESNA 1996

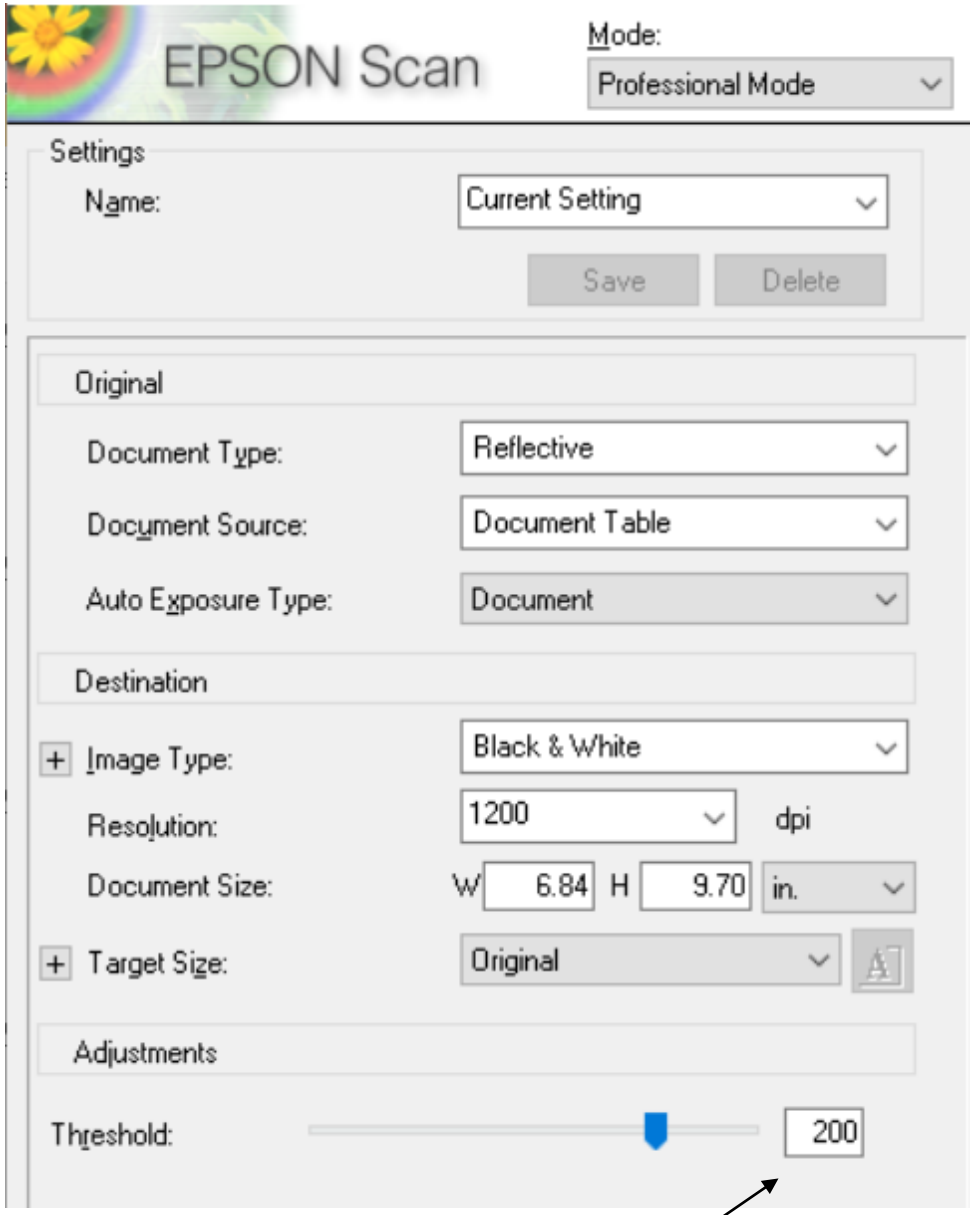
Threshold

- Adjusts the point between ‘nothing’ (white) and ‘something’ (Black)
- On my scanner, this can range in value from 0 to 255

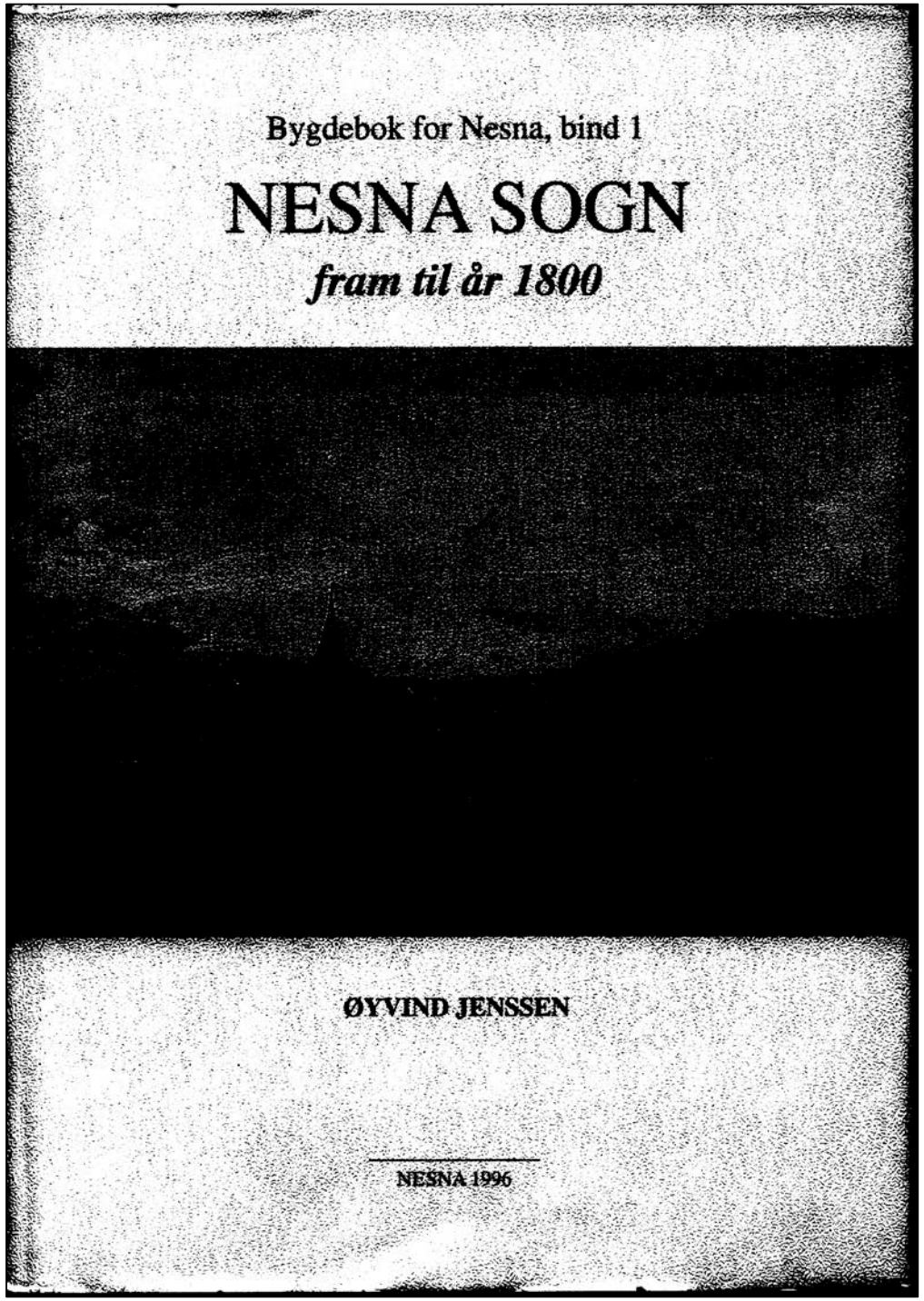


Threshold: 10





Threshold: 200



EPSON Scan

Mode: Professional Mode

Settings

Name: Current Setting

Save | Delete

Original

Document Type: Reflective

Document Source: Document Table

Auto Exposure Type: Document

Destination

Image Type: Black & White

Resolution: 1200 dpi

Document Size: W 8.50 H 11.70 in.

Target Size: Original

Adjustments

Threshold: 110

Threshold: 110

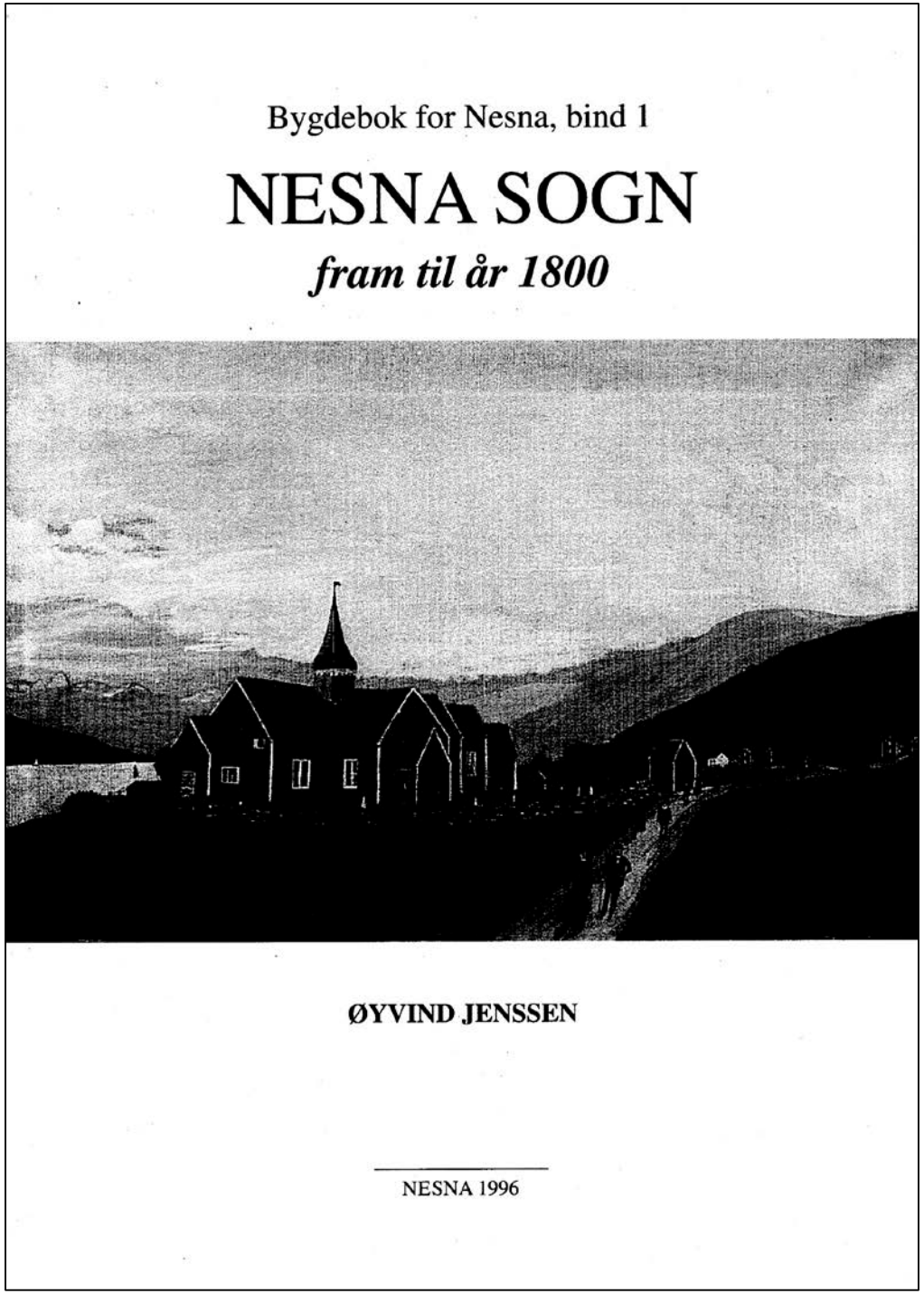


Image Type: **Black and White**

- Good for lines and simple drawing
- OK for text
- Not so good for pictures

Advantage: Small files

- Each pixel requires one bit
  - 0 for Black
  - 1 for White

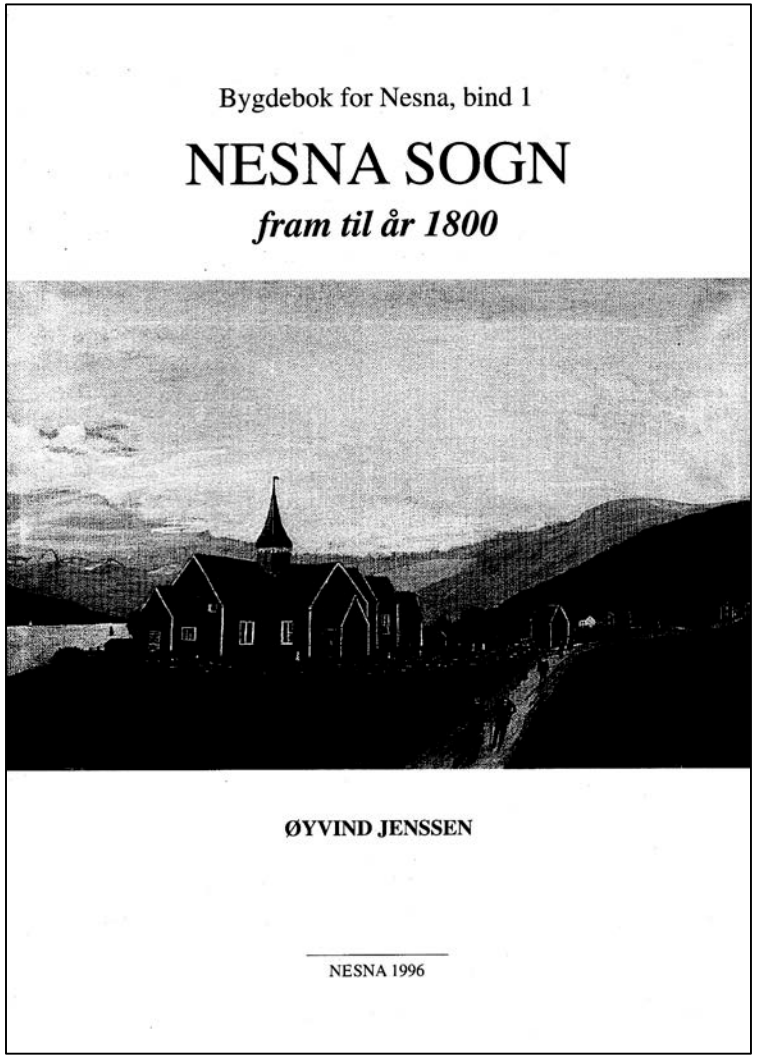
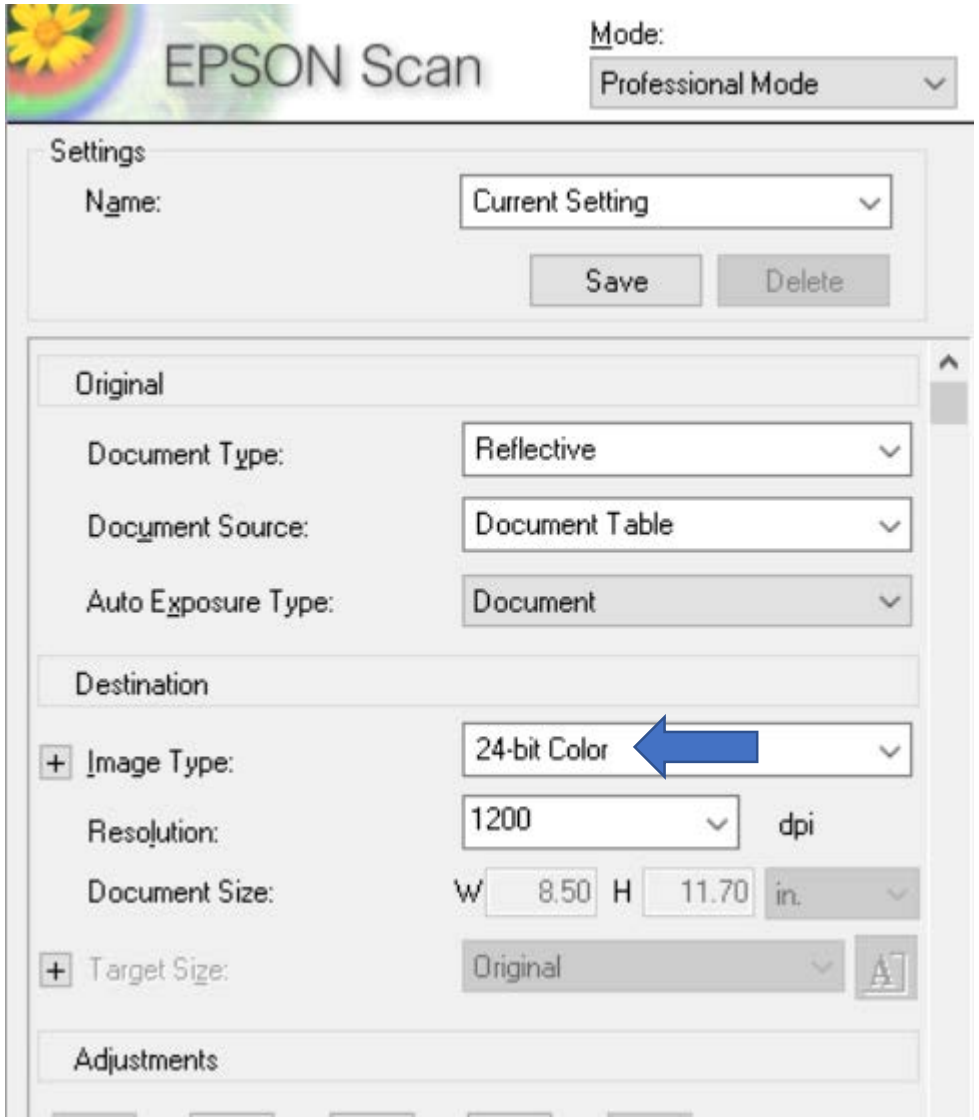


Image Type: Color

- The digitizing device examines each Pixel
- The color of each pixel is recorded


EPSON Scan
Mode:
Professional Mode
Settings
Name:
Current Setting
Save
Delete
Original
Document Type:
Reflective
Document Source:
Document Table
Auto Exposure Type:
Document
Destination
Image Type:
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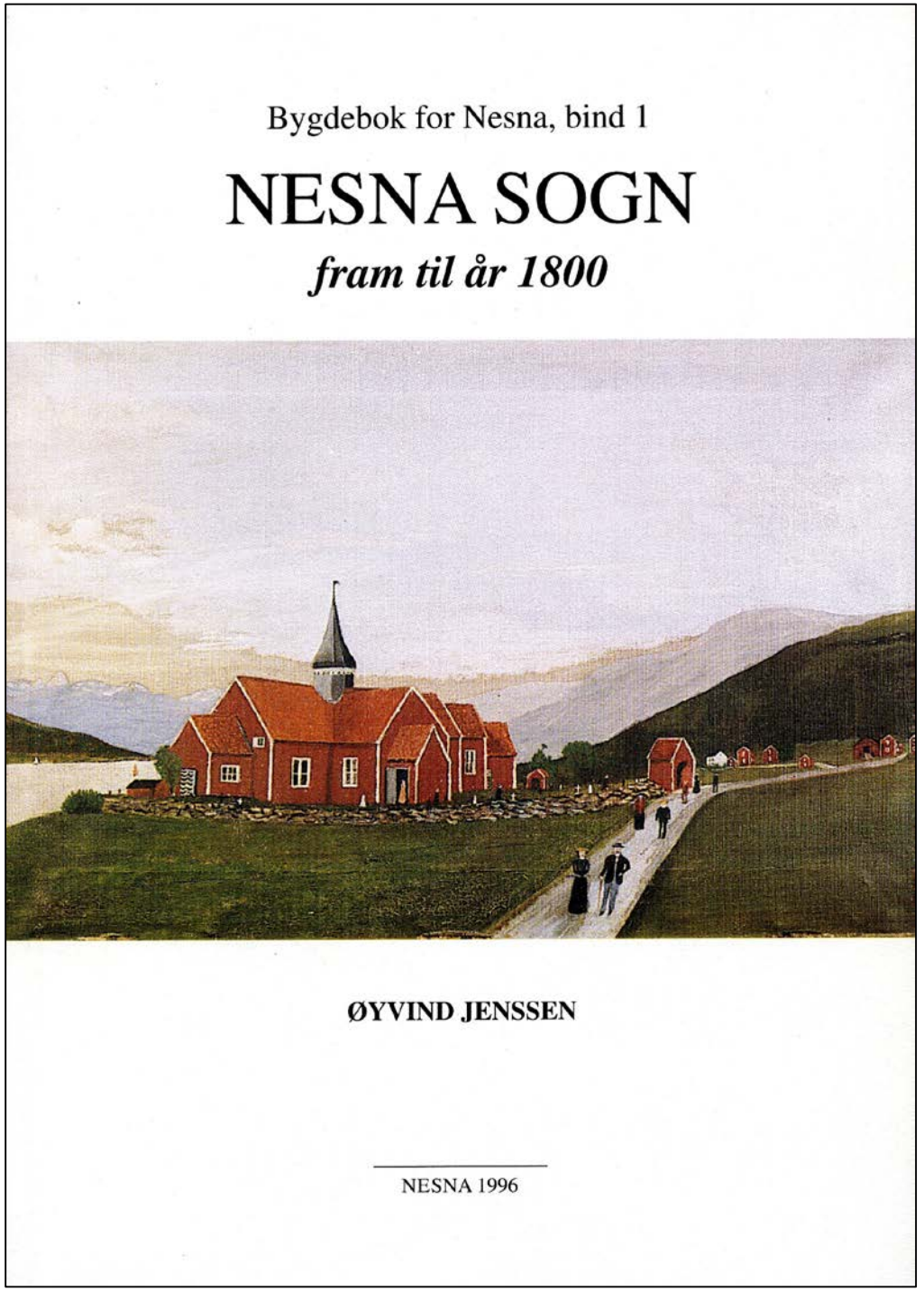
Resolution:
1200
dpi
Document Size:
W
8.50
H
11.70
in.
Target Size:
Original
Adjustments


Bygdebok for Nesna, bind 1
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NESNA 1996

Computer Colors

- Each pixel's color is broken down into three **Primary Color** Values
  - Red
  - Green
  - Blue

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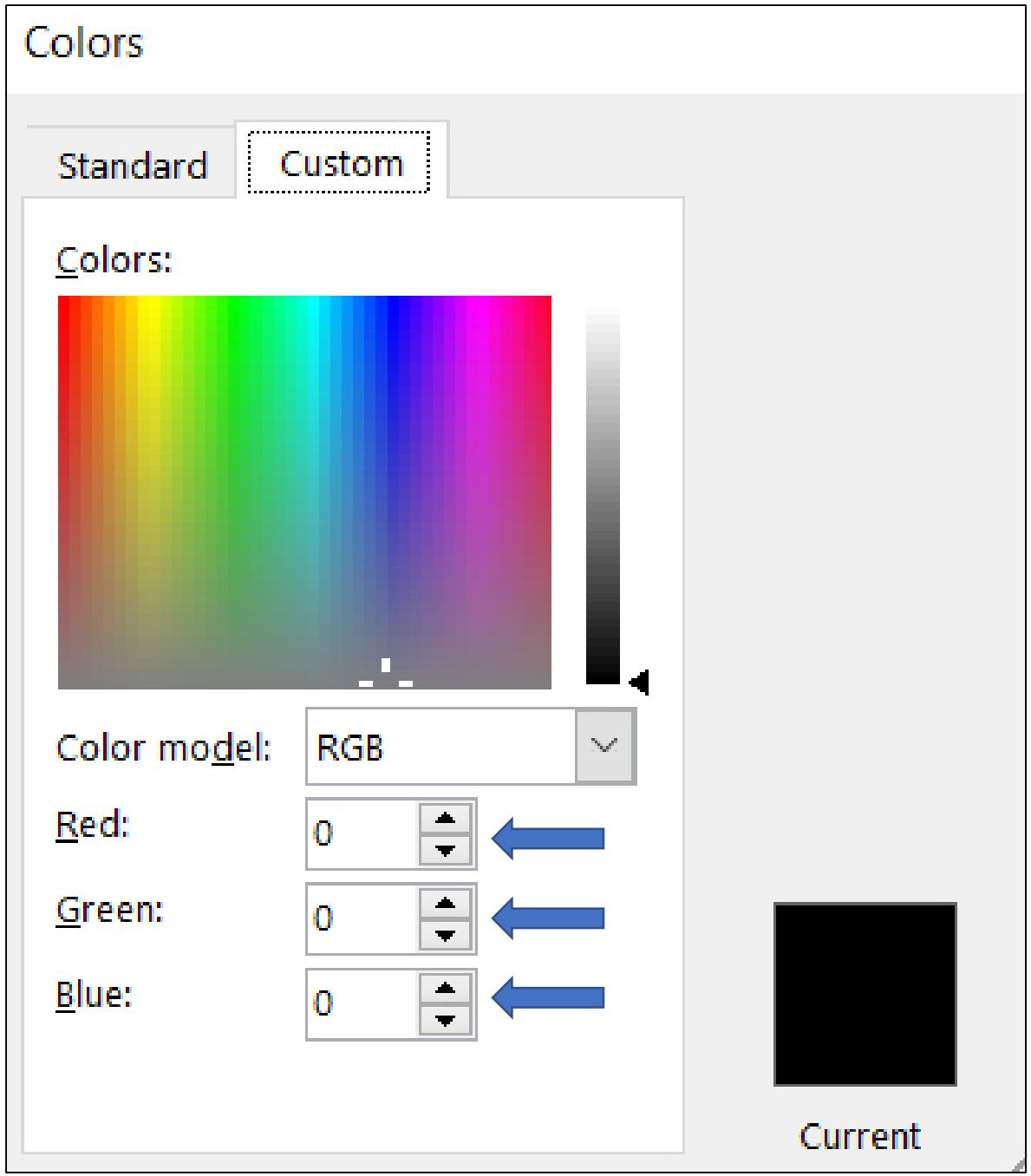
- These colors can be mixed in varying intensities to create any other color

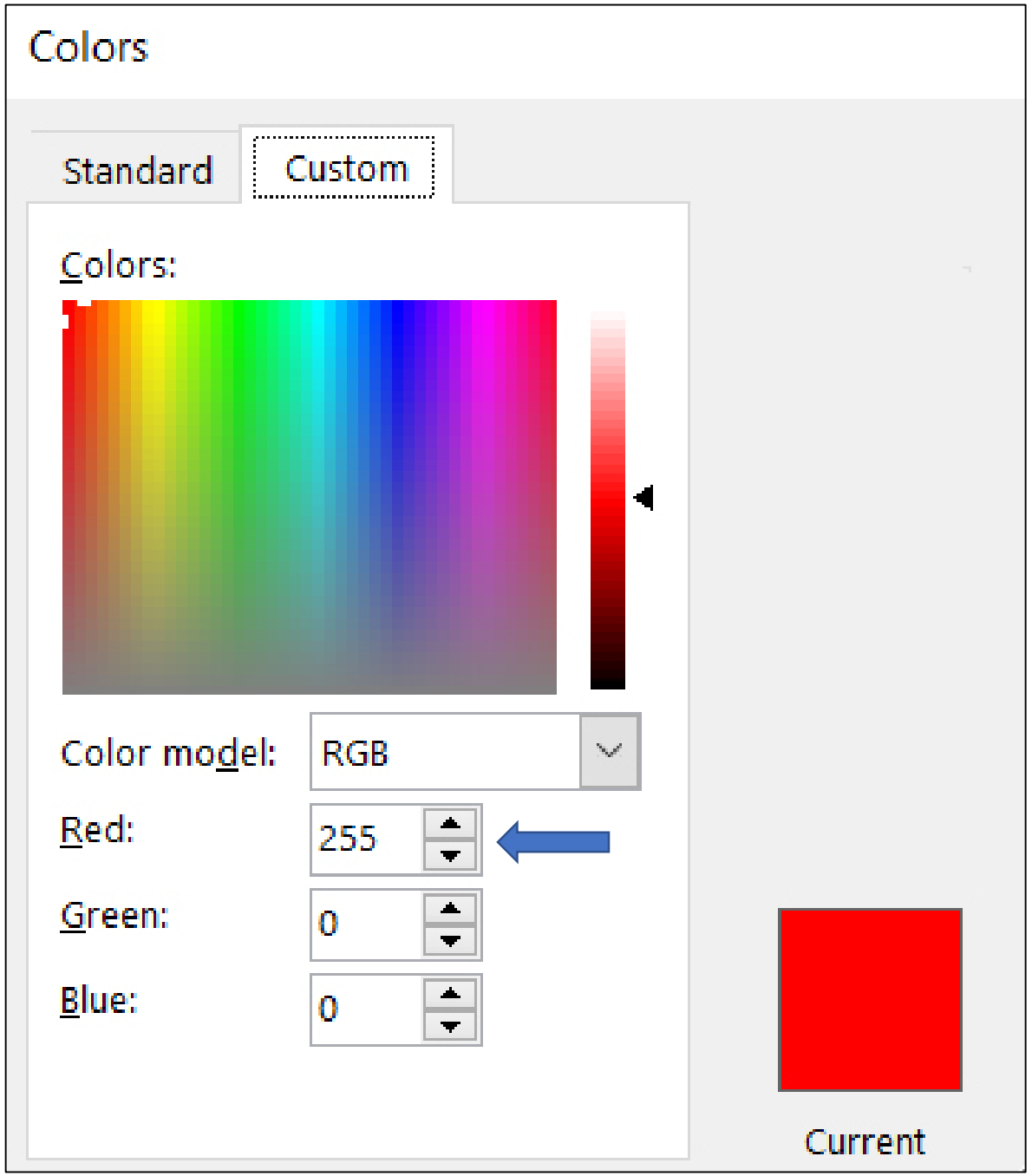
Computer Colors

- Each pixel's color is broken down into three **Primary Color** Values
  - Red
  - Green
  - Blue
- These colors can be mixed in varying intensities to create any other color
- Each color has a unique numeric value
  - By default, each color's value usually ranges from 0 to 255



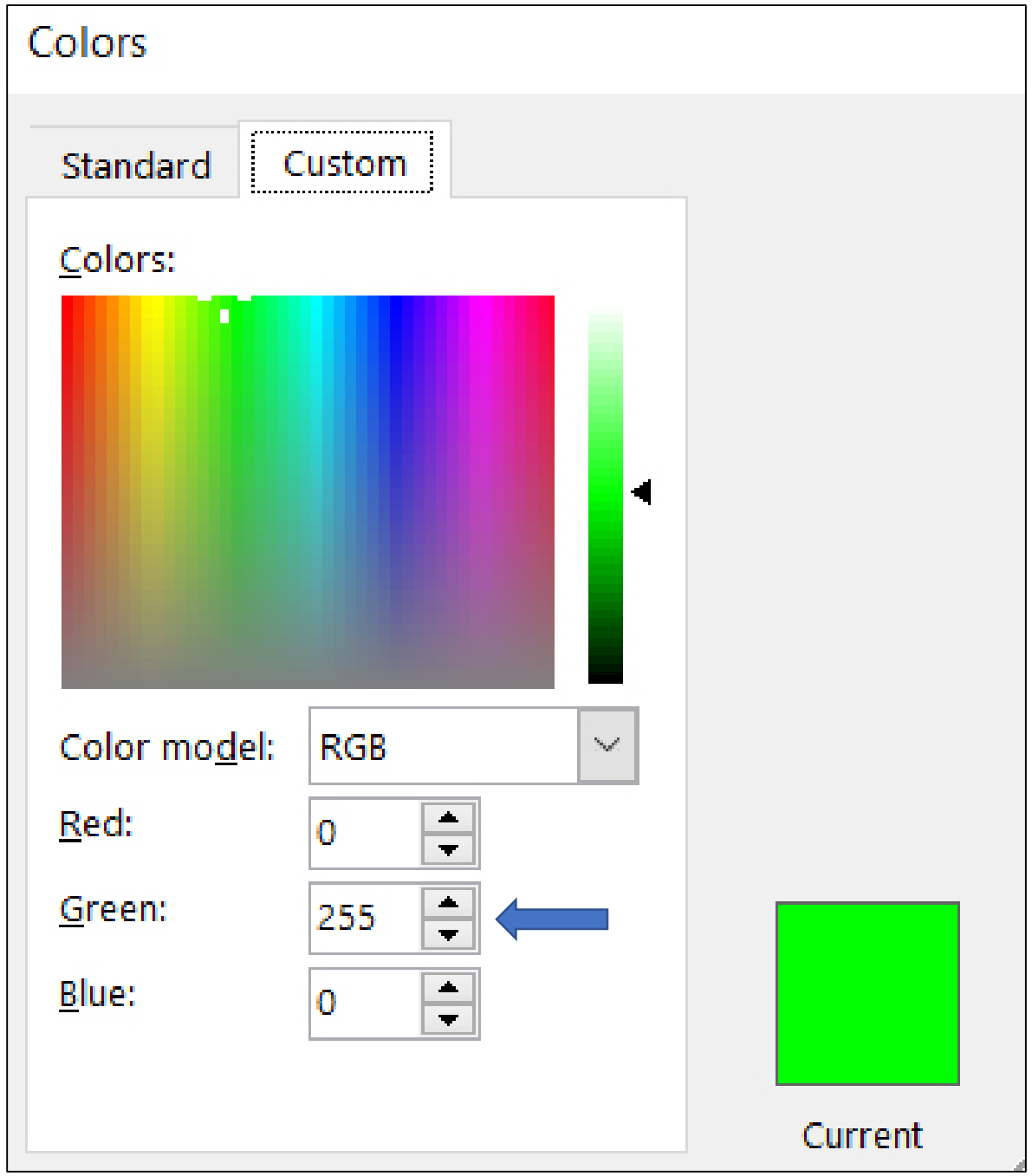
Black

- Absence of all/any colors
- Red, Green and Blue components are all 0 (minimum)



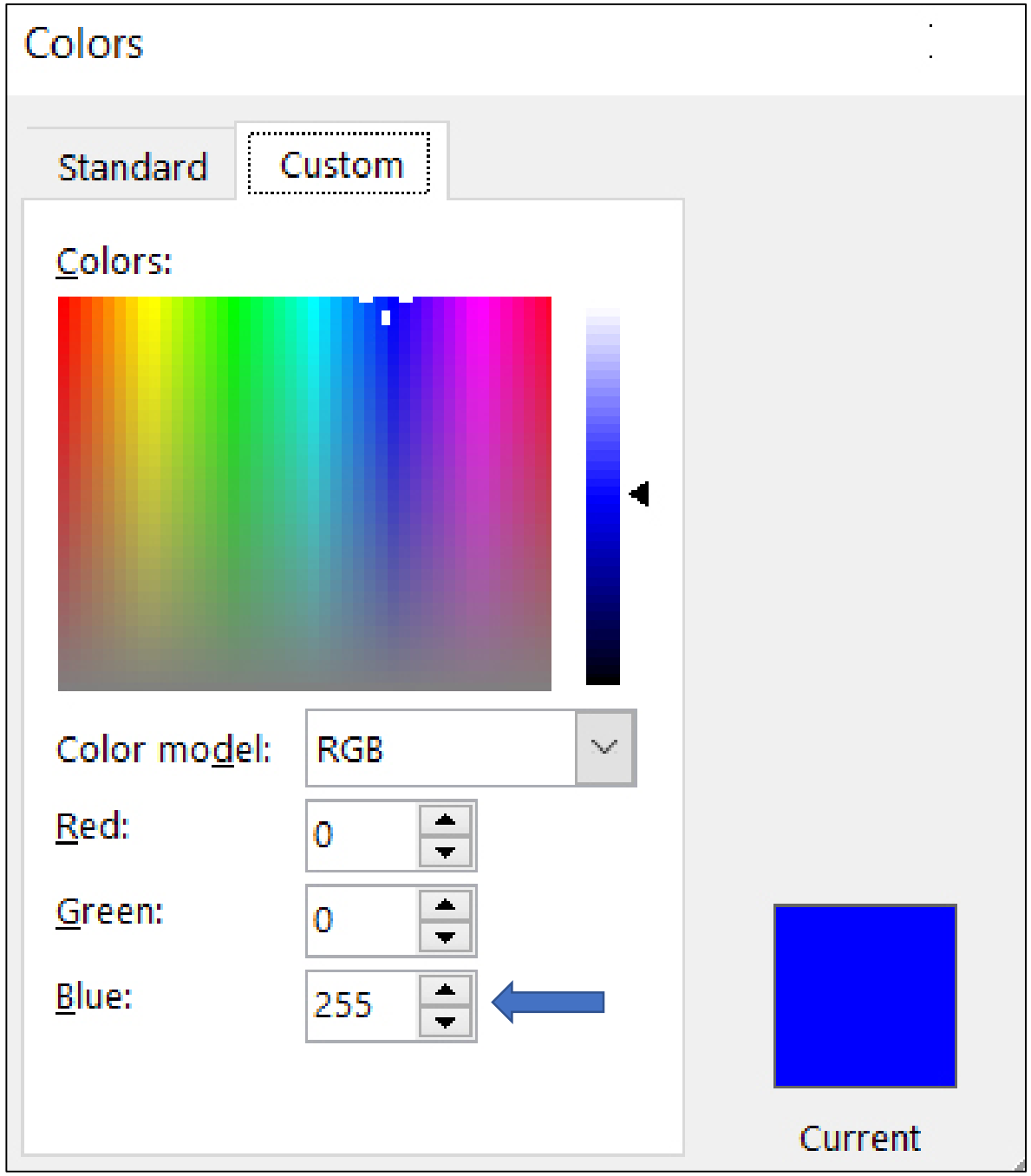
Red

- Red is 255 (Maximum)
- Green is 0 (Minimum)
- Blue is 0 (Minimum)



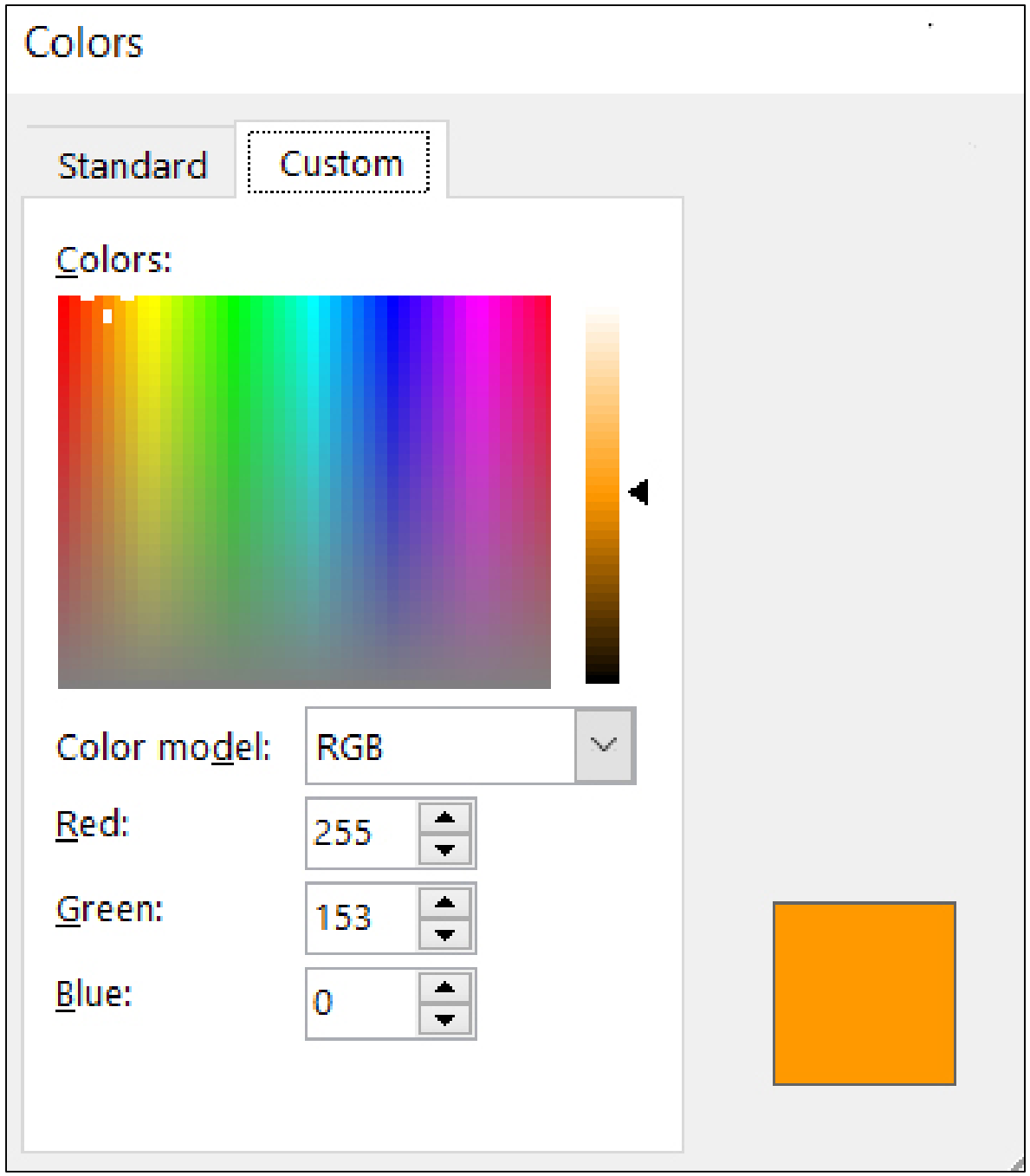
Green

- Red is 0 (Minimum)
- Green is 255 (Maximum)
- Blue is 0 (Minimum)



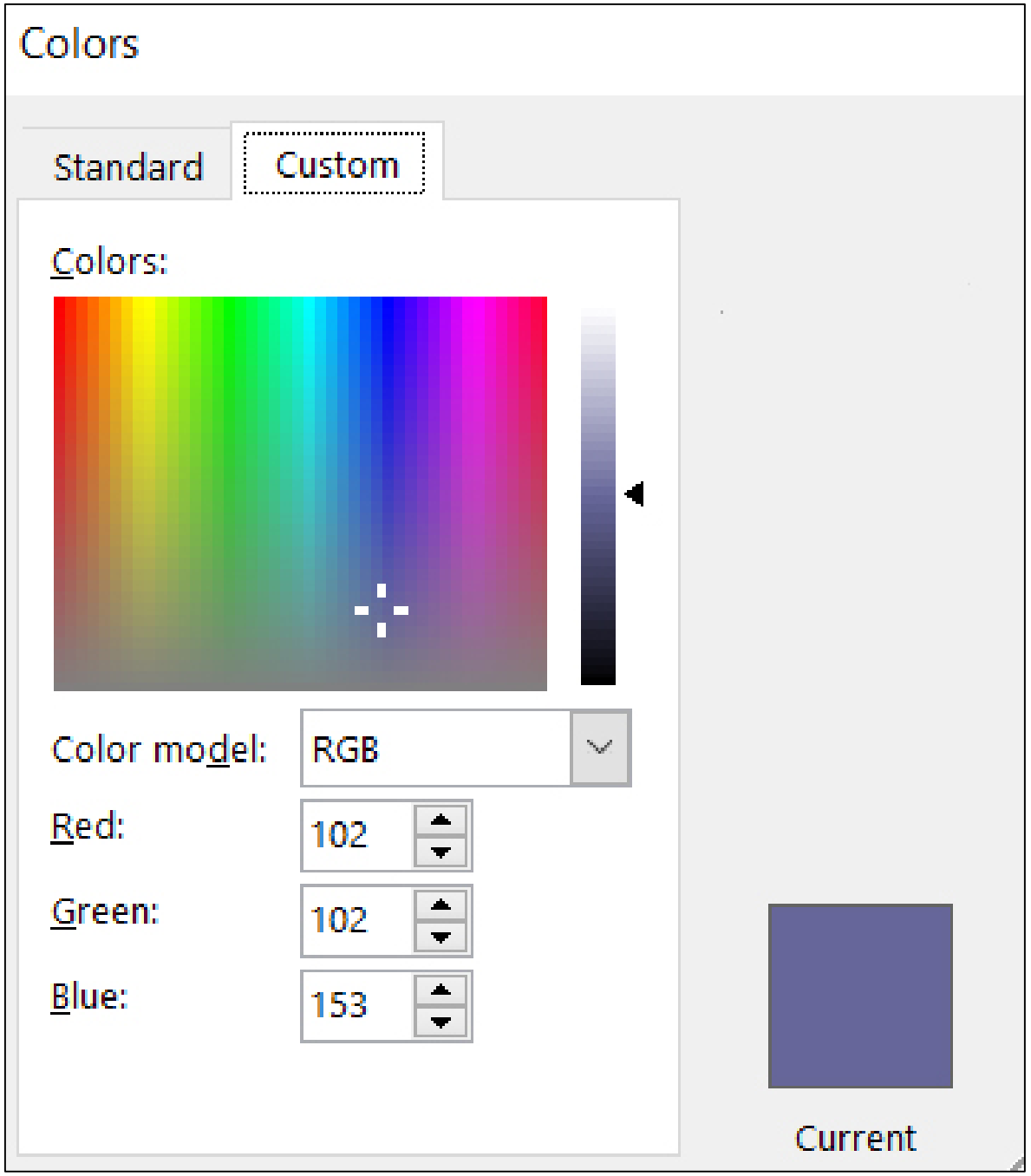
Blue

- Red is 0 (Minimum)
- Green is 0 (Minimum)
- Blue is 255 (Maximum)



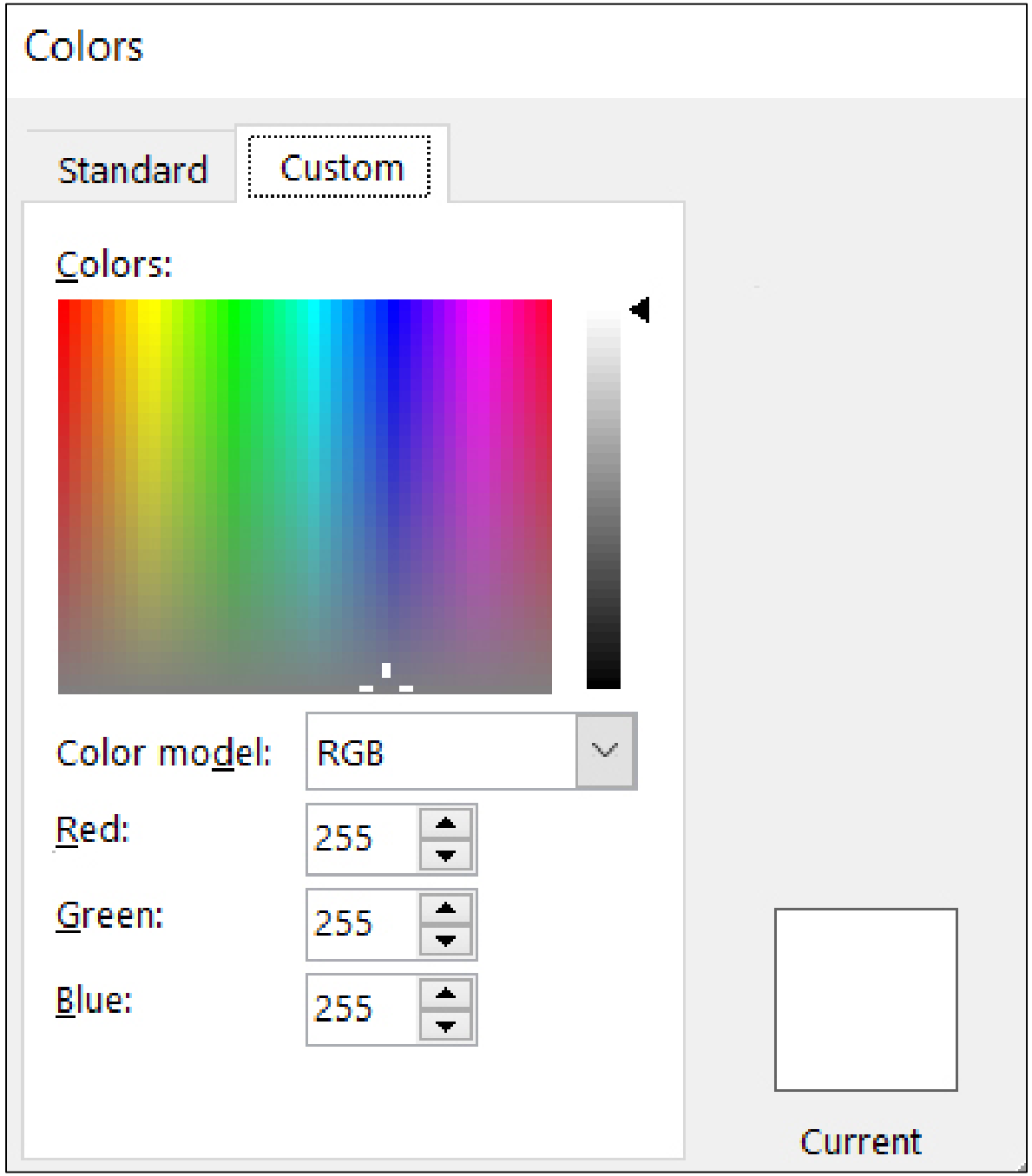
Orange

- Combination of Colors
- Red is 255 (Maximum)
- Green is 153
- Blue is 0 (Minimum)



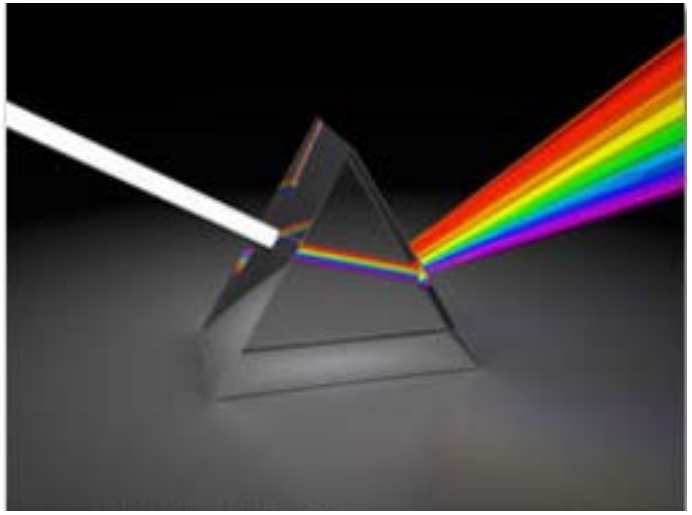
Purple

- Combination of Colors
- Red is 102
- Green is 102
- Blue is 153



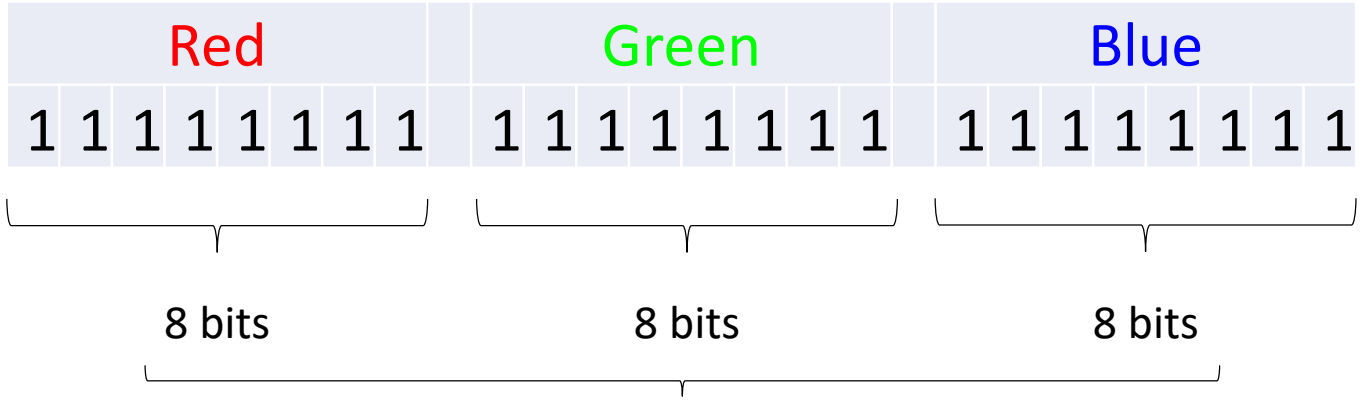
White

- Combination of all colors
- Red is 255 (Maximum)
- Green is 255 (Maximum)
- Blue is 255 (Maximum)



Saving Colors

- Each color value ranges from 0 to 255
- These values can be stored in an 8-bit binary location

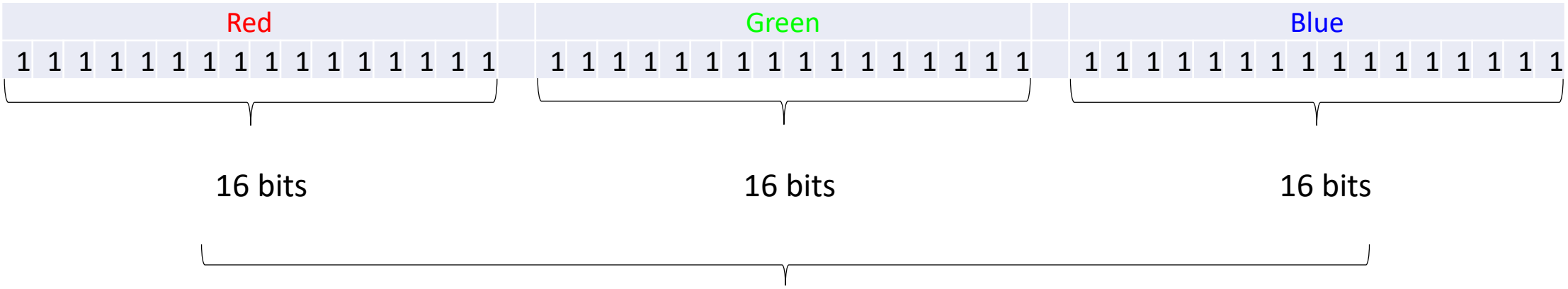


24-bit Color Depth

16,777,216 unique colors

48-bit Color Depth

- Each color value ranges from 0 to 65,536
- These values can be stored in an 16-bit binary location



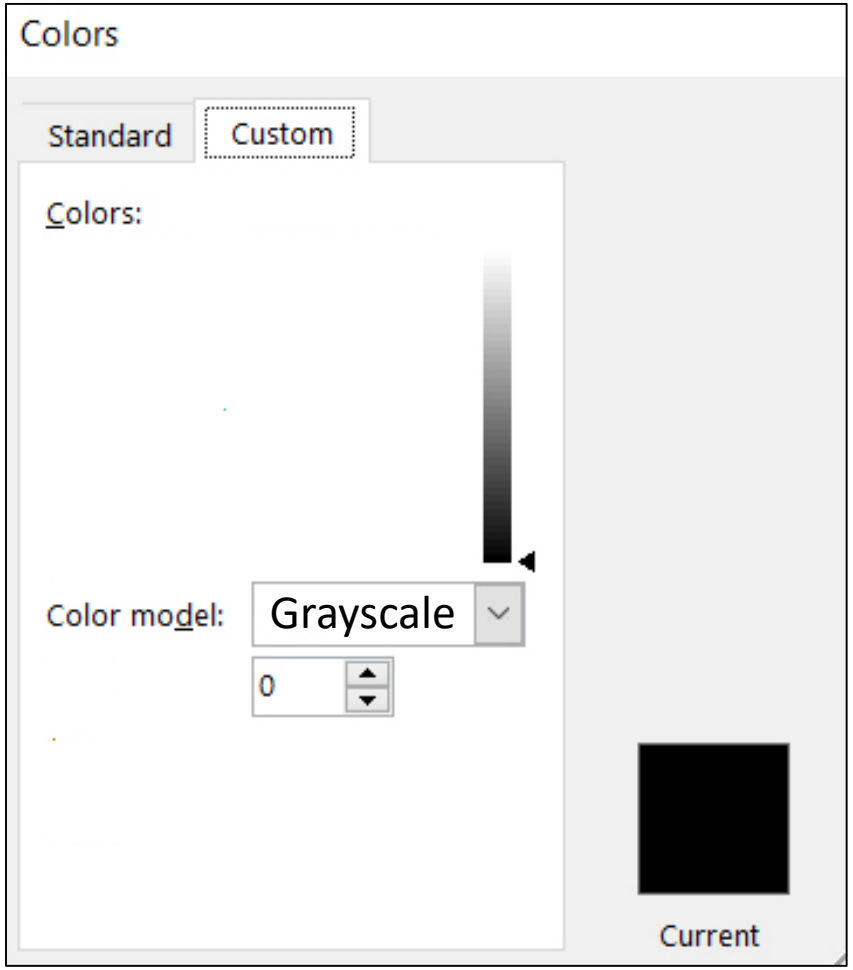
48-bit Color Depth

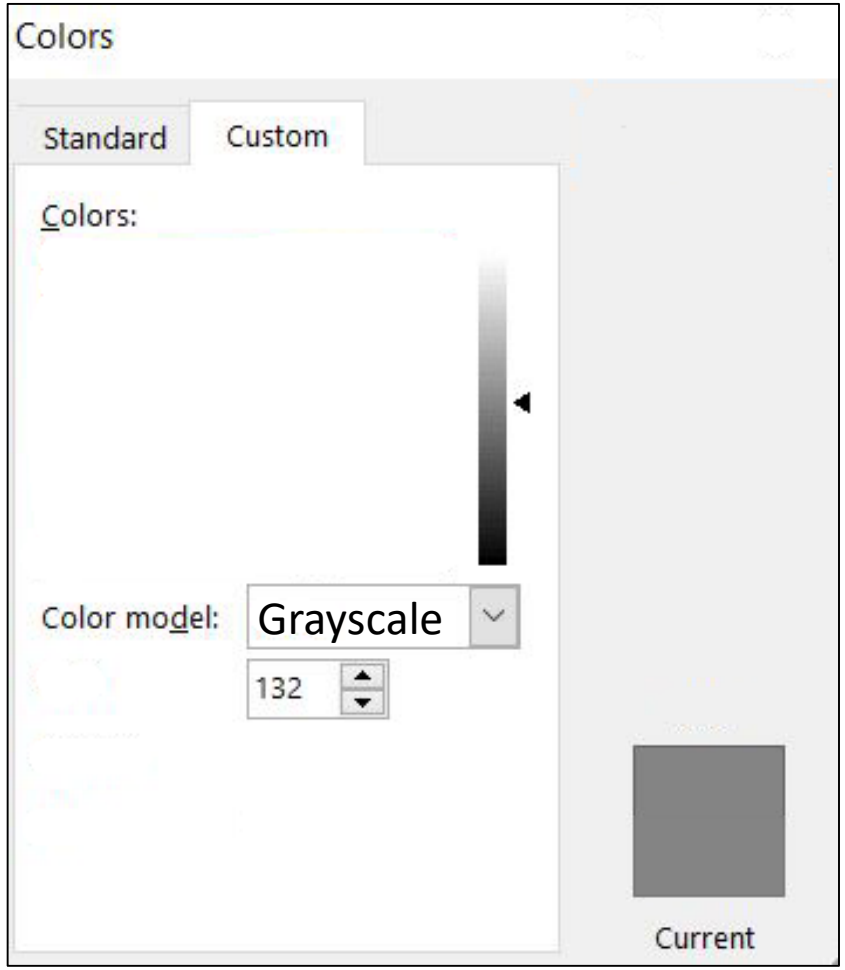
281,474,976,700,000 unique colors

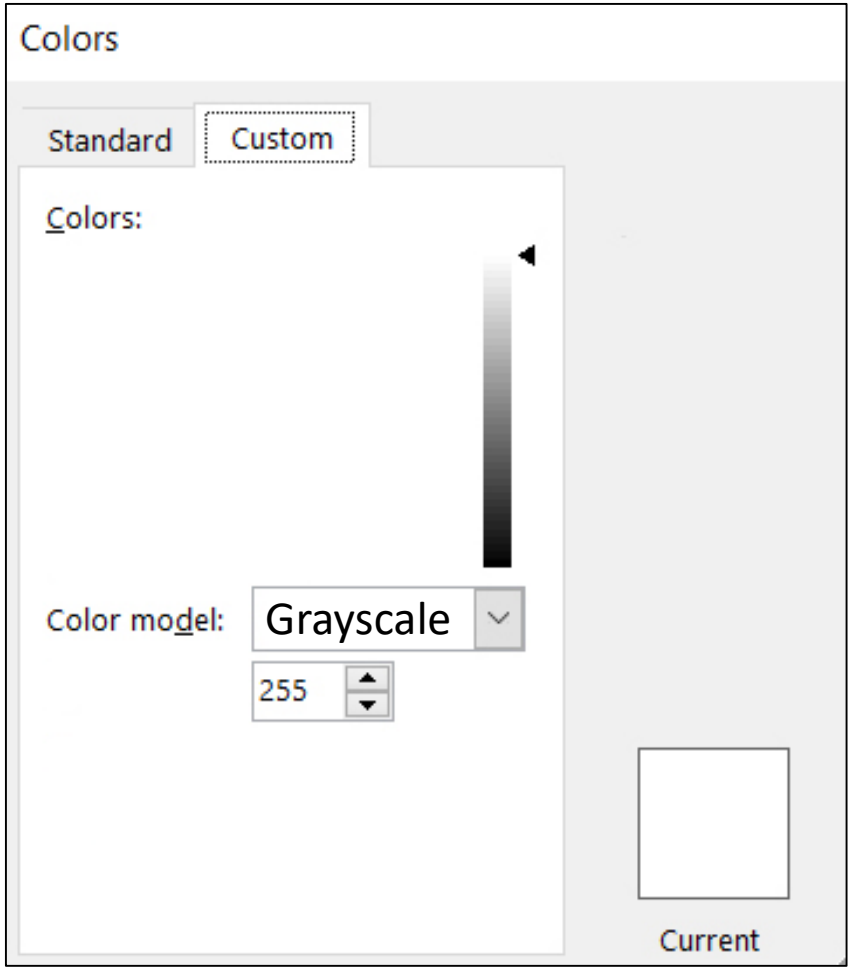
Image Type: Grayscale

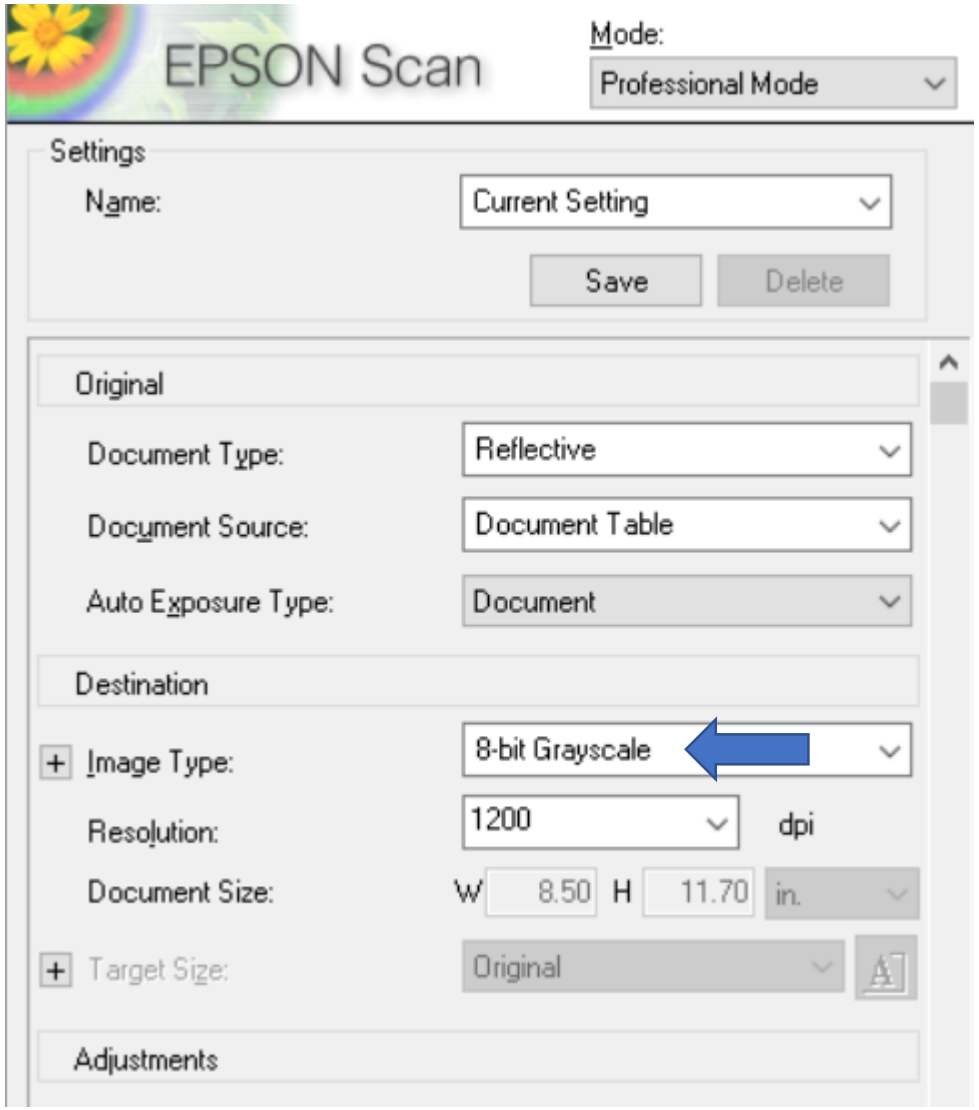
- The digitizing device examines each Pixel
- The color of each pixel is recorded
  - But the color palate is limited to shades of Gray
  - Each color component (Red, Green, Blue) has the exact same value

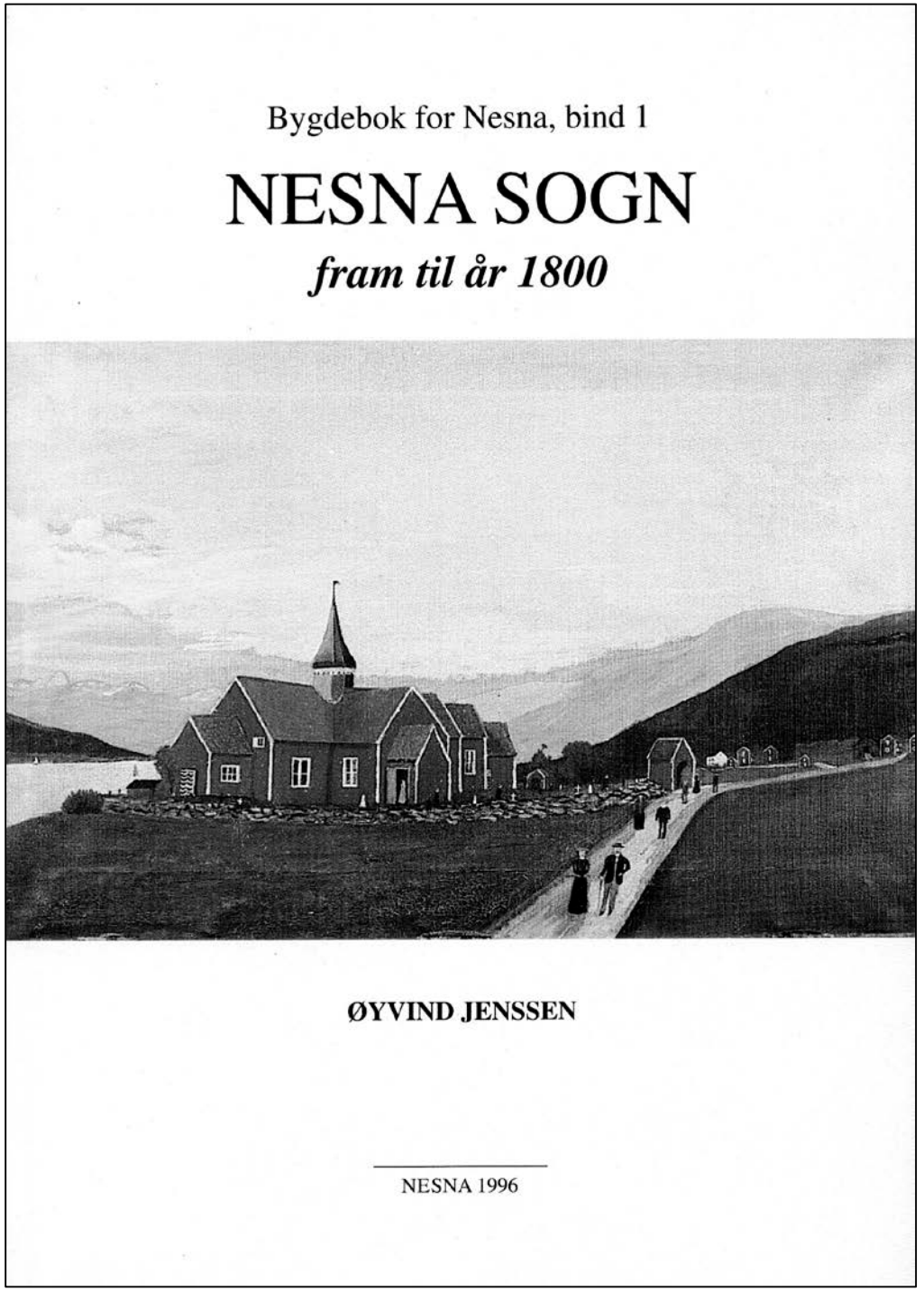
Equal Parts Red, Green and Blue








EPSON Scan
Mode:
Professional Mode
Settings
Name:
Current Setting
Save
Delete
Original
Document Type:
Reflective
Document Source:
Document Table
Auto Exposure Type:
Document
Destination
Image Type:
8-bit Grayscale
Resolution:
1200
dpi
Document Size:
W
8.50
H
11.70
in.
Target Size:
Original
Adjustments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Grayscale Storage

- Since the Red, Green and Blue values are always the same, only one value is stored

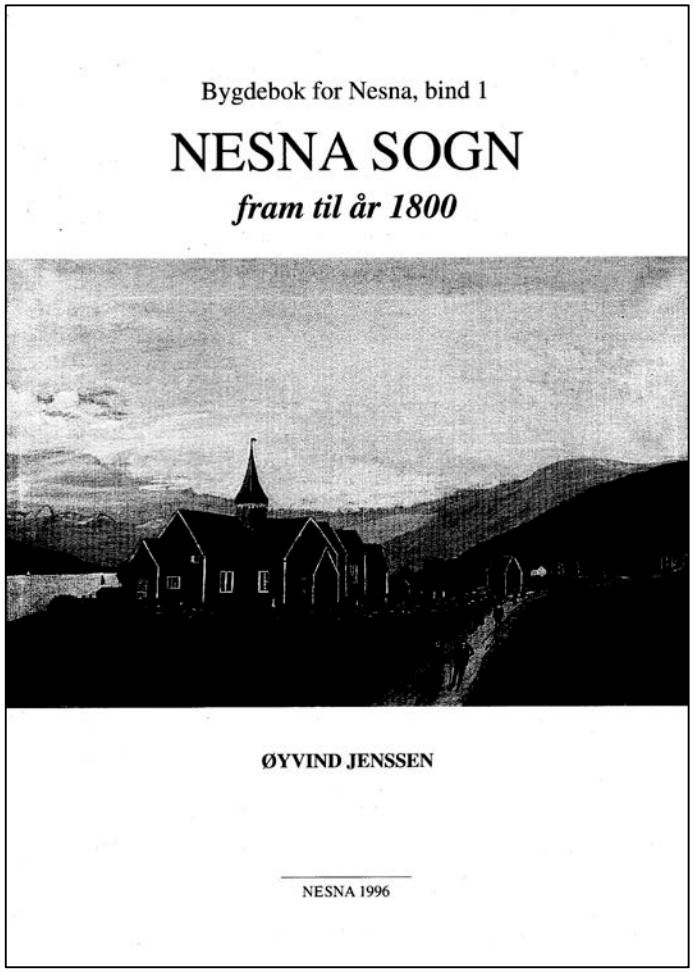
- **8-bit color depth**
  - Shades of Gray in 256 steps

Gray							
1	1	1	1	1	1	1	1

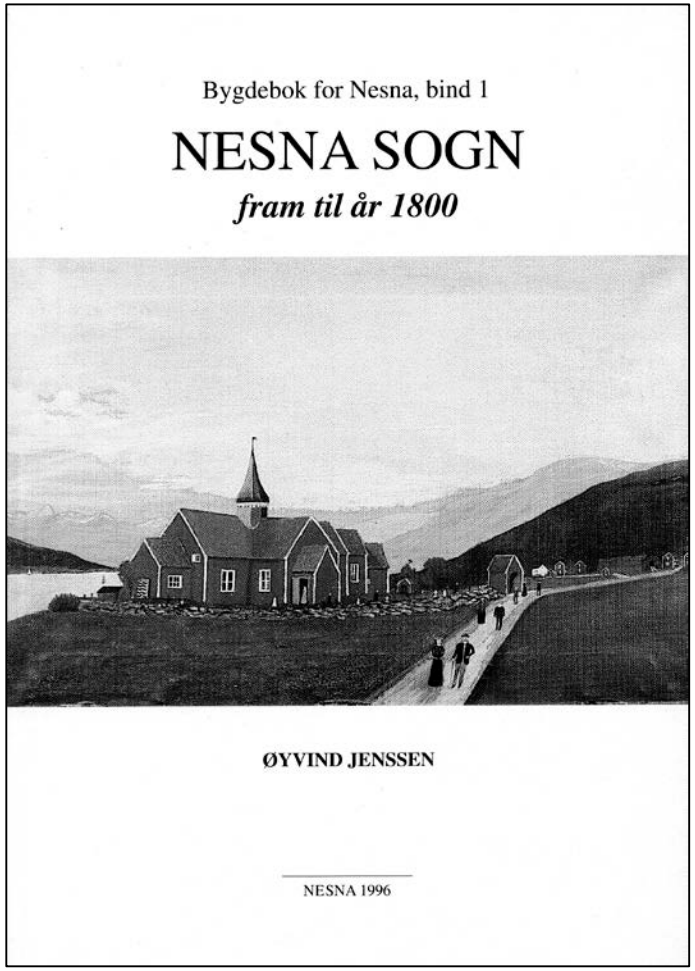
- **16-bit color depth**
  - Shades of Gray in 65,536 steps

Gray															
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

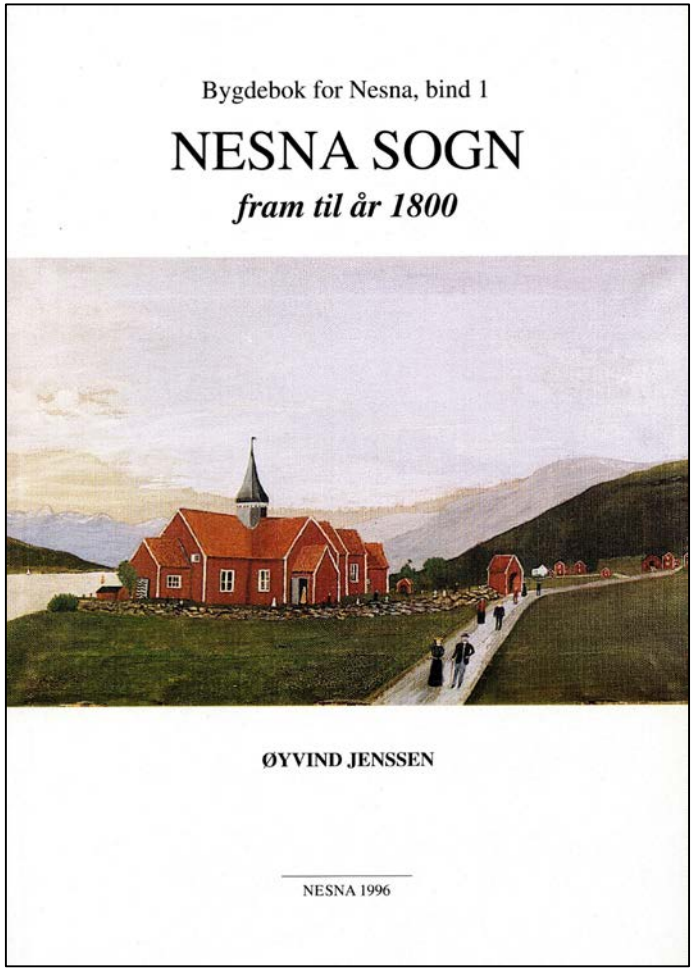
Three Image Types



Black and White

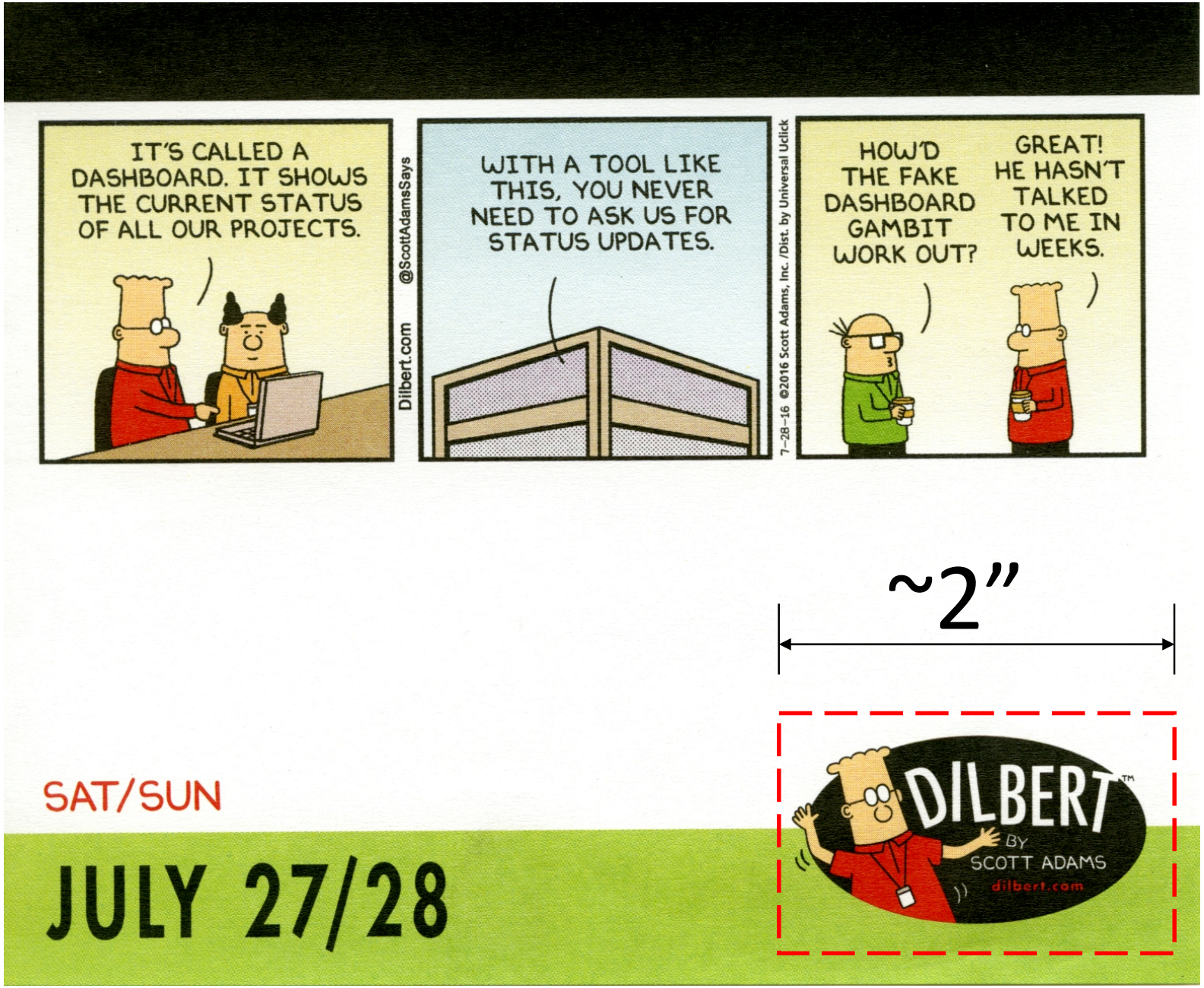


Greyscale

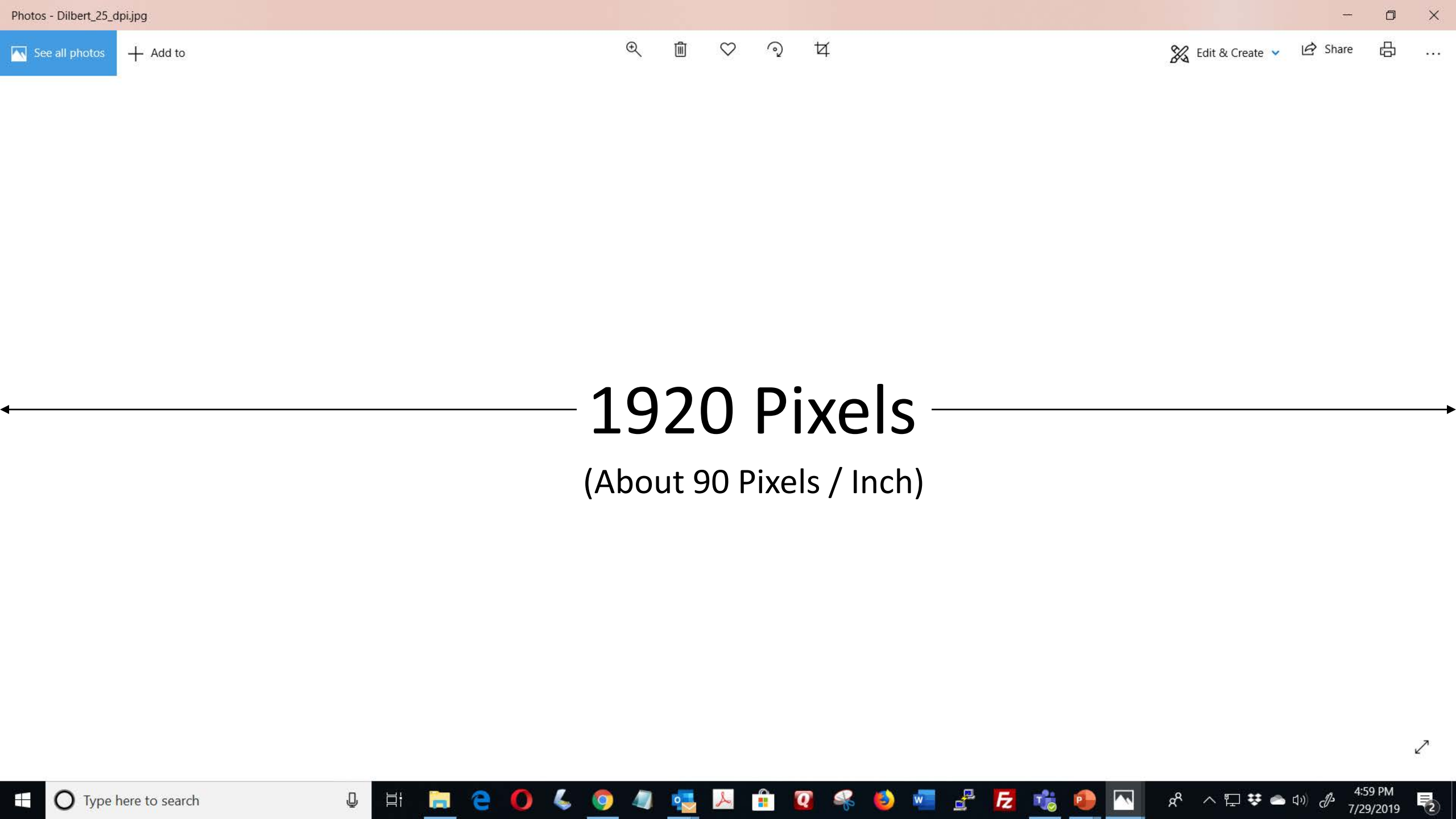


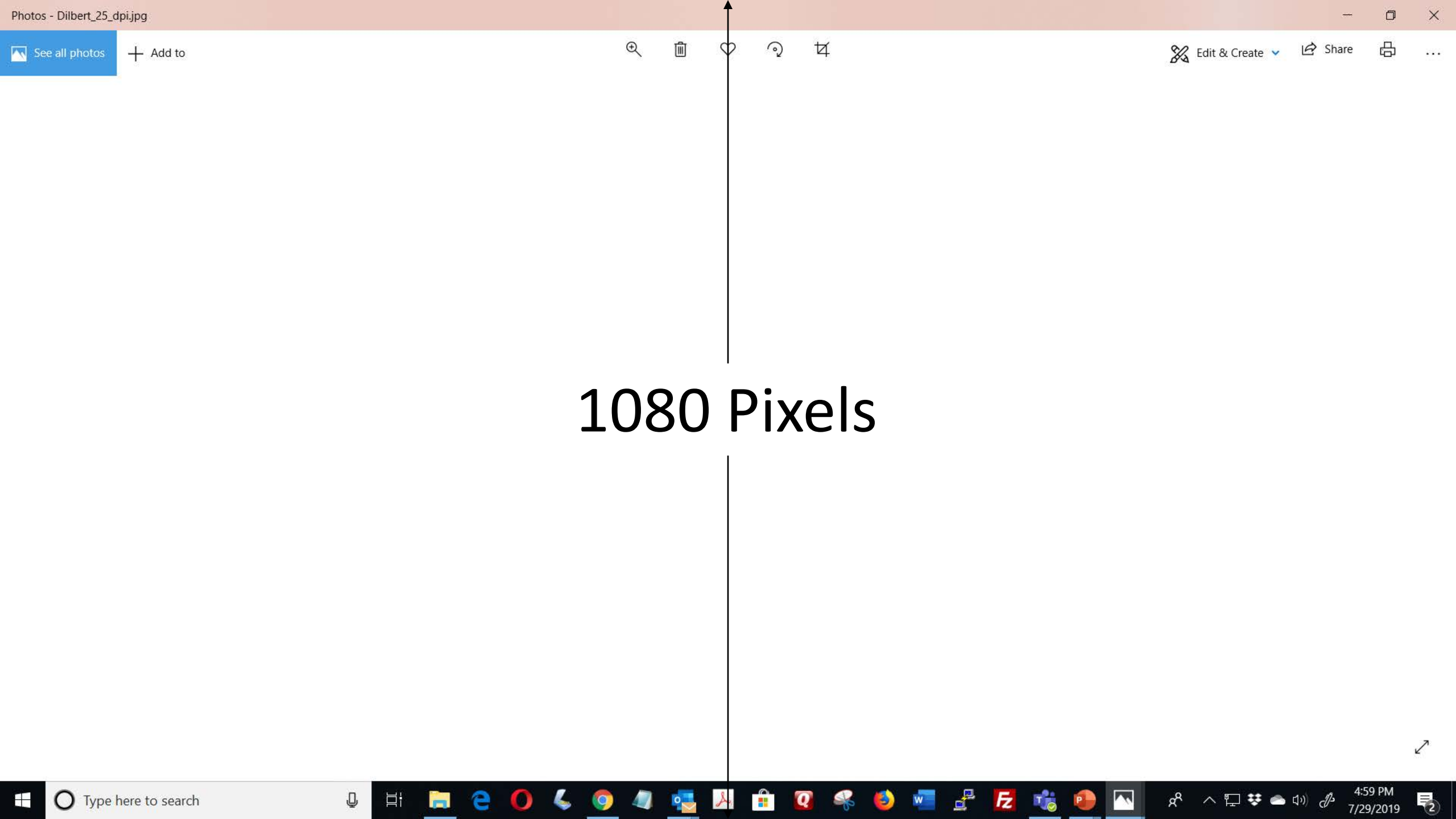
Color

Image Size vs. Resolution



Scanned using a Flatbed Scanner at a variety of resolutions…


Photos - Dilbert_25_dpi.jpg
See all photos
Add to
Edit & Create
Share
1920 Pixels
(About 90 Pixels / Inch)
Type here to search
4:59 PM
7/29/2019


Photos - Dilbert_25_dpi.jpg
See all photos
Add to
Edit & Create
Share
1080 Pixels
Type here to search
4:59 PM
7/29/2019

25 dpi (Dots per Inch)

Photos - Dilbert_50_dpi_001.jpg

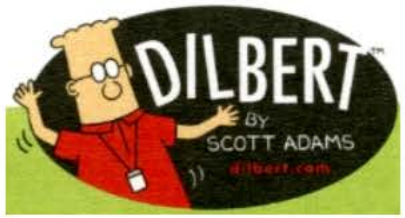
See all photos | Add to | Edit & Create | Share

50 dpi

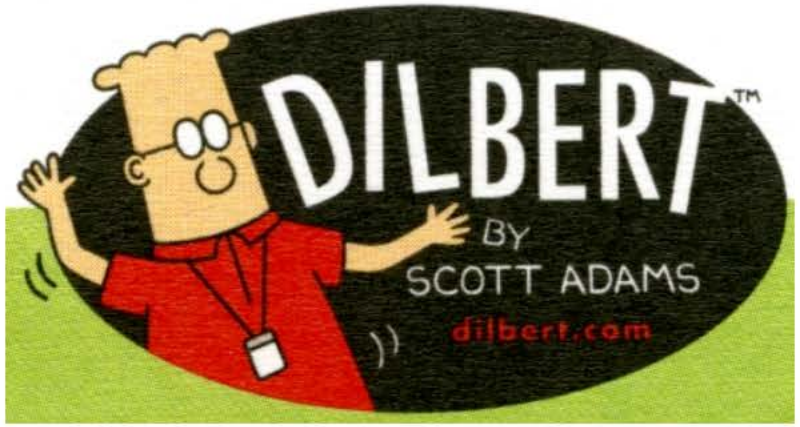
Type here to search

5:00 PM
7/29/2019

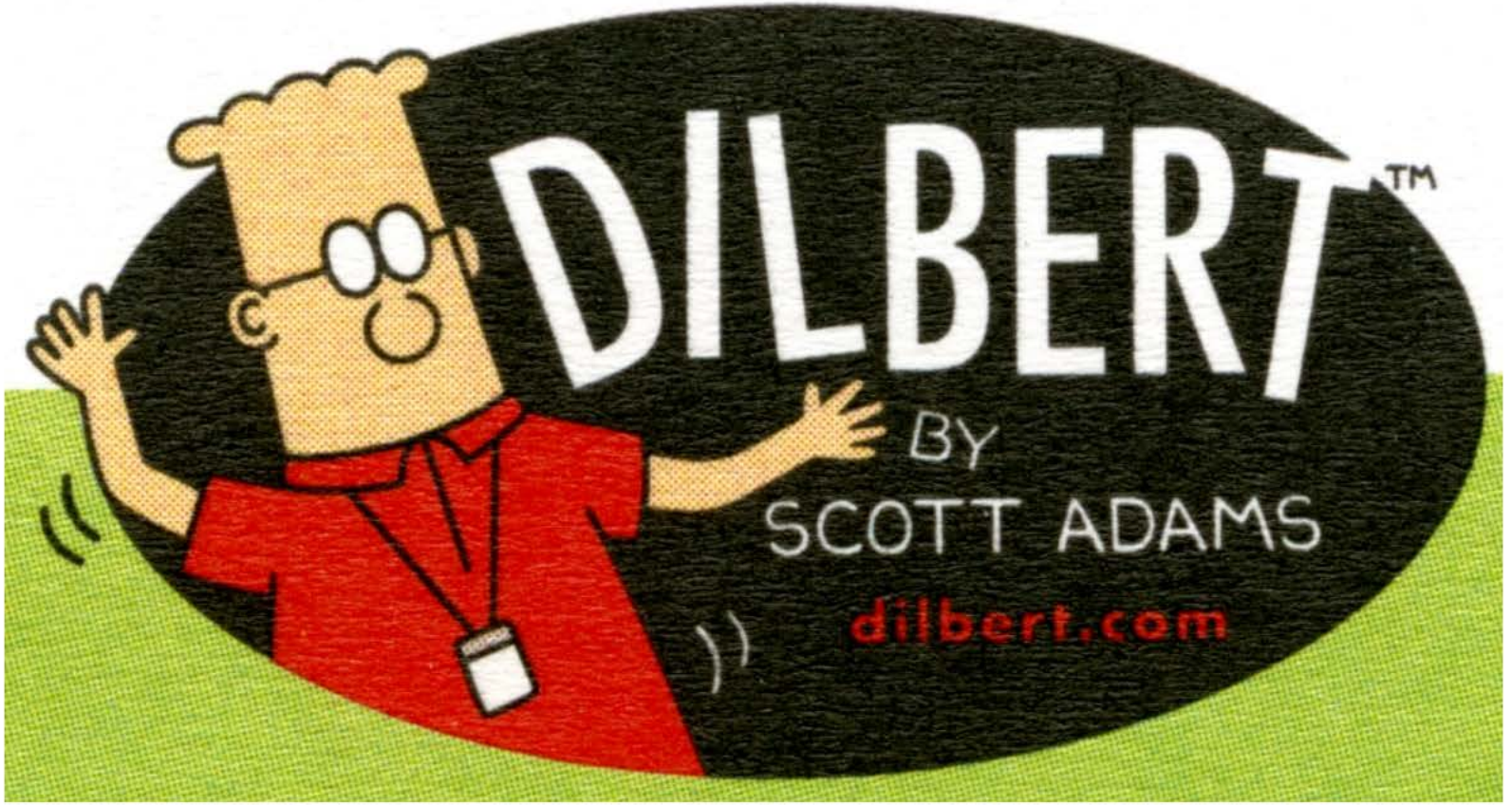
150 dpi



300 dpi



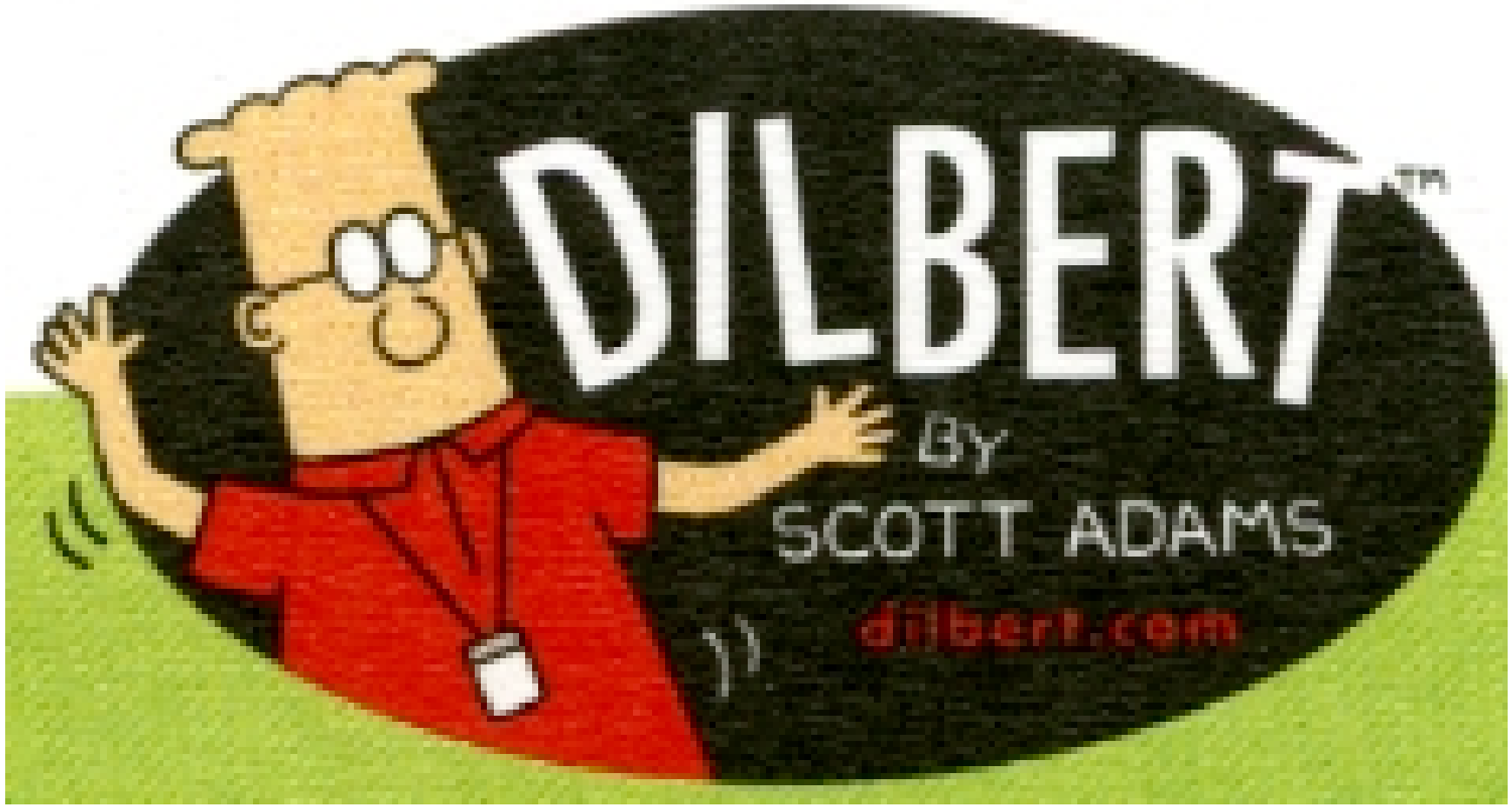
600 dpi



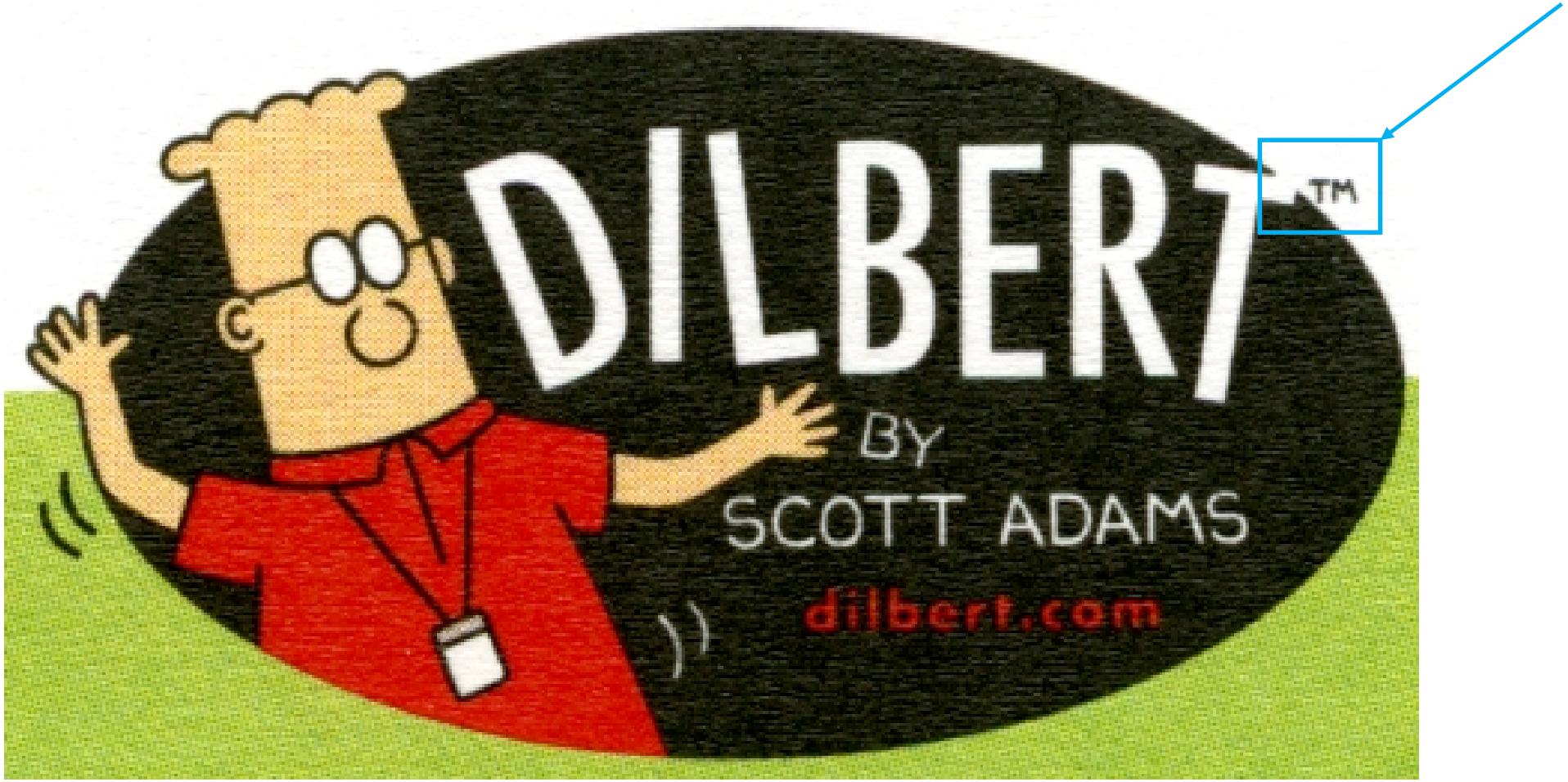
25 dpi

Resolution: **50** dpi

Resolution: **150** dpi



Resolution: **300** dpi



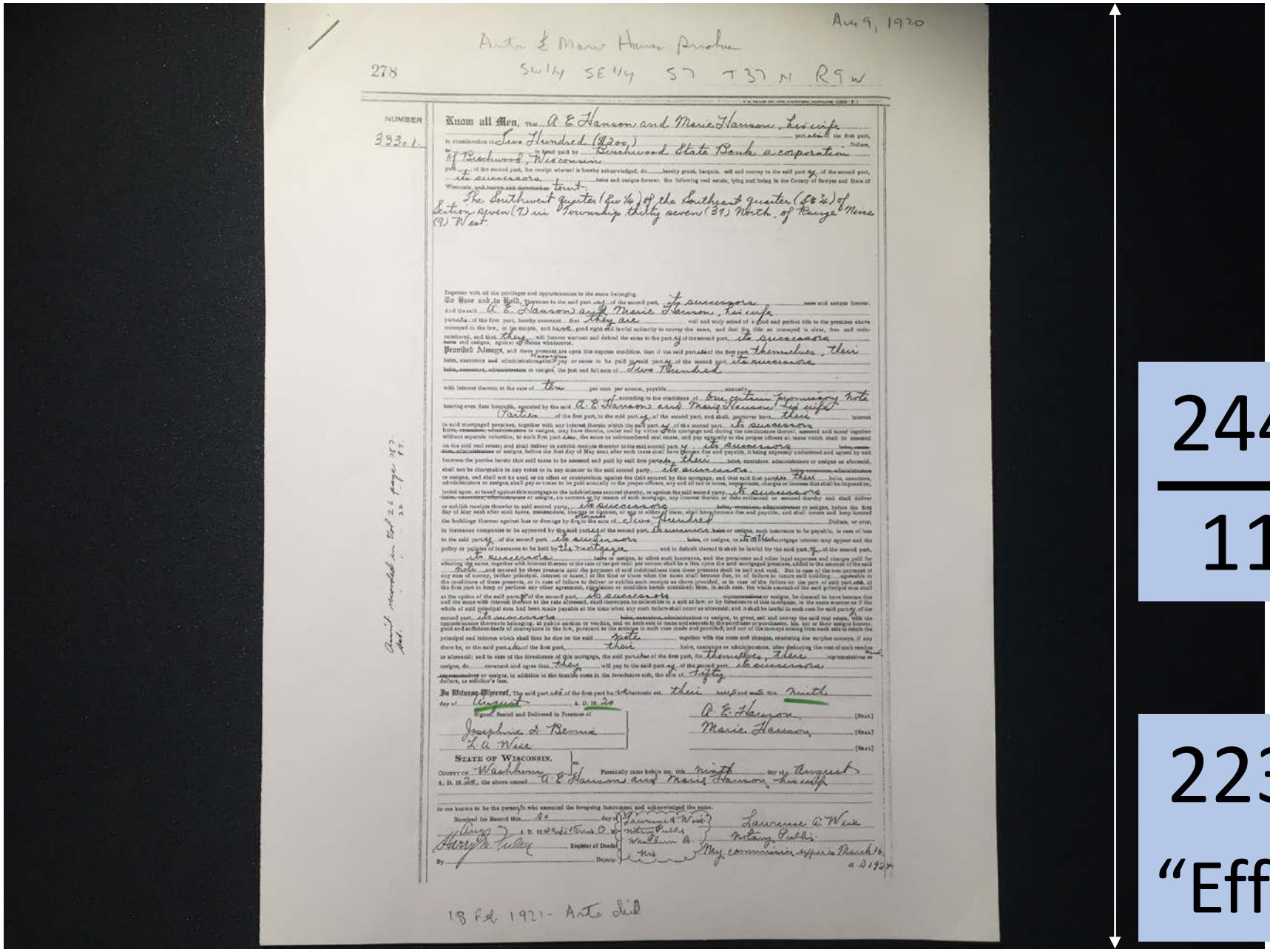
Resolution: 300 dpi

Key Concept

- When you digitize something, you need “enough” resolution
  - Small Original?
  - Plan to make it larger?
  - Digitize at a “high” resolution!

“Digitize at a High Resolution?”

- **Flatbed Scanner**
  - You can adjust the resolution
  - My Epson V700: 50 dpi -> 12,800 dpi
- **Digital Camera**
  - Take maximum advantage of camera orientation
  - Move the camera closer to the document



Aug 9, 1920

Anton & Marie Hanson Probate

278 SW¼ SE¼ S7 T37 N R9 W

NUMBER 3330.1

Know all Men, That A E Hanson and Marie Hanson, his wife

in consideration of Two Hundred ($200) Dollars, to in hand paid by Birchwood State Bank a corporation of Birchwood, Wisconsin

the receipt whereof is hereby acknowledged, do hereby grant, bargain, sell and convey to the said part y of the second part, its successors and assigns forever, the following real estate, lying and being in the County of Sawyer and State of Wisconsin, and known and described as follows, to-wit:

The Southwest quarter (SW ¼) of the Southeast quarter (SE ¼) of Section seven (7) in Township thirty seven (37) North of Range Nine (9) West.

Together with all the privileges and appurtenances to the same belonging.

To Have and to Hold, Premises to the said part y of the second part, its successors and assigns forever.

And the said A. E. Hanson and Marie Hanson, his wife parties of the first part, hereby covenant that they are well and truly seized of a good and perfect title to the premises above conveyed in the law, in fee simple, and have good right and lawful authority to convey the same, and that the title so conveyed is clear, free and unincumbered, and that they will forever warrant and defend the same to the part y of the second part, its successors and assigns, against all claims whatsoever.

Provided Always, and these presents are upon this express condition, that if the said parties of the first part themselves, their heirs, executors and administrators, do pay or cause to be paid unto said party of the second part its successors heirs, executors, administrators or assigns, the just and full sum of Two Hundred

with interest thereon at the rate of Ten per cent. per annum, payable annually, according to the conditions of One certain promissory note bearing even date herewith, executed by the said A. E. Hanson and Marie Hanson, his wife Parties of the first part, to the said part y of the second part, and shall, moreover have their interest in said mortgaged premises, together with any interest therein which the said part y of the second part, its successors heirs, executors, administrators or assigns, may have therein, either real by virtue of this mortgage and during the continuance thereof, assumed and taxed together without separate valuation, to such first part ies, the same as unincumbered real estate, and pay ingenuity to the proper officers all taxes which shall be assessed on the said real estate; and shall deliver or exhibit receipts therefor to the said second part y its successors heirs, executors, administrators or assigns, before the first day of May next after such taxes shall have become due and payable, it being expressly understood and agreed by and between the parties hereto that said taxes to be assessed and paid by said first parties, their heirs, executors, administrators or assigns as aforesaid, shall not be chargeable in any event or in any manner to the said second party, its successors heirs, executors, administrators or assigns, and shall not be used as an offset or counterclaim against the debt secured by this mortgage, and that said first parties their heirs, executors, administrators or assigns, shall pay or cause to be paid annually to the proper officers, any and all tax or taxes, assessments, charges or income that shall be imposed on, levied upon, or taxed against this mortgage or the indebtedness secured thereby, or against the said second party, its successors heirs, executors, administrators or assigns, on account of or by reason of such mortgage, any interest therein or debt evidenced or secured thereby and shall deliver or exhibit receipts therefor to said second party, its successors heirs, executors, administrators or assigns, before the first day of May next after such taxes, assessments, charges or income, or any or either of them, shall have become due and payable, and shall insure and keep insured the buildings thereon against loss or damage by fire in the sum of Two Hundred Dollars, or over, in insurance companies to be approved by the said party of the second part, its successors heirs or assigns, such insurance to be payable, in case of loss to the said part y of the second part, its successors heirs, or assigns, as their interests may appear and the policy or policies of insurance to be held by the mortgagee, and in default thereof it shall be lawful for the said part y of the second part, its successors heirs, or assigns, to effect such insurance, and the premiums and other legal expenses and charges paid for effecting the same, together with interest thereon at the rate of ten per cent. per annum, shall be a lien upon the said mortgaged premises, added to the amount of the said Note and secured by these presents until the payment of said indebtedness then these presents shall be null and void. But in case of the non-payment of any sum of money, (either principal, interest or taxes,) at the time or times when the same shall become due, or of failure to insure and building agreeable to the conditions of these presents, or in case of failure to deliver or exhibit such receipts as above provided, or in case of the failure on the part of said part ies of the first part to keep or perform any other agreement, stipulation or condition herein contained; then, in such case, the whole amount of the said principal sum shall at the option of the said party of the second part, its successors heirs, executors, administrators or assigns, be deemed to have become due and the same with interest thereon at the rate aforesaid, shall thereupon be collectible in a suit at law, or by foreclosure of this mortgage, in the same manner as if the whole of said principal sum had been made payable at the time when any such failure shall occur as aforesaid; and it shall be lawful in such case for said party of the second part, its successors heirs, executors, administrators or assigns, to grant, sell and convey the said real estate, with the appurtenances thereunto belonging, at public auction or vendue, and to such sale to make and execute to the purchaser or purchasers, his, her or their assigns forever, good and sufficient deeds of conveyance in the law, pursuant to the statute in such case made and provided; and out of the moneys arising from such sale to retain the principal and interest which shall then be due on the said Note together with the costs and charges, rendering the surplus convey, if any there be, to the said parties of the first part, their heirs, executors or administrators, after deducting the cost of such sale as aforesaid; and in case of the foreclosure of this mortgage, the said parties of the first part, for themselves, their heirs, representatives or assigns, do covenant and agree that they will pay to the said part y of the second part, its successors representatives or assigns, in addition to the taxable costs in the foreclosure suit, the sum of Fifty dollars, as solicitor's fee.

In Witness Whereof, The said parties of the first part have hereunto set their hand and seal this Ninth day of August A. D. 19 20

Signed, Sealed and Delivered in Presence of

Josephine A Bessie

L A Wise

A E Hanson [Seal]

Marie Hanson [Seal]

[Seal]

STATE OF WISCONSIN, } ss.

COUNTY OF Washburn } Personally came before me, this Ninth day of August A. D. 19 20, the above named A E Hanson and Marie Hanson, his wife

to me known to be the person s who executed the foregoing instrument and acknowledged the same.

Received for Record this 10 day of Aug A. D. 19 23 at 1 o'clock P. M. and recorded in Vol 26 page 253

Harry R Culley Register of Deeds By Deputy

Laurence A Wise Notary Public Washburn Co. Wis

Laurence A Wise Notary Public My commission expires March 16, A D 1924

Anton Hanson died 18 Feb 1921

2448 Pixels

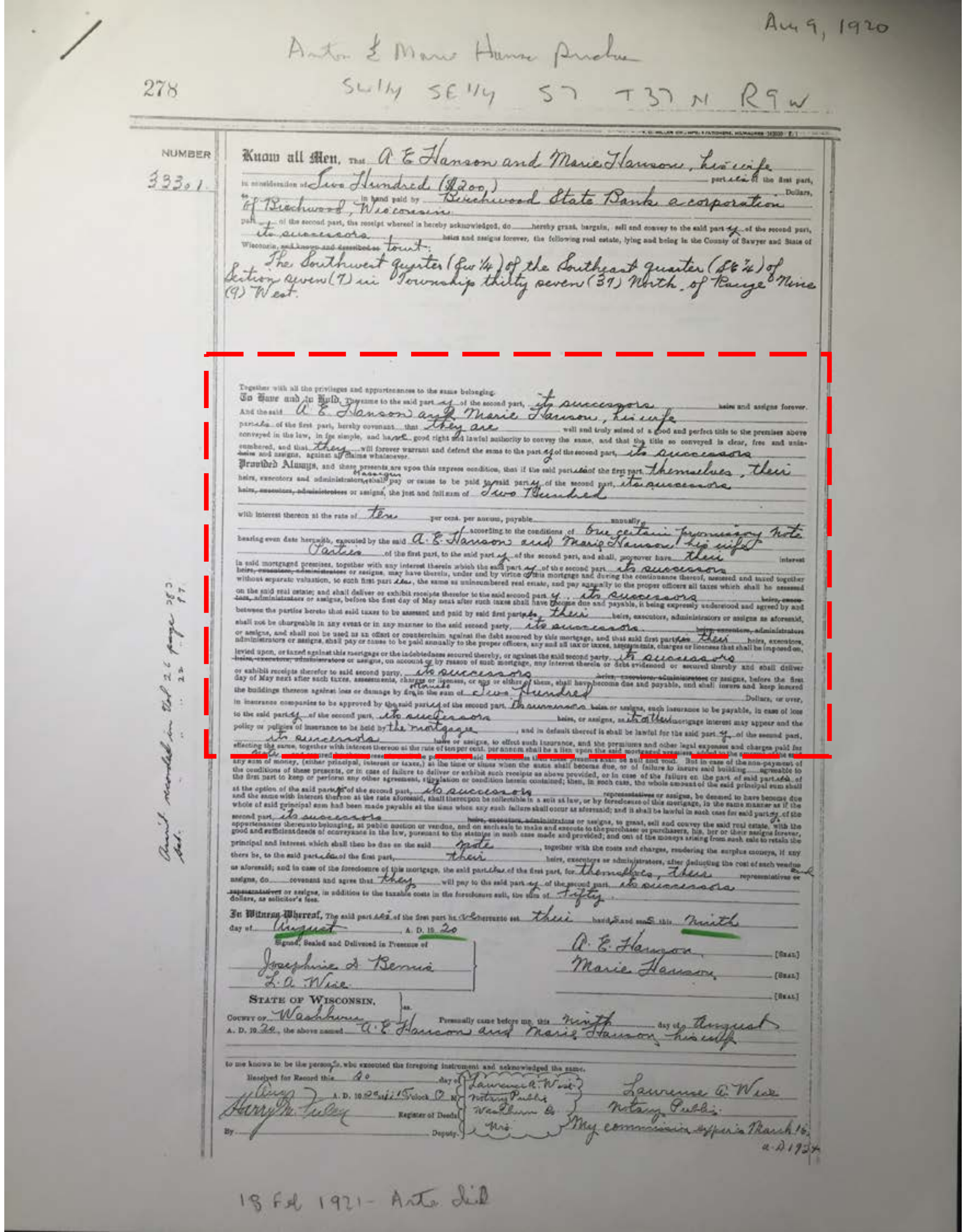
11 Inches

223 **Pixels per Inch**

"Effective Resolution"

3264 Pixels

iPhone 6



Aug 9, 1920

Anton & Marie Hanson Purchase

278

SW 1/4 SE 1/4 S7 T37 N R9W

NUMBER 33301

Know all Men, That A E Hanson and Marie Hanson, his wife ... in consideration of Two Hundred ($200) ... Dollars, in hand paid by Birchwood State Bank a corporation of Birchwood, Wisconsin ... its successors ...

The Southwest quarter (Sw 1/4) of the Southeast quarter (Se 1/4) of Section seven (7) in Township thirty seven (37) North of Range Nine (9) West.

In Witness Whereof, ... ninth day of August A. D. 19 20

A. E. Hanson [Seal]
Marie Hanson [Seal]

Josephine A. Bemis
L. A. Wise

State of Wisconsin, County of Washburn

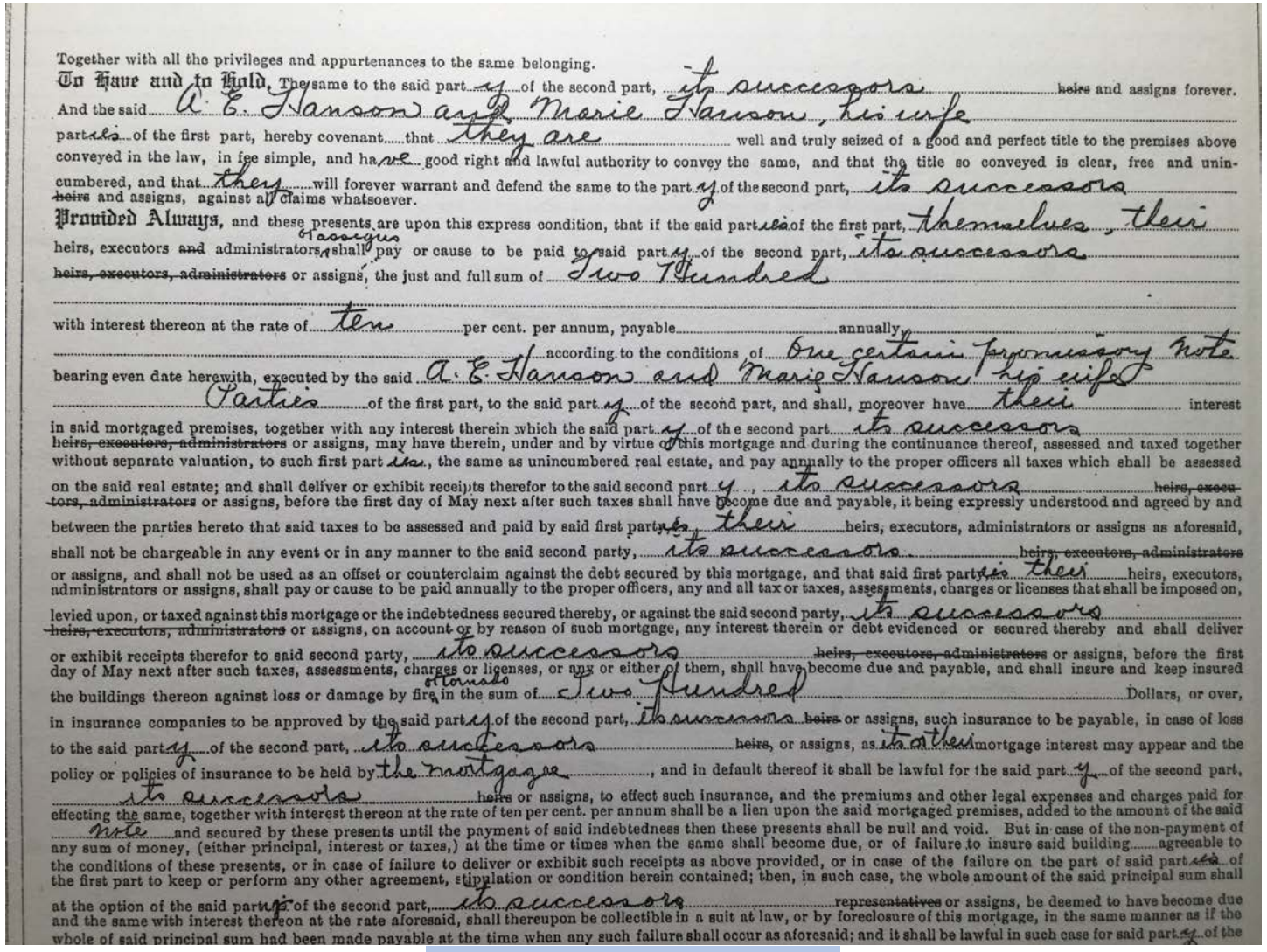
Lawrence A. Wise
Notary Public

18 Feb 1921 - Anton died

3264 Pixels

11 Inches

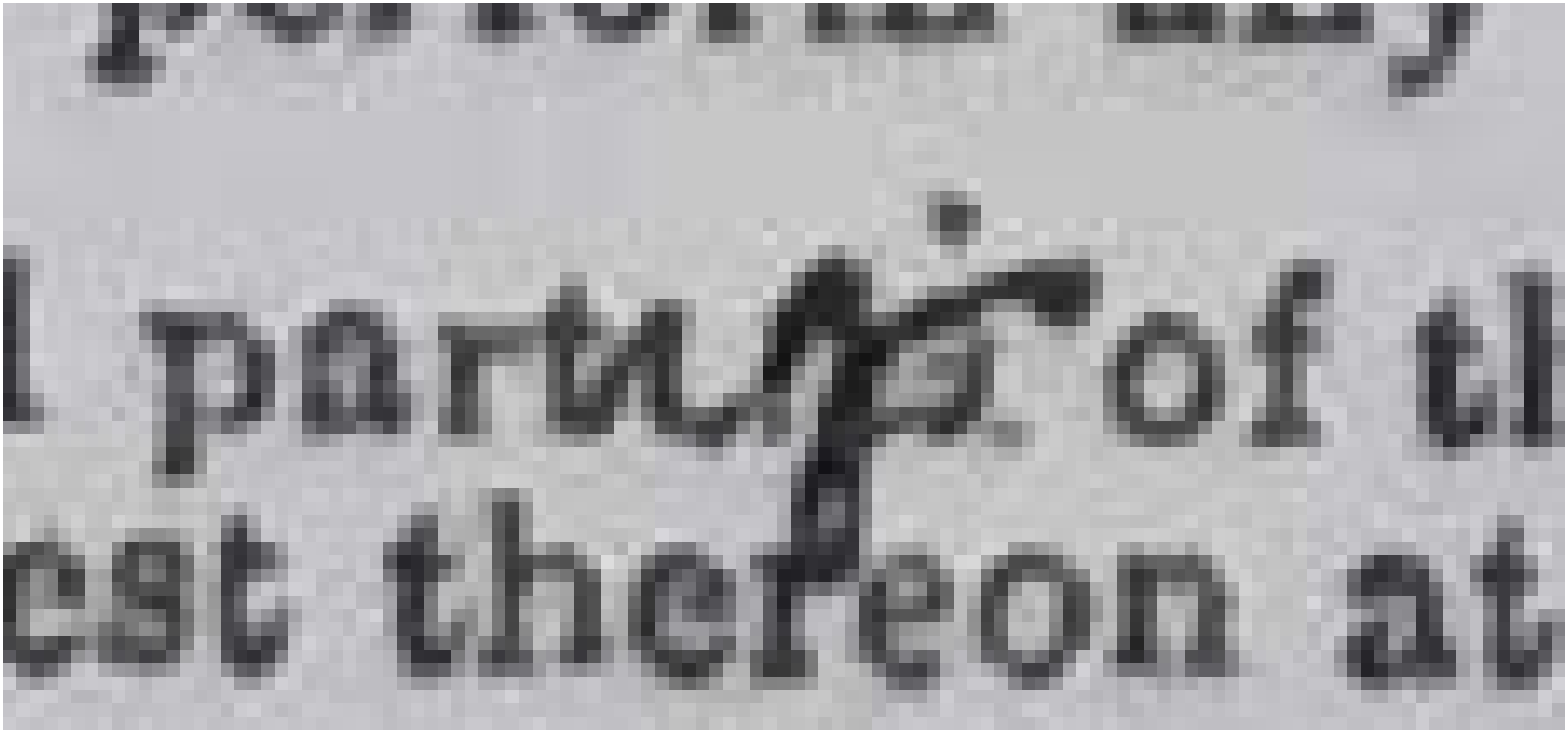
297 Pixels per Inch

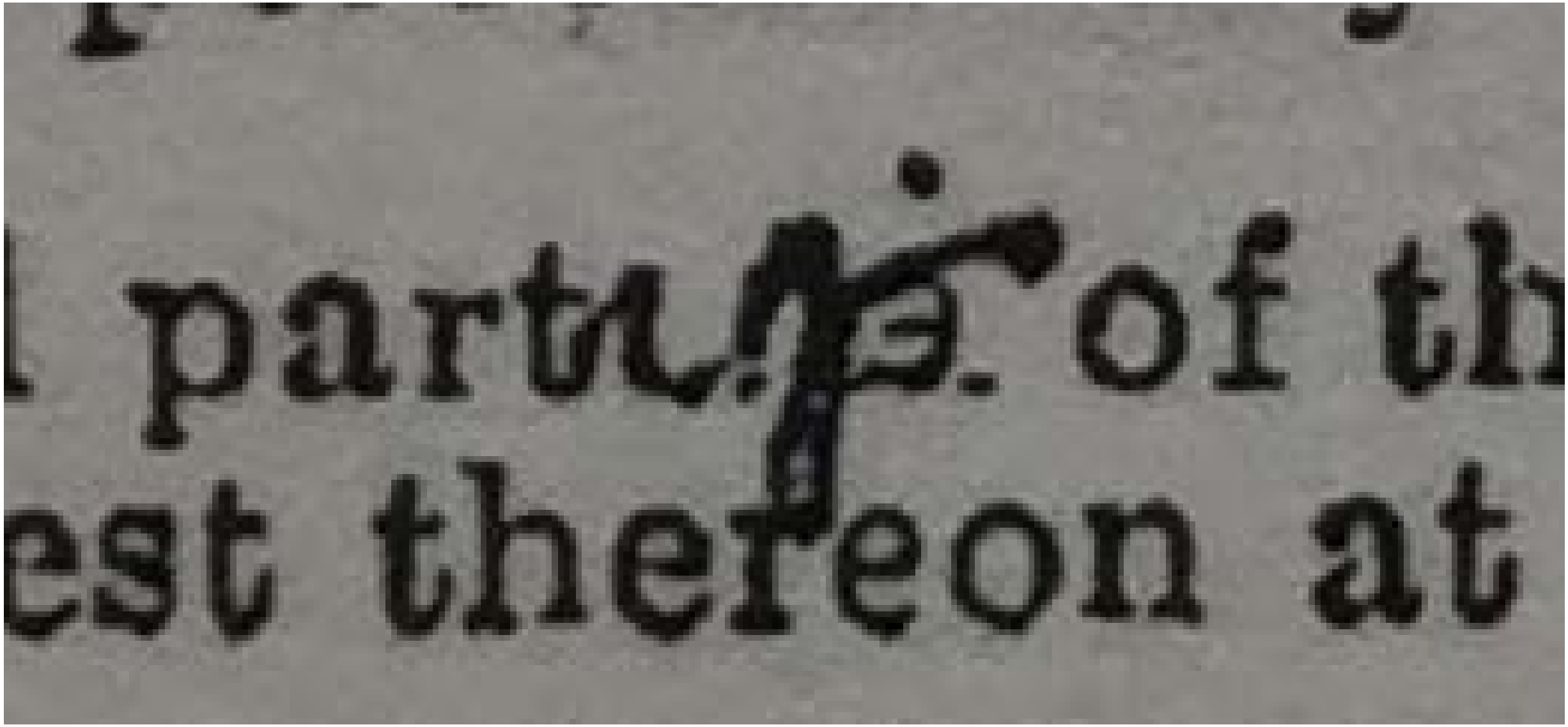


Together with all the privileges and appurtenances to the same belonging.
To Have and to Hold, The same to the said part y of the second part, its successors ~~heirs~~ and assigns forever.
And the said A. E. Hanson and Marie Hanson, his wife
parties of the first part, hereby covenant that they are well and truly seized of a good and perfect title to the premises above conveyed in the law, in fee simple, and have good right and lawful authority to convey the same, and that the title so conveyed is clear, free and unincumbered, and that they will forever warrant and defend the same to the part y of the second part, its successors ~~heirs~~ and assigns, against all claims whatsoever.
Provided Always, and these presents are upon this express condition, that if the said parties of the first part, themselves, their heirs, executors and administrators, assigns shall pay or cause to be paid to said part y of the second part, its successors ~~heirs, executors, administrators~~ or assigns, the just and full sum of Two Hundred
with interest thereon at the rate of ten per cent. per annum, payable annually according to the conditions of One certain Promissory Note bearing even date herewith, executed by the said A. E. Hanson and Marie Hanson his wife Parties of the first part, to the said part y of the second part, and shall, moreover have their interest in said mortgaged premises, together with any interest therein which the said part y of the second part its successors ~~heirs, executors, administrators~~ or assigns, may have therein, under and by virtue of this mortgage and during the continuance thereof, assessed and taxed together without separate valuation, to such first part ies, the same as unincumbered real estate, and pay annually to the proper officers all taxes which shall be assessed on the said real estate; and shall deliver or exhibit receipts therefor to the said second part y, its successors ~~heirs, executors, administrators~~ or assigns, before the first day of May next after such taxes shall have become due and payable, it being expressly understood and agreed by and between the parties hereto that said taxes to be assessed and paid by said first parties, their heirs, executors, administrators or assigns as aforesaid, shall not be chargeable in any event or in any manner to the said second party, its successors ~~heirs, executors, administrators~~ or assigns, and shall not be used as an offset or counterclaim against the debt secured by this mortgage, and that said first parties, their heirs, executors, administrators or assigns, shall pay or cause to be paid annually to the proper officers, any and all tax or taxes, assessments, charges or licenses that shall be imposed on, levied upon, or taxed against this mortgage or the indebtedness secured thereby, or against the said second party, its successors ~~heirs, executors, administrators~~ or assigns, on account or by reason of such mortgage, any interest therein or debt evidenced or secured thereby and shall deliver or exhibit receipts therefor to said second party, its successors ~~heirs, executors, administrators~~ or assigns, before the first day of May next after such taxes, assessments, charges or licenses, or any or either of them, shall have become due and payable, and shall insure and keep insured the buildings thereon against loss or damage by fire, of Nonsko in the sum of Two Hundred Dollars, or over, in insurance companies to be approved by the said part y of the second part, its successors ~~heirs~~ or assigns, such insurance to be payable, in case of loss to the said part y of the second part, its successors ~~heirs~~, or assigns, as its or their mortgage interest may appear and the policy or policies of insurance to be held by the mortgagee, and in default thereof it shall be lawful for the said part y of the second part, its successors ~~heirs~~ or assigns, to effect such insurance, and the premiums and other legal expenses and charges paid for effecting the same, together with interest thereon at the rate of ten per cent. per annum shall be a lien upon the said mortgaged premises, added to the amount of the said note and secured by these presents until the payment of said indebtedness then these presents shall be null and void. But in case of the non-payment of any sum of money, (either principal, interest or taxes,) at the time or times when the same shall become due, or of failure to insure said building agreeable to the conditions of these presents, or in case of failure to deliver or exhibit such receipts as above provided, or in case of the failure on the part of said parties of the first part to keep or perform any other agreement, stipulation or condition herein contained; then, in such case, the whole amount of the said principal sum shall at the option of the said part y of the second part, its successors ~~representatives~~ or assigns, be deemed to have become due and the same with interest thereon at the rate aforesaid, shall thereupon be collectible in a suit at law, or by foreclosure of this mortgage, in the same manner as if the whole of said principal sum had been made payable at the time when any such failure shall occur as aforesaid; and it shall be lawful in such case for said part y of the

3264 Pixels / 5.5 Inches

594 Pixels per Inch



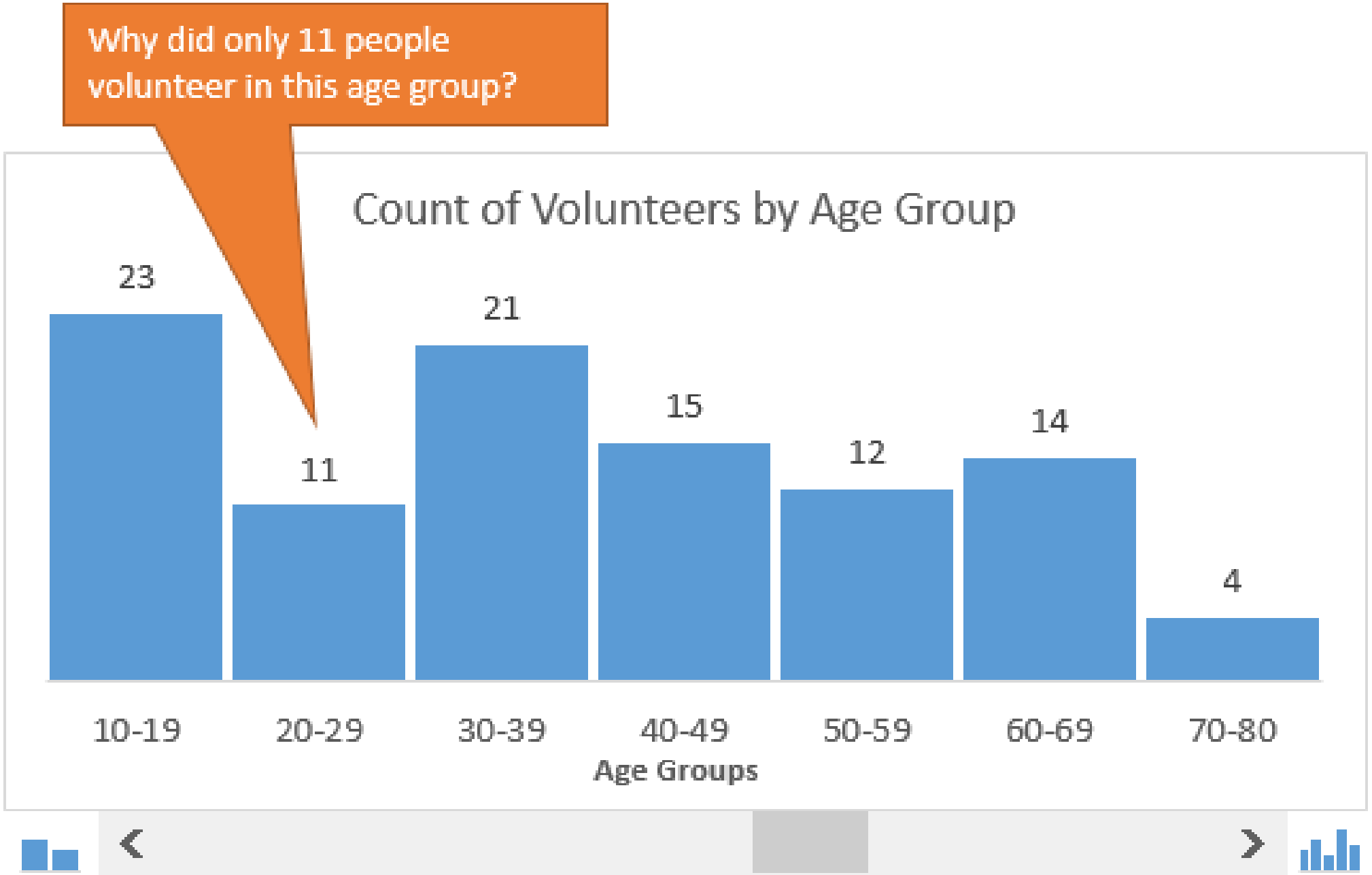

l part of th
est thereon at

Printing Digital Images

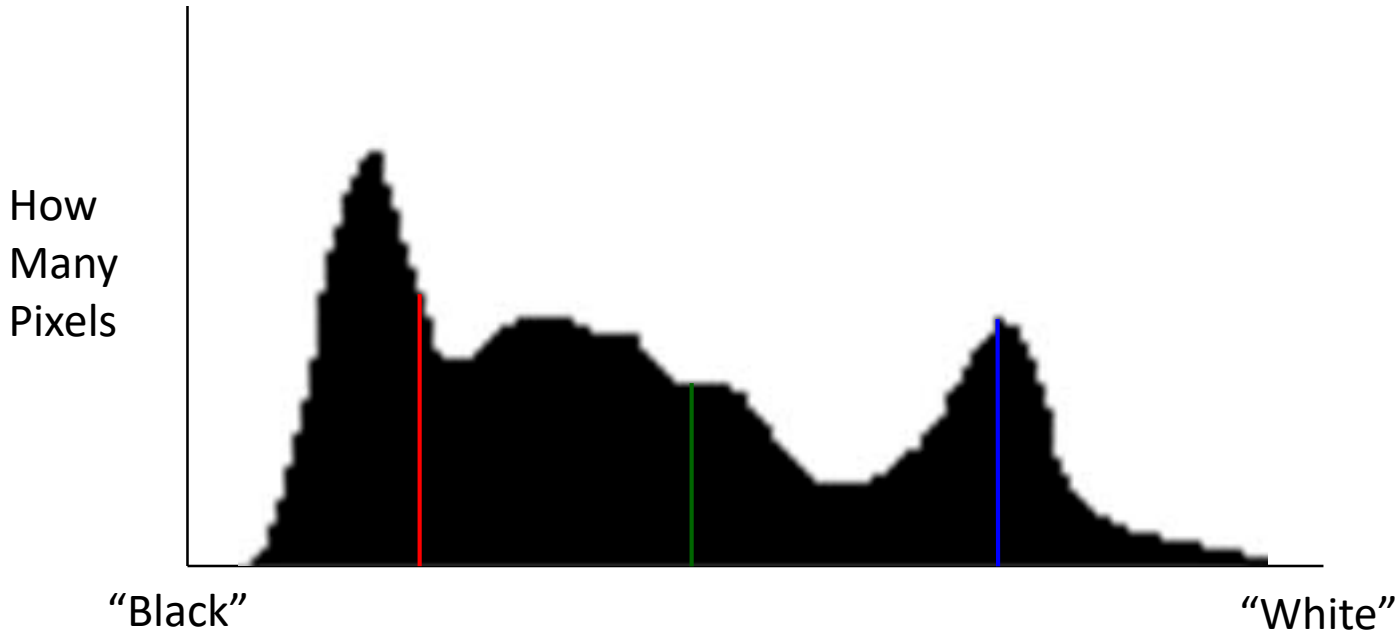
The **optimal effective resolution** for printing images is **300 dpi**

- Images at anything less than 300 dpi may not print well
- Print quality does not improve beyond 300 dpi

Histograms

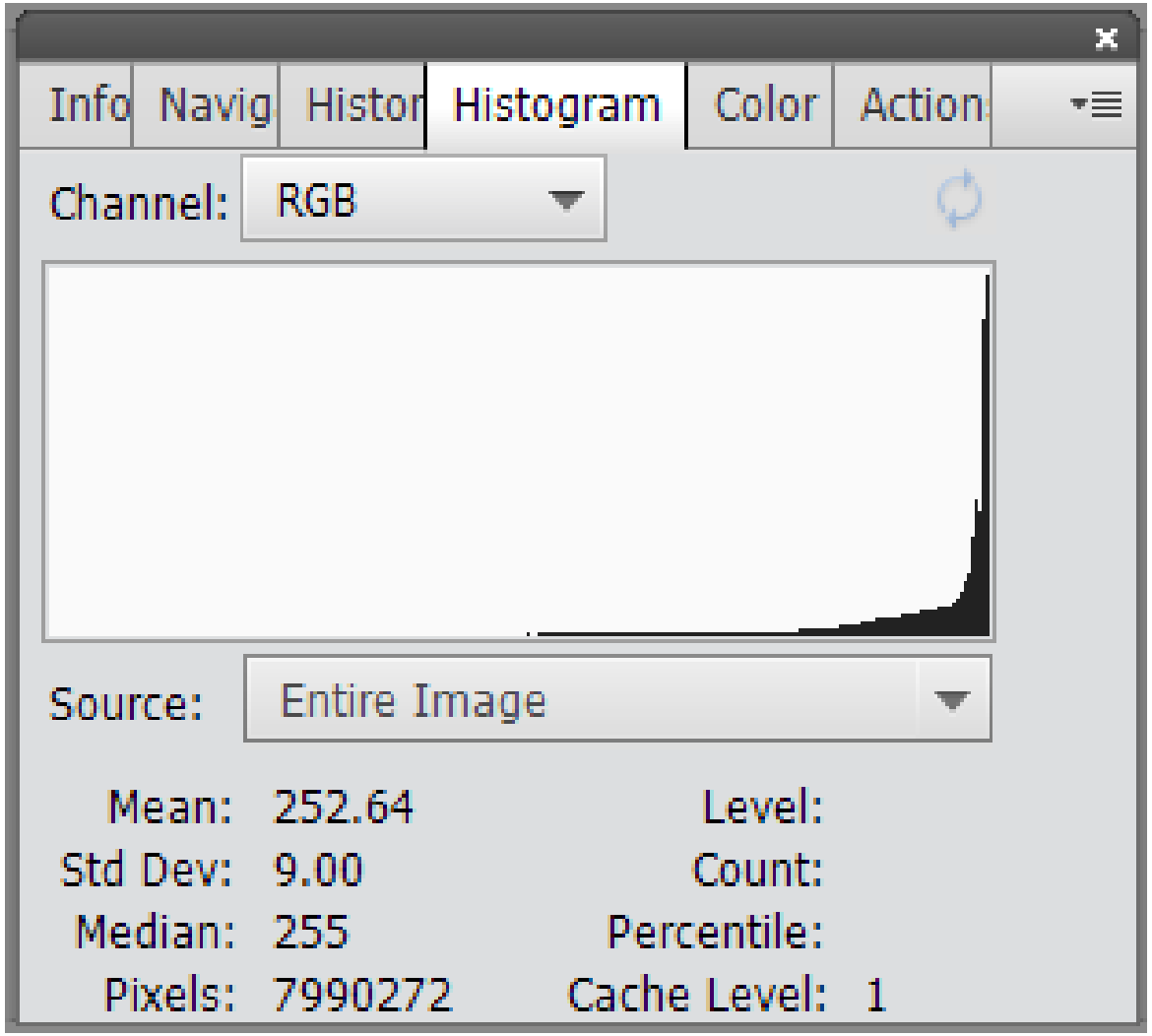

Why did only 11 people volunteer in this age group?
Count of Volunteers by Age Group
23
11
21
15
12
14
4
10-19
20-29
30-39
40-49
50-59
60-69
70-80
Age Groups

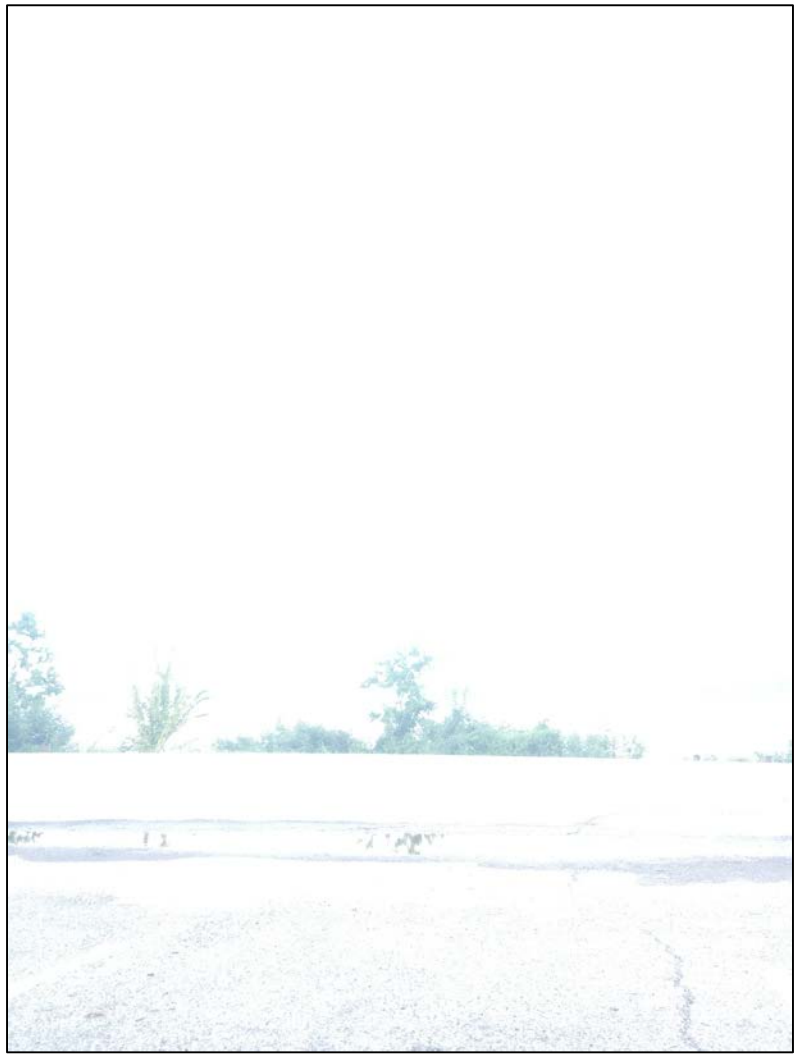
Histogram



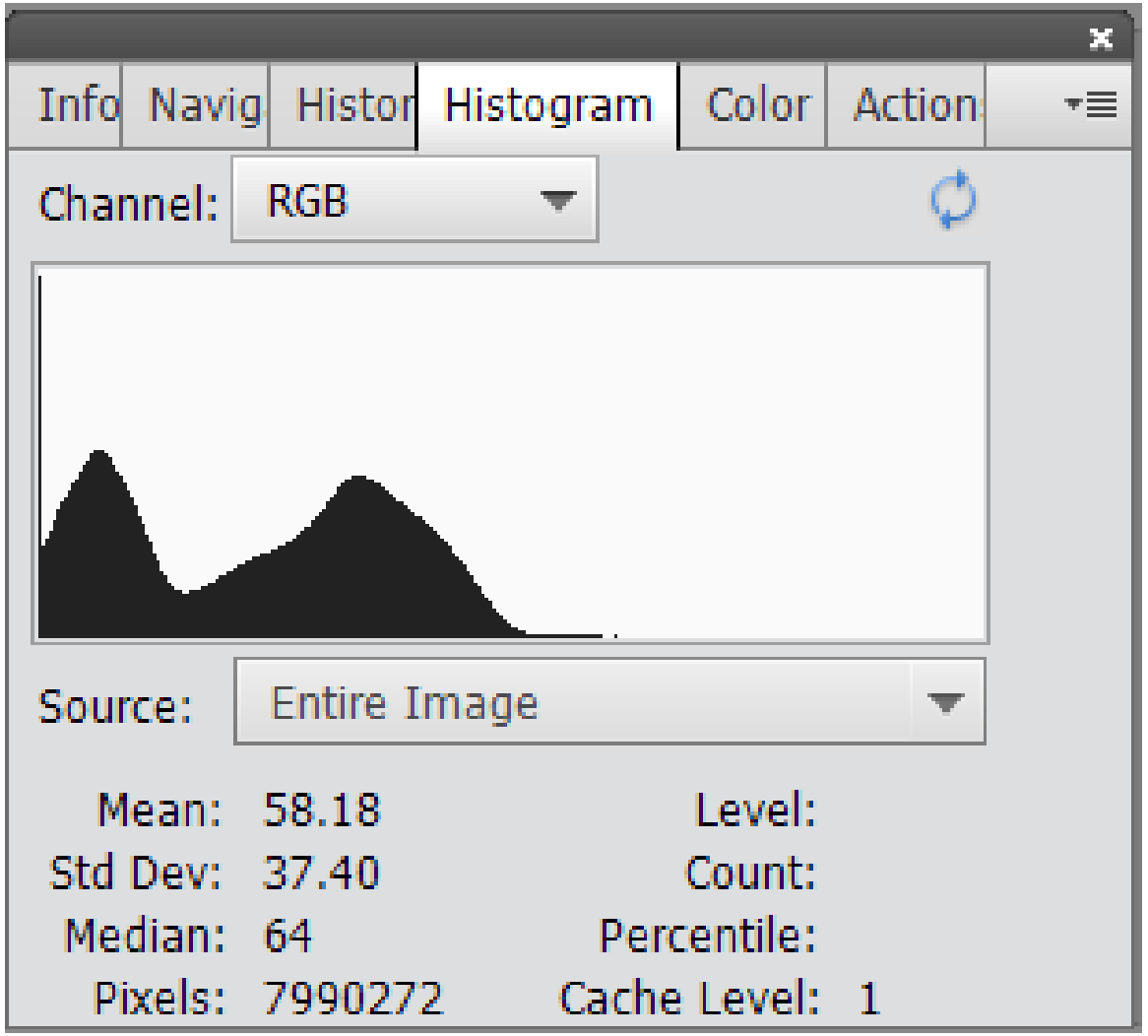
A Count of the number of Pixels at each color

Over Exposed

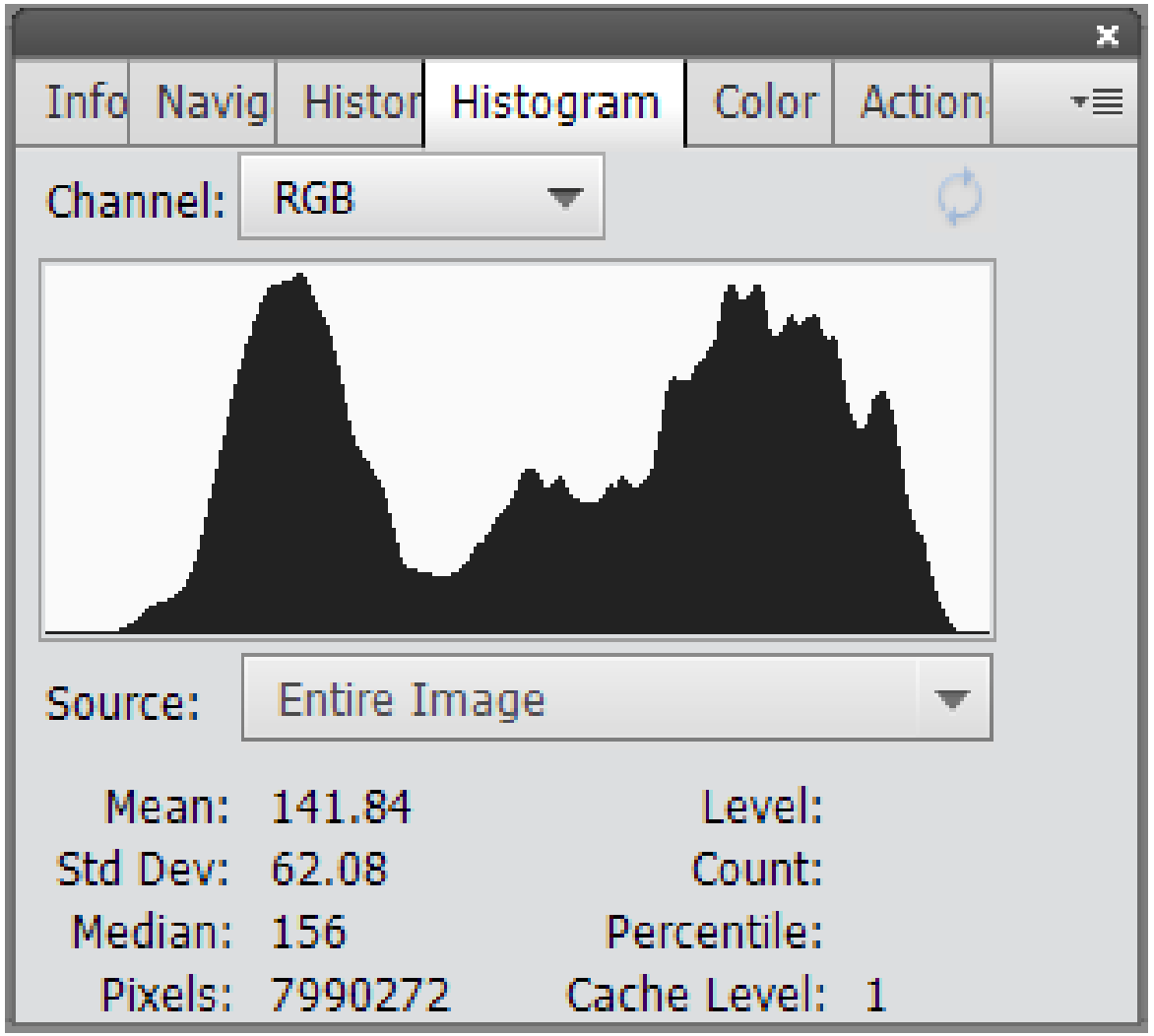


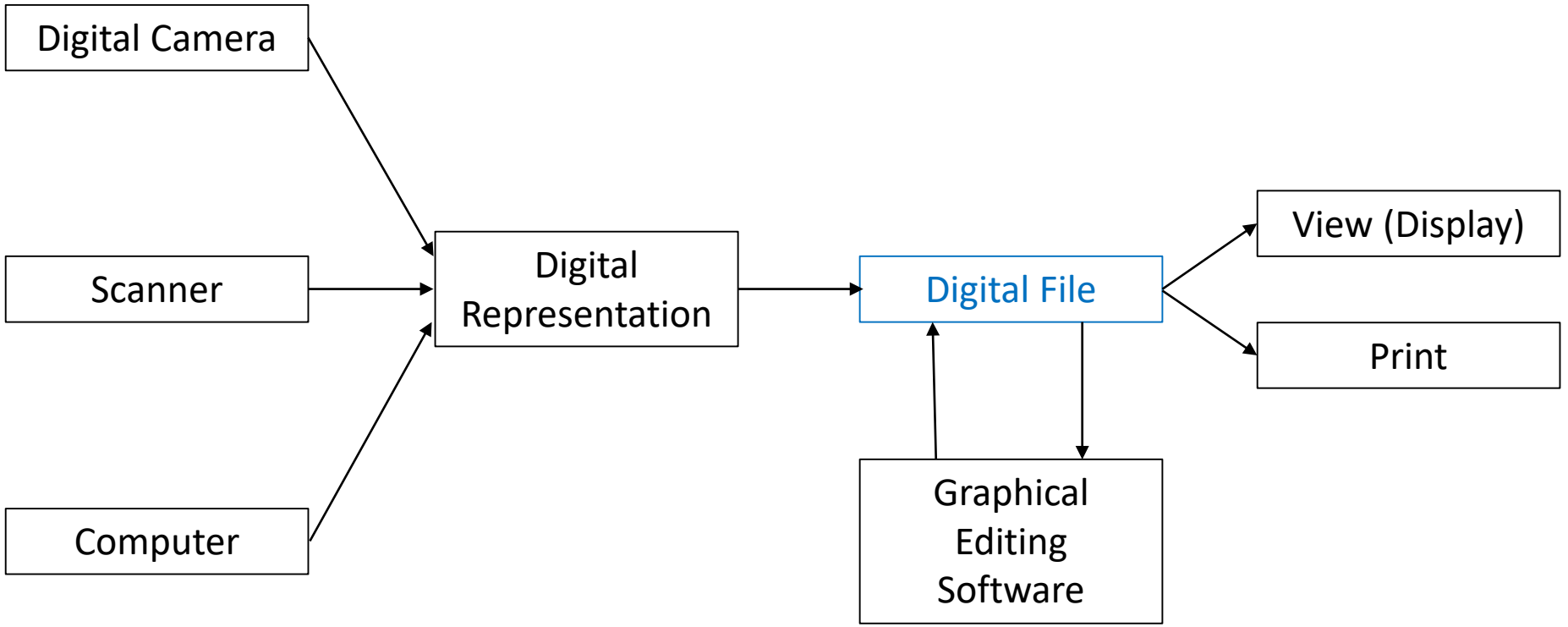


Under Exposed



Proper Exposure




Digital Camera
Scanner
Computer
Digital Representation
Digital File
View (Display)
Print
Graphical Editing Software

Digital Image File Formats

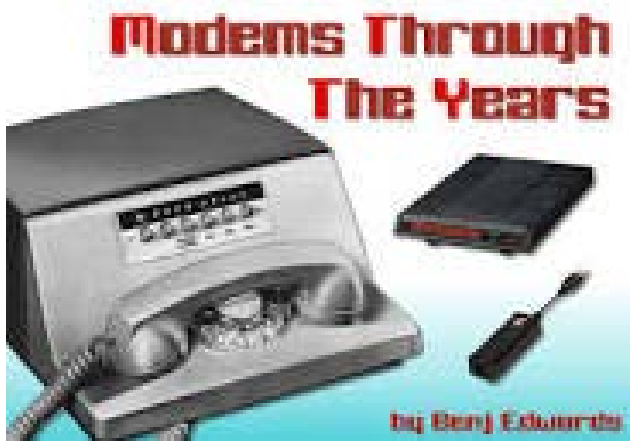
- There are 100+ digital image file formats defined
- We will only be discussing 4 of them
- Two major categories :
  - **Lossless**
  - **Lossy**

Lossless File Formats

- **No** digital data is lost/discarded when the file is saved
- Advantage
  - The quality of the image is preserved
- Disadvantage
  - The resulting files tend to be very large

Back in the dark ages…

- Data networks (modems) were slow
- Storage devices did not have a lot of capacity
  - And they were expensive!
- It was very desirable to minimize the file sizes of digital images



Lossy File Formats

- Many file formats that optimized file size vs. image quality were developed
- All of them degraded the quality of the image
  - Some more than others
- Most of them are no longer used
- A few have survived

Commonly Used File Formats

- TIFF
- JPEG (JPG)
- PNG
- RAW

TIFF

- **T**agged **I**mage **F**ile **F**ormat
- Lossless
- Has been format of choice for digital archivists and preservationist for many years
- Disadvantages:
  - Creates large files
  - Many browsers cannot display TIFF formatted images

JPEG (JPG)

- **J**oint **P**hotographic **E**xperts **G**roup
- Lossy
- Widely used: Supported by every browser I am aware of
- The compression algorithm saves information about groups of pixels
- The degree of compression can be varied
- The compression is performed every time the file is saved
  - Causes additional loss every time the file is saved
- This process does not change the **number of pixels** that are saved
- Does NOT support *transparent images*

What is a transparent image?

A transparent image allows you to view the color of the background

Not Transparent

Transparent

Dallas Genealogical Society

Genealogical & Family History Records, Resources & Activities for

Home Events Blog Records

Dallas Genealogical Society

Genealogical & Family History Records, Resources & Activities for

Home Events Blog Records

Why Use JPEG?

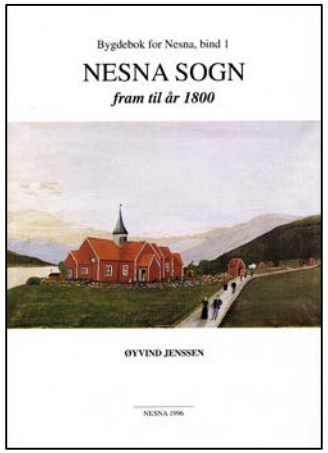
- Really small file sizes (relatively speaking)
- In most applications (vacation pictures, low resolution scans) the image quality is not that bad

PNG

- **P**ortable **N**etwork **G**raphics
- Supports *transparent images*
- Lossless
- Performs file compression (make its files smaller)
- Supported by every browser I am aware of

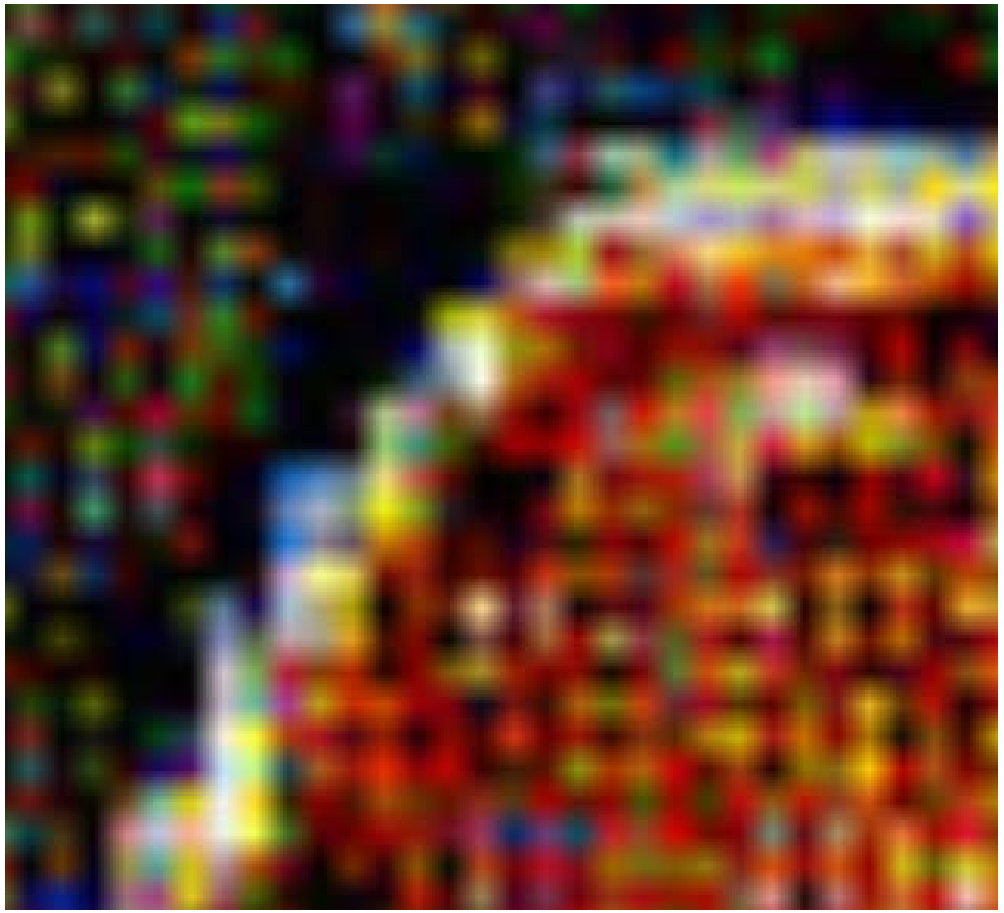
How do file sizes compare?

	TIF	PNG	JPEG
600 dpi, 24-bit color depth (MB)	70	30	10
Savings compared to TIF:		(-57%)	(-85%)



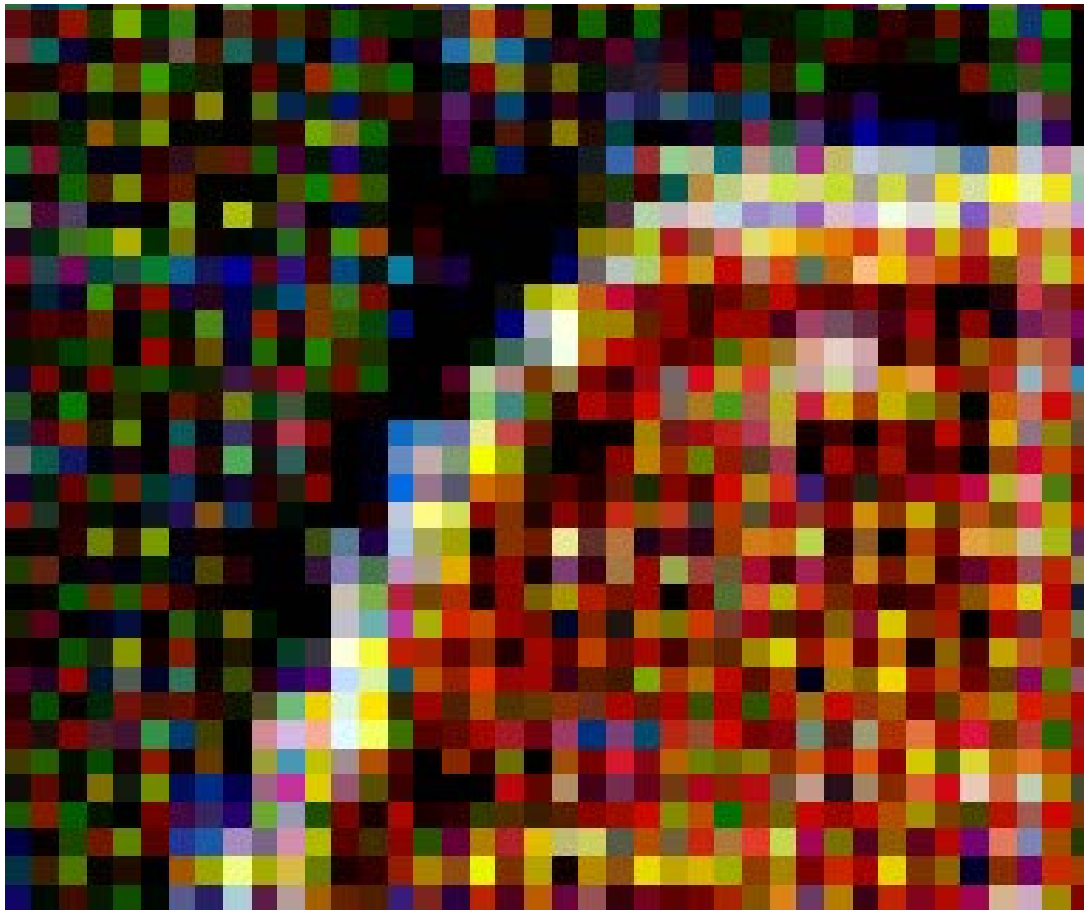
What about the image quality?

What about the image quality?



JPEG

300 dpi, 24 bit Color Depth



TIF

Digital Cameras

- Most create JPEG image files
- Higher end cameras will also create a **Raw** format
  - This is essentially a TIFF format
- You can use software compatible with your camera to read and convert RAW to JPEG, TIFF and other file formats

Image Type Conversion

- You can save a TIFF (or PNG) image as a JPEG
  - The JPEG file will be a lower quality image
- You can also save a JPG as a TIFF or PNG
  - The TIFF (or PNG) will have the same (lower) quality as the JPEG

Recommendations

- Use TIFF, PNG or RAW when digitizing important/significant images
  - Make JPEG copies and use them on social media
- If JPEG is all you have:
  - Save it as TIFF or PNG
  - Make a master copy
    - NEVER edit/save it
    - Work with a copy of the master if you need to edit it

Metadata

- Data *about* something

Pre-Digital Metadata

- Date (Aug 61)
- Description
  (Hanson – Evans – Tollief's Fam)

Digital Metadata

- Saved as part of the file
- Typical Information:
  - Date and Time created/modified
  - Resolution (number of pixels)
  - Color depth
  - Horizontal and Vertical Resolution (dpi)
    - Will be accurate for images created with a scanner

Photograph Metadata

- EXIF – Exchangeable Image File Format
- Information about the camera, lens and exposure settings
- May include GPS coordinates

File Format

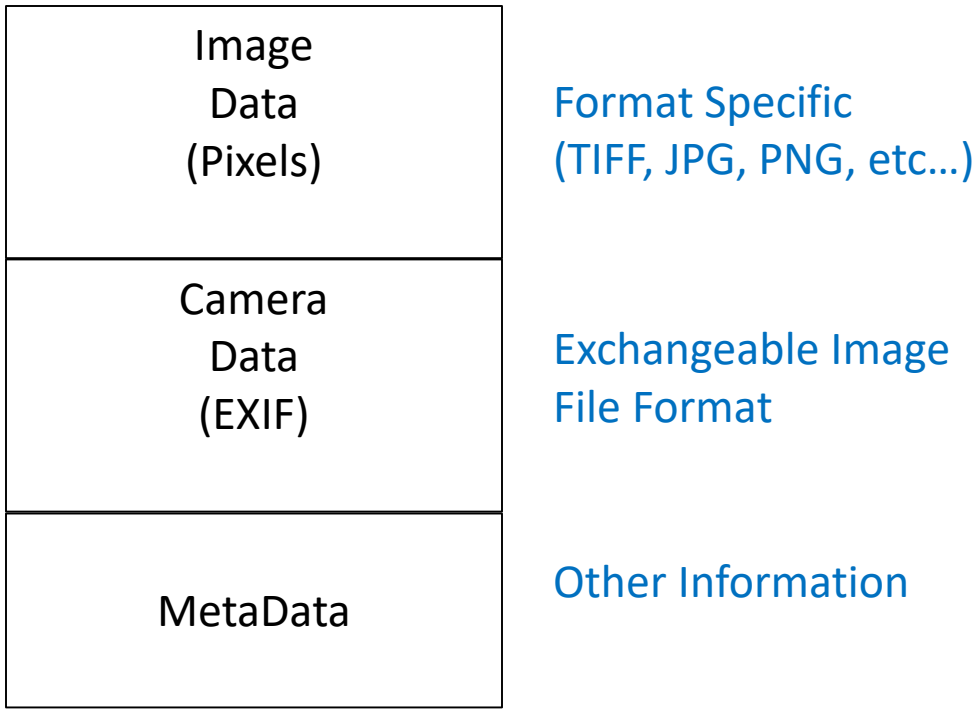
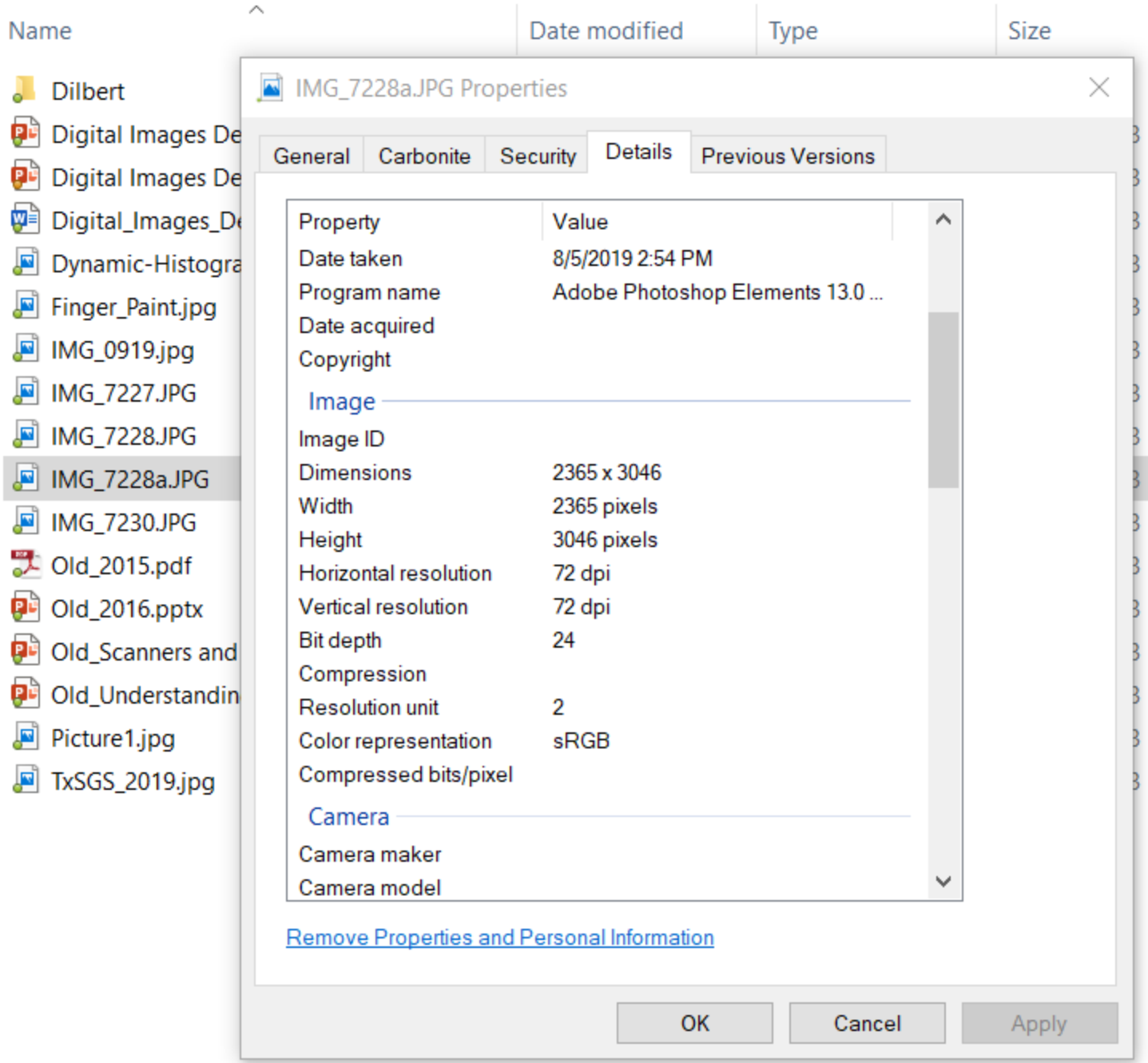
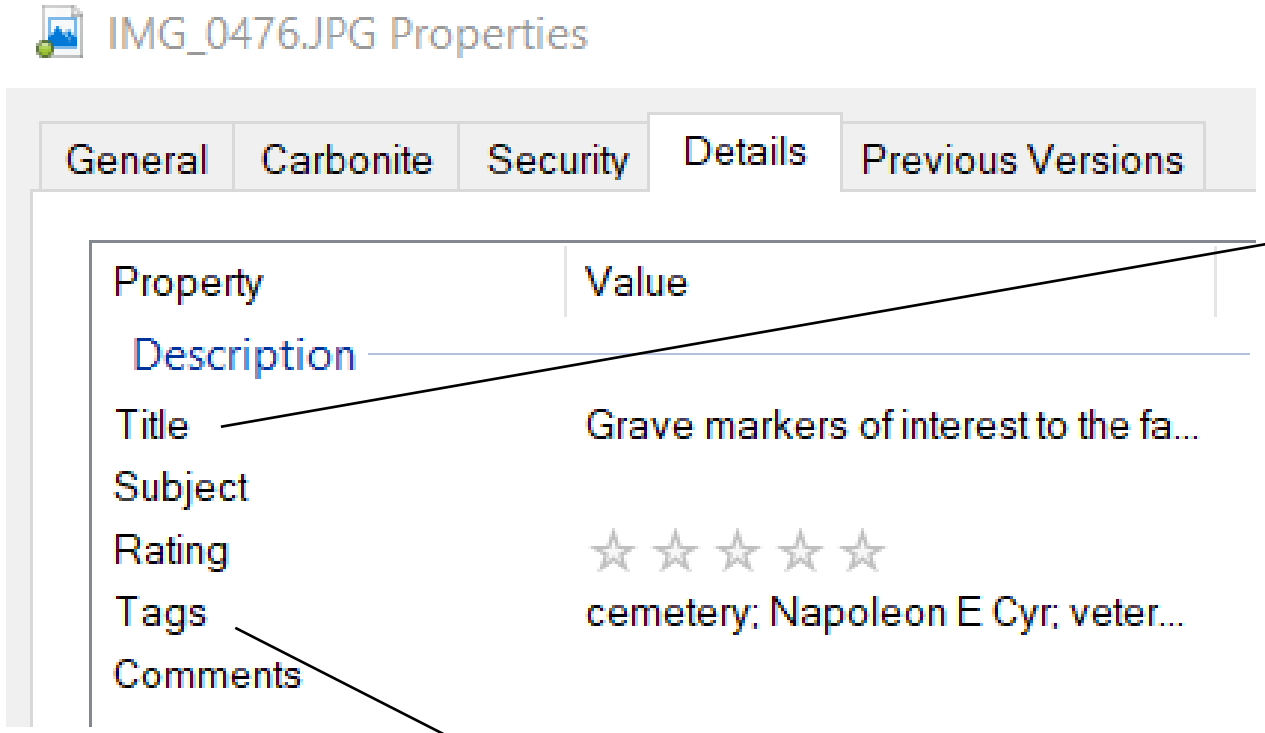


Image
Data
(Pixels)
Camera
Data
(EXIF)
MetaData
Format Specific
(TIFF, JPG, PNG, etc…)
Exchangeable Image
File Format
Other Information



Windows & MacIntosh O/S allow you to view & modify Metadata

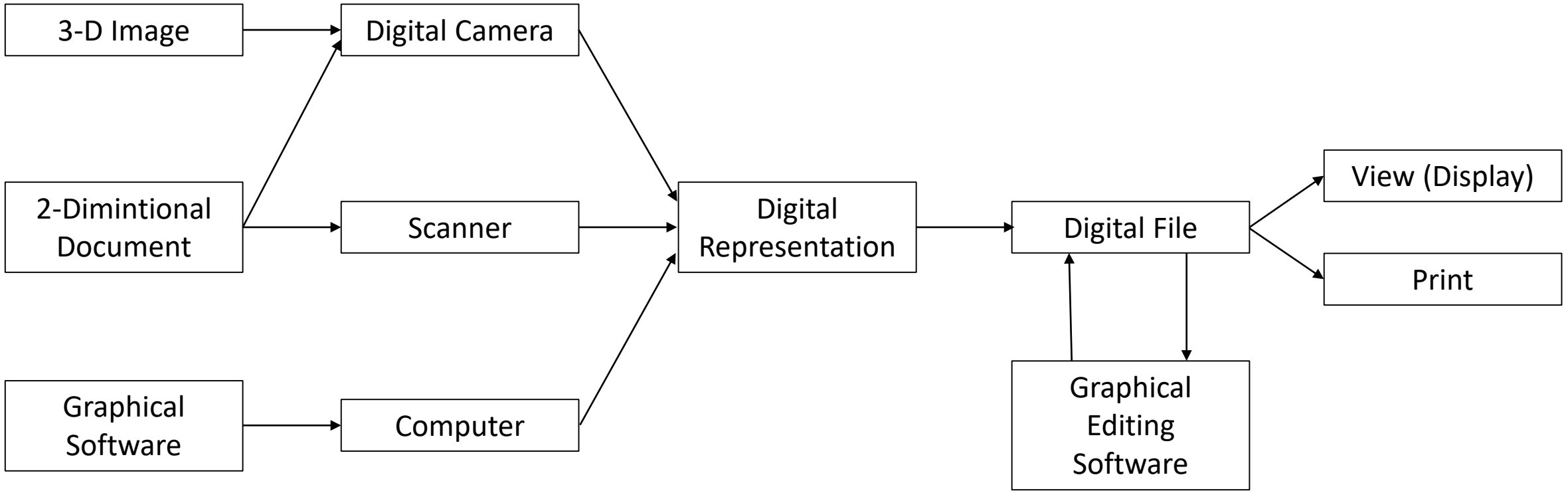
You can also use specialized software

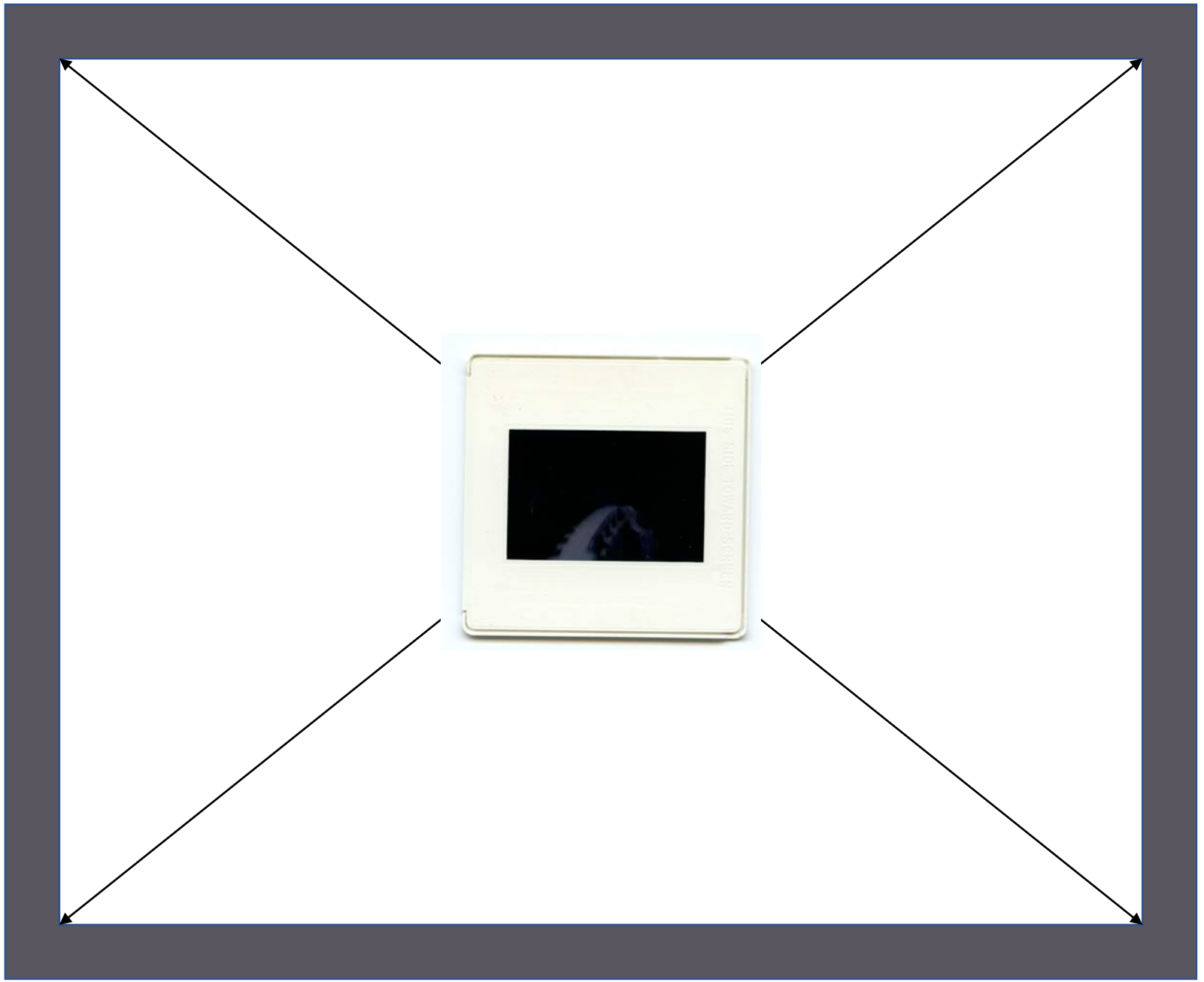


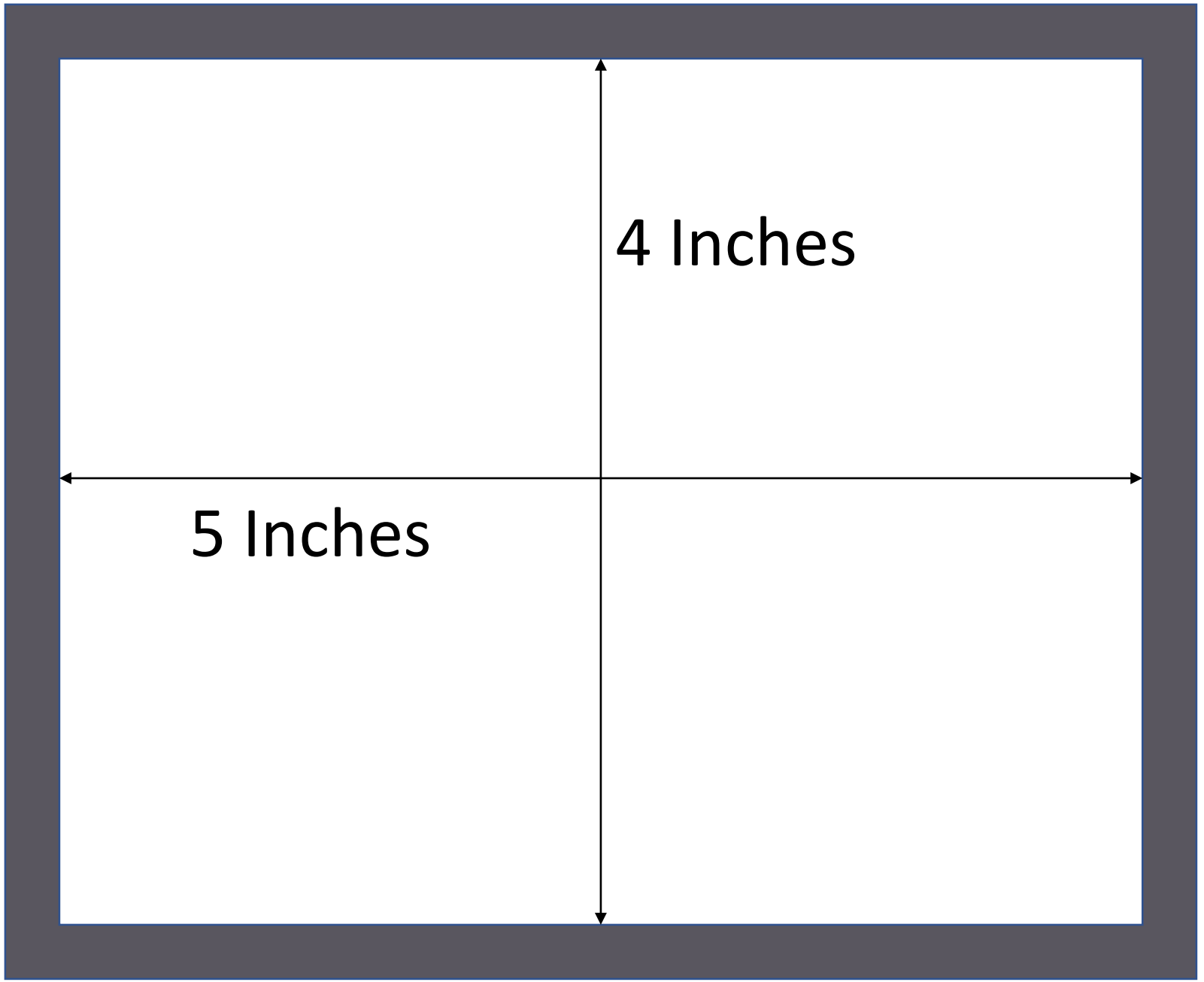
Grave markers of interest to the family of Tony Hanson located in the Woodlawn cemetery in Birchwood, Wisconsin. Photographed by Tony Hanson on 27 July 2005.

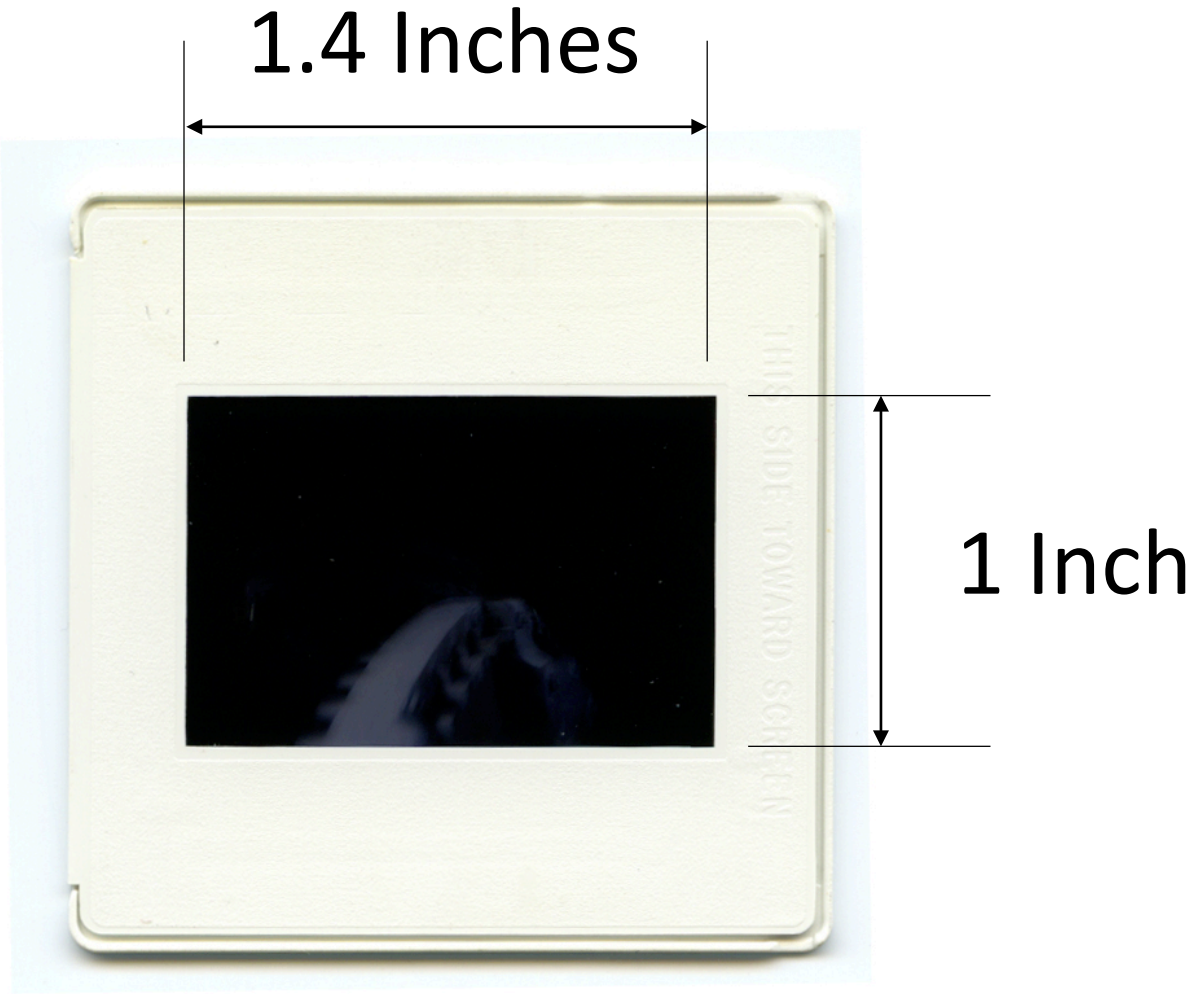
cemetery; Napoleon E Cyr; veteran; WWII;

Putting It All Together





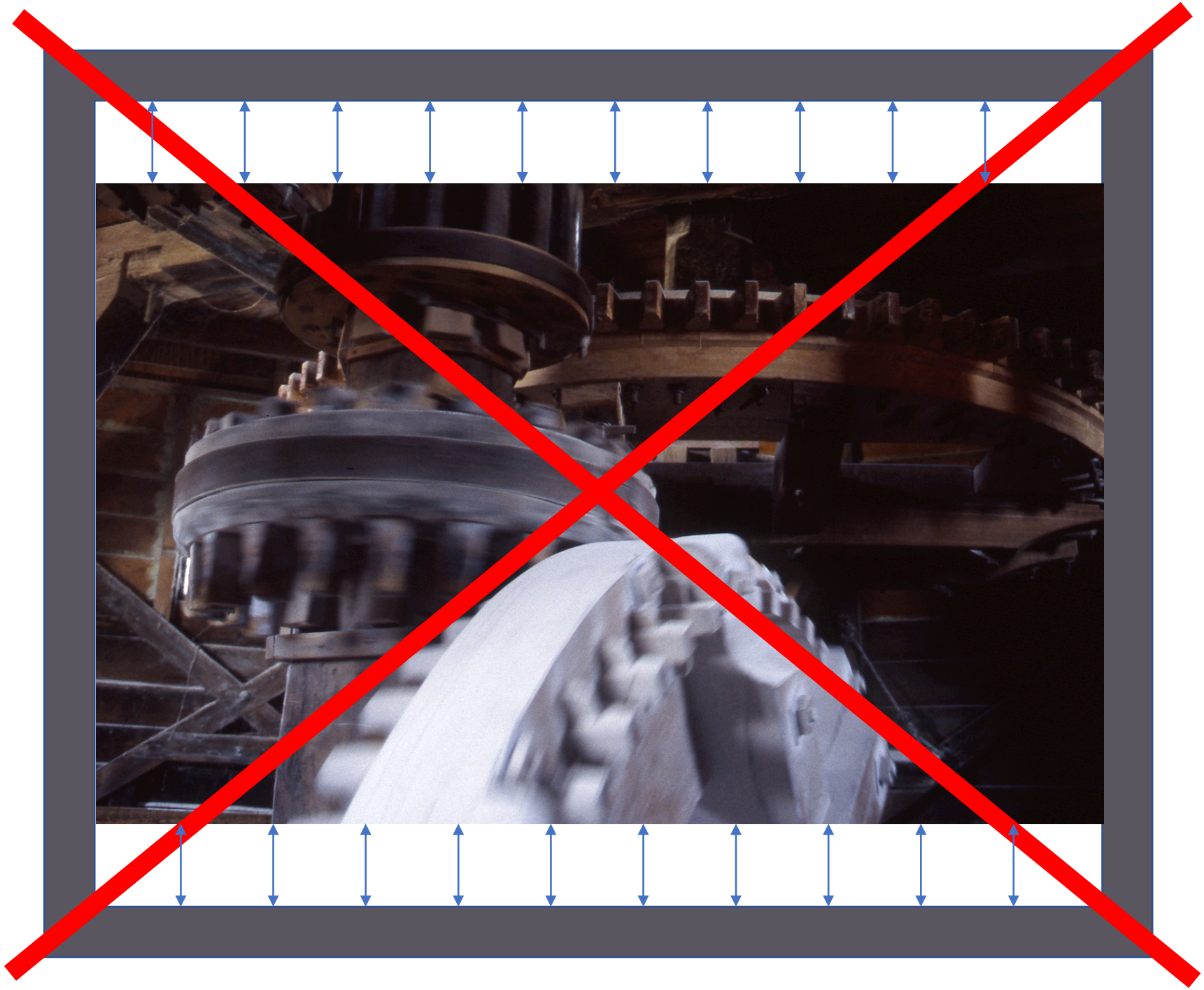

4 Inches
5 Inches

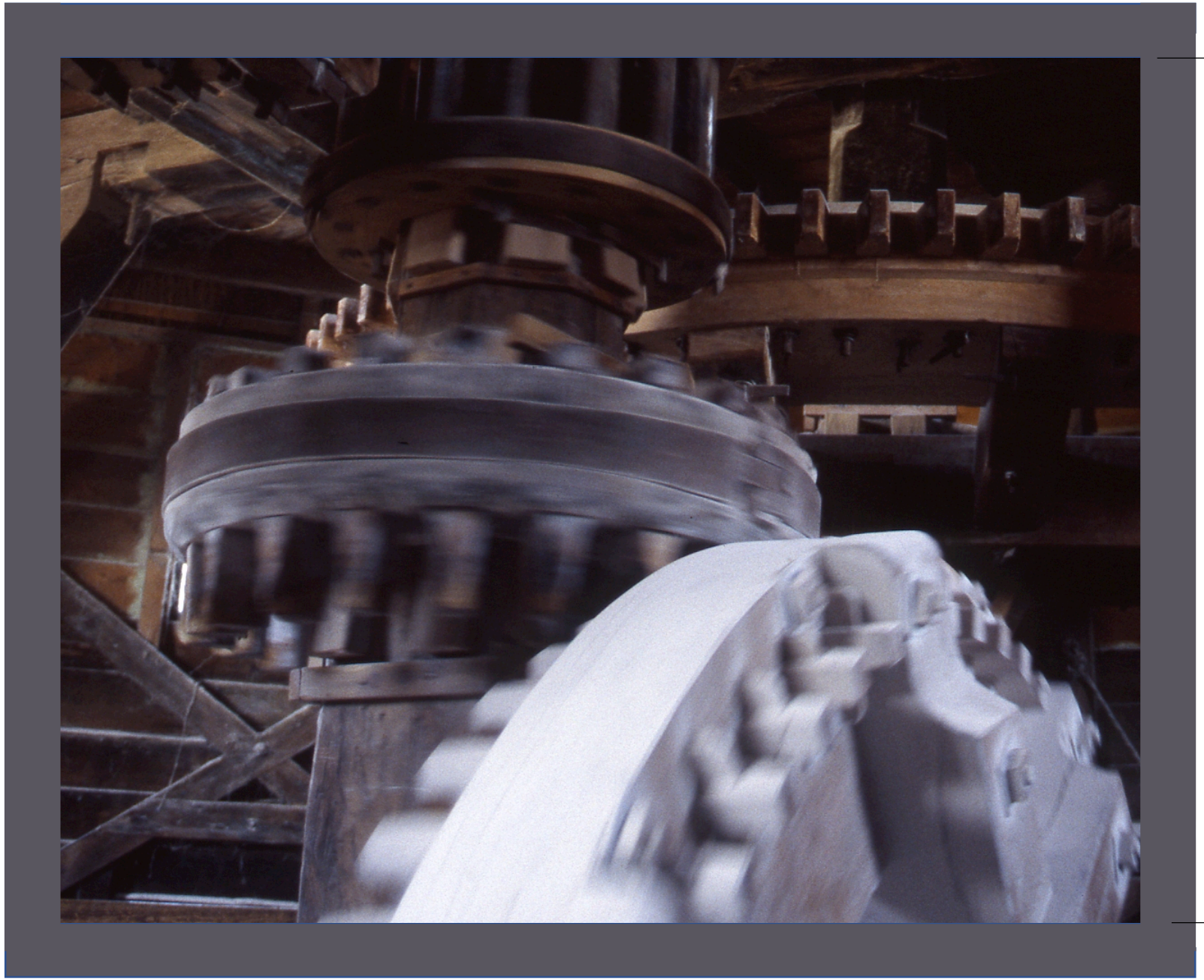

1.4 Inches
1 Inch

Aspect Ratios

$$\frac{1.4}{1} = \mathbf{1.4 : 1}$$

$$\frac{5}{4} = \mathbf{1.25 : 1}$$



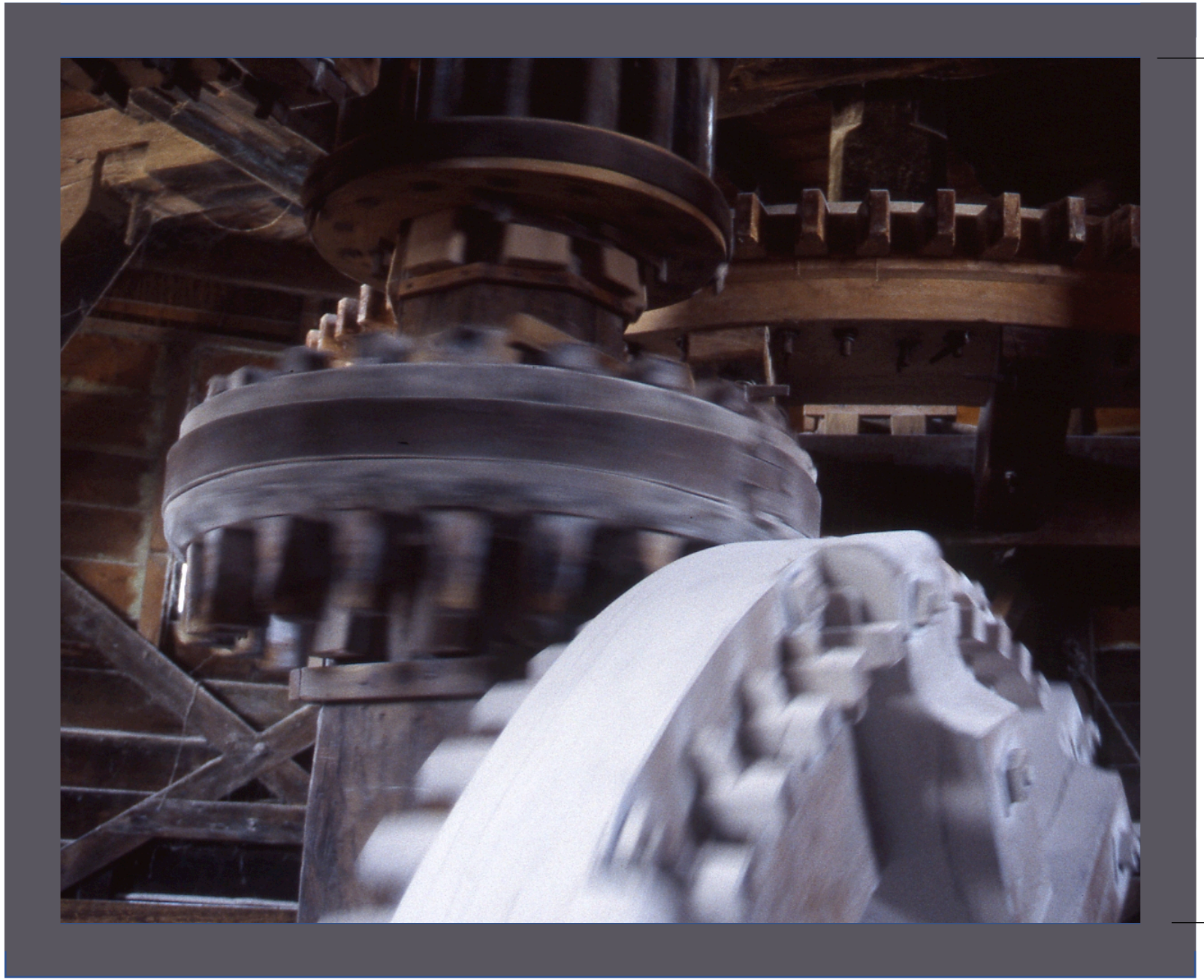


4 Inches

We want 300
Pixels Per Inch

4 Inches x 300 Pixels / Inch = 1200 Pixels

(Optimal Resolution for a Printed Image)



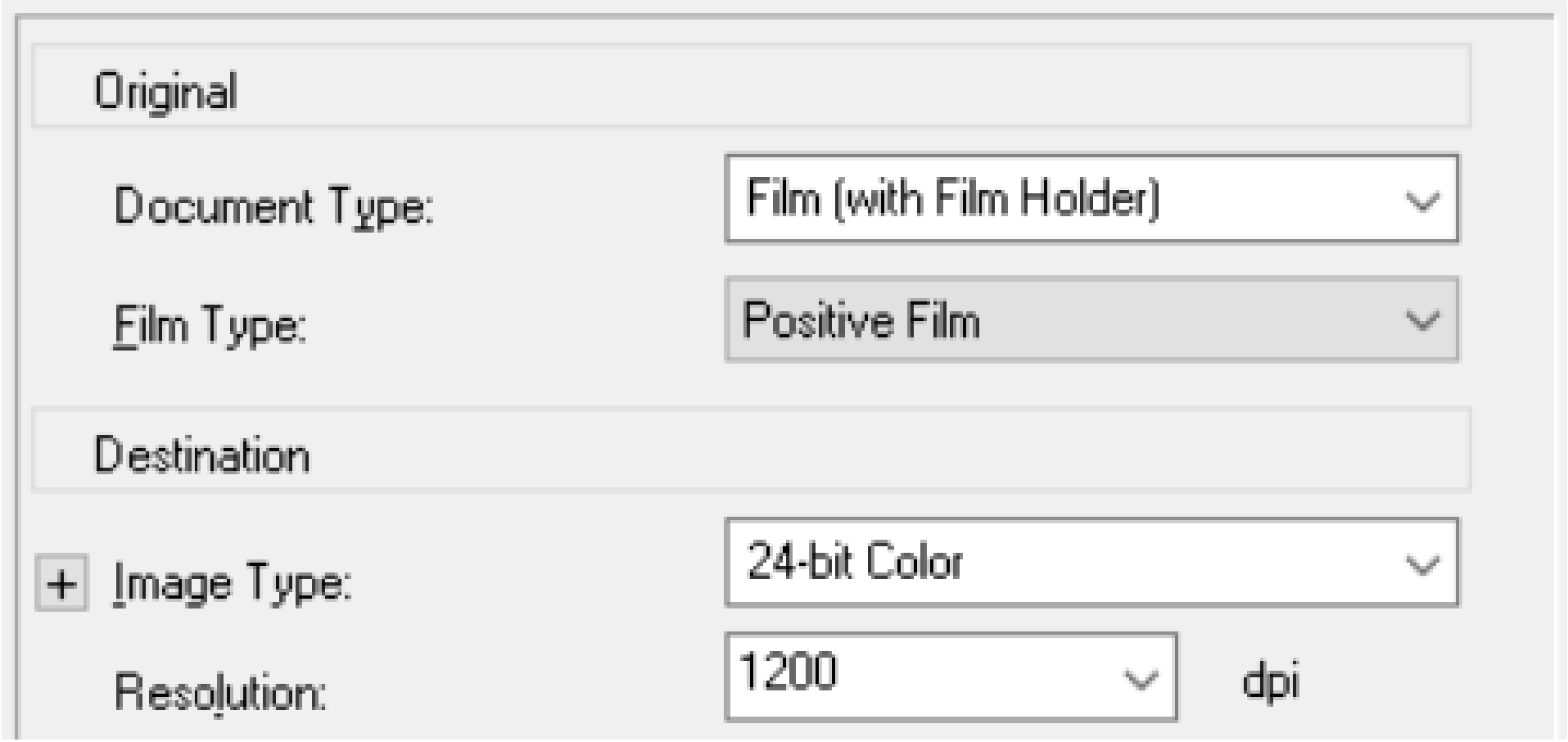
4 Inches

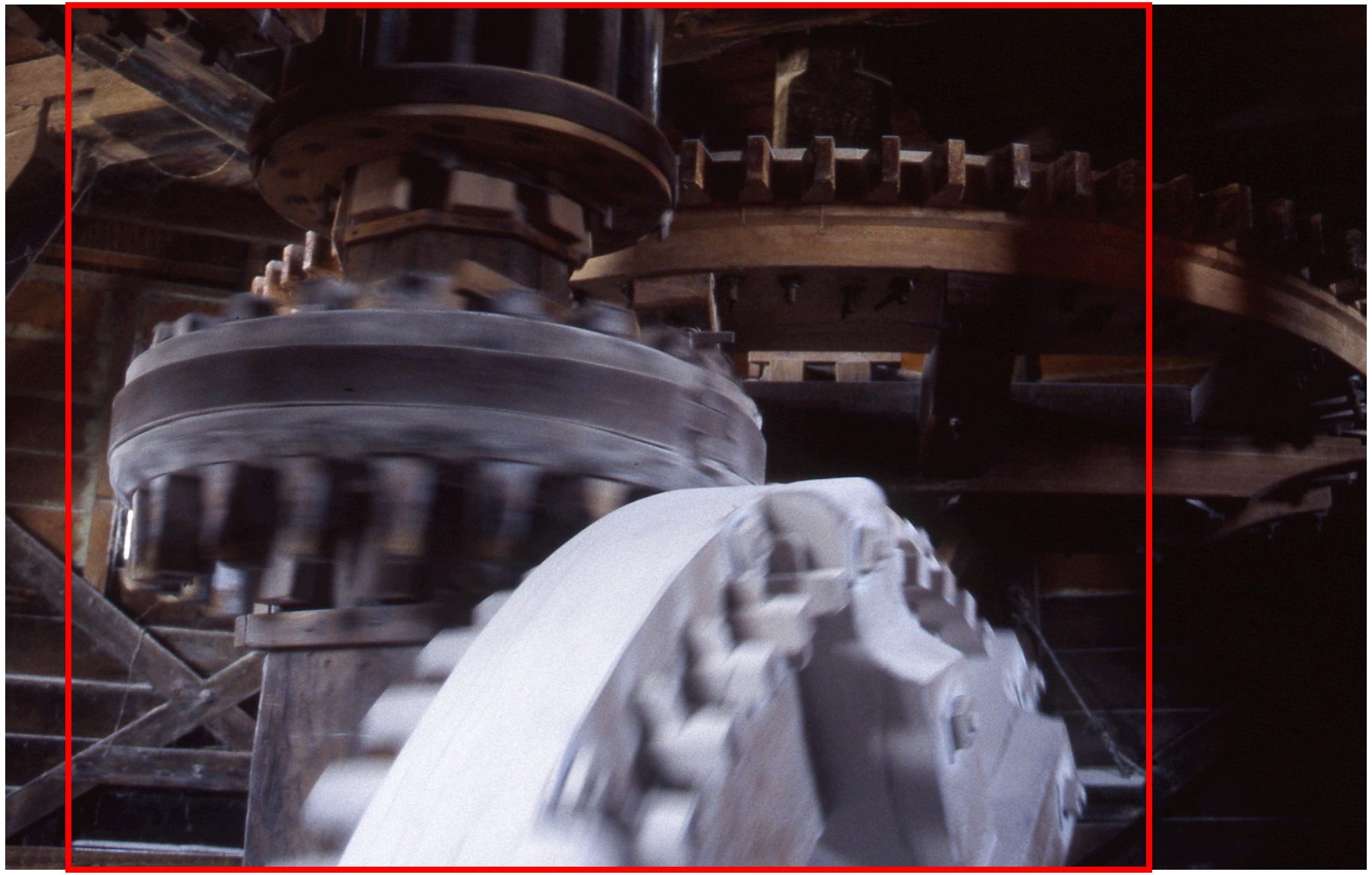
1200 Pixels

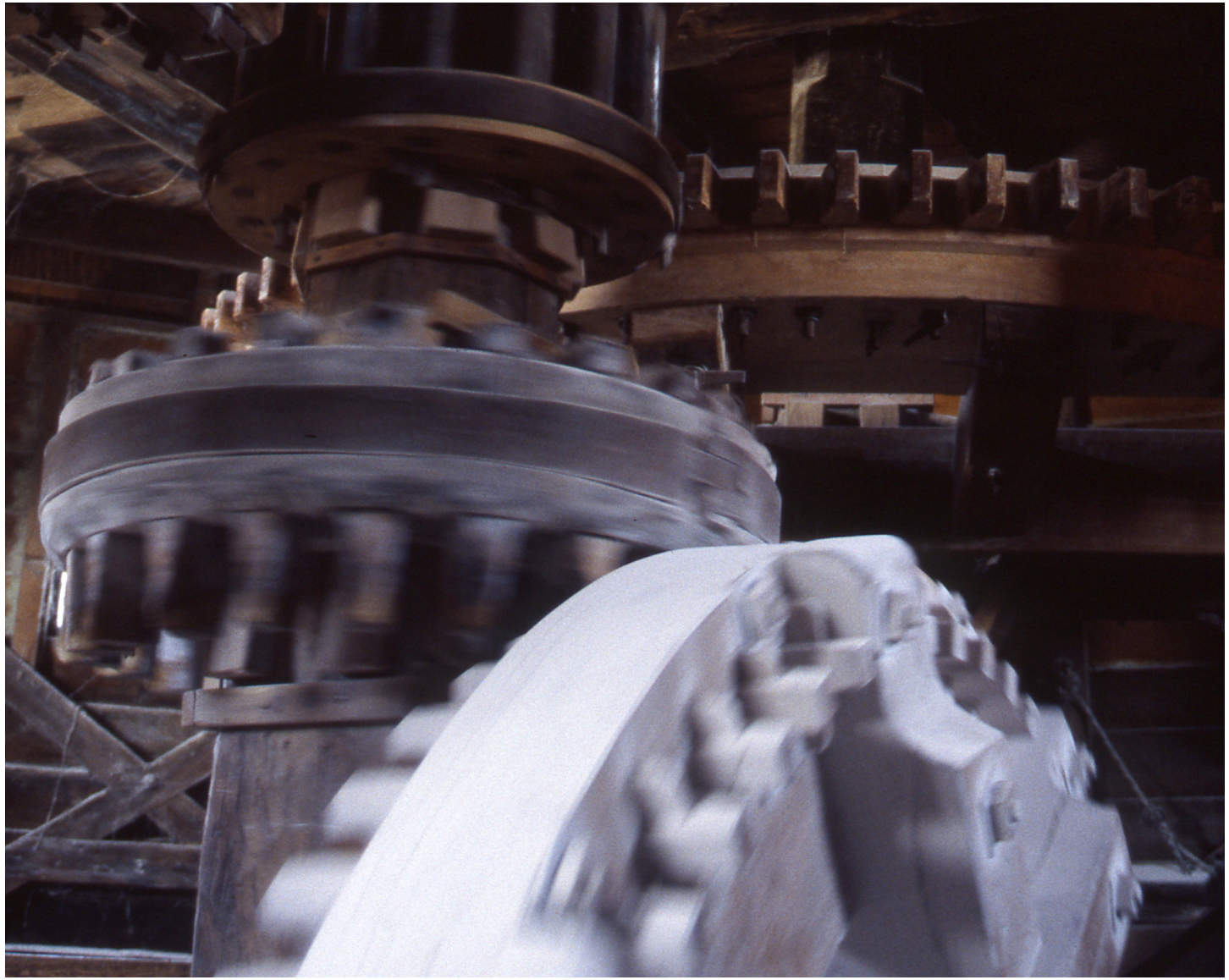
I need to scan at a resolution of 1200 dpi

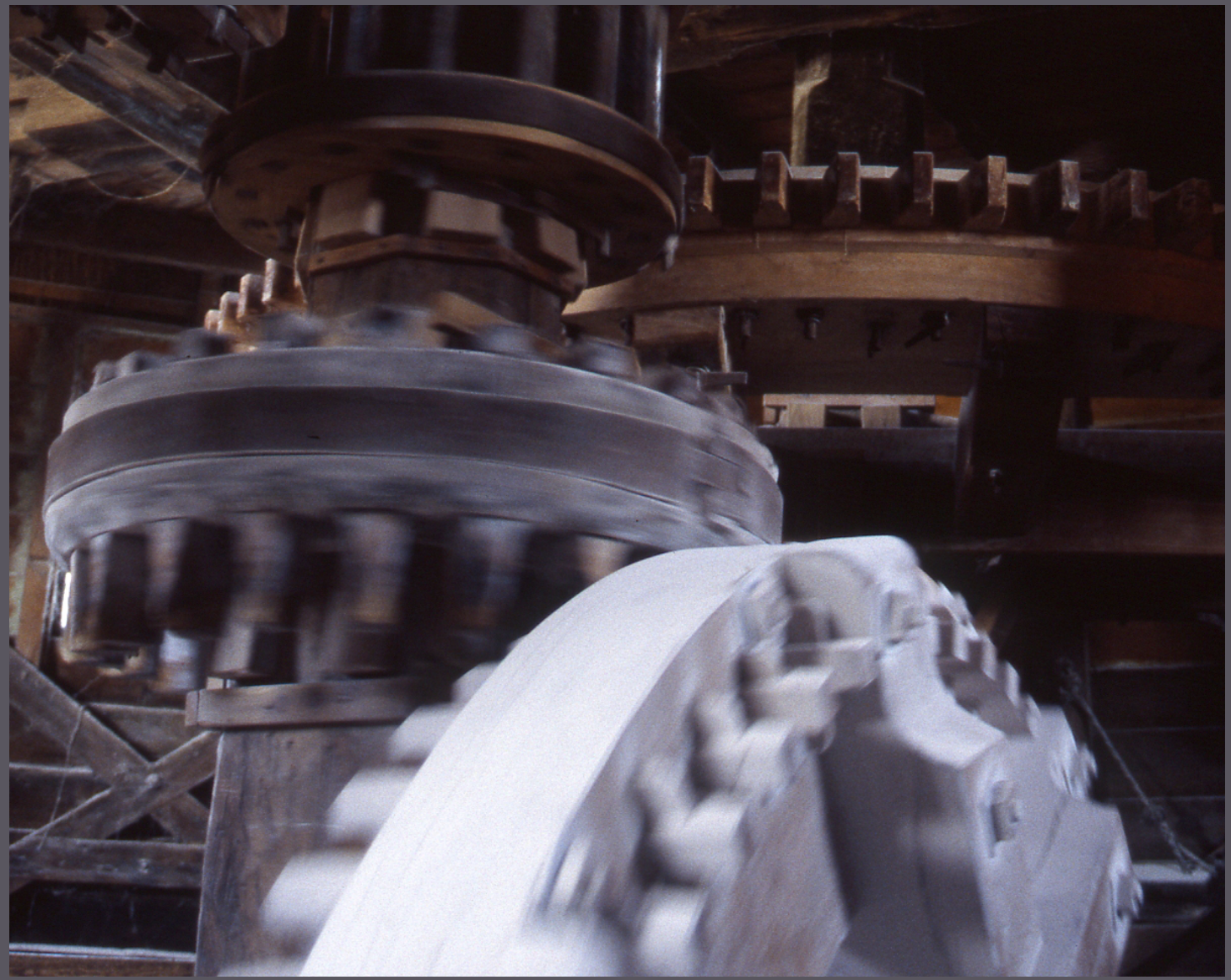
1 Inch **1200 Pixels**

Scanner Settings

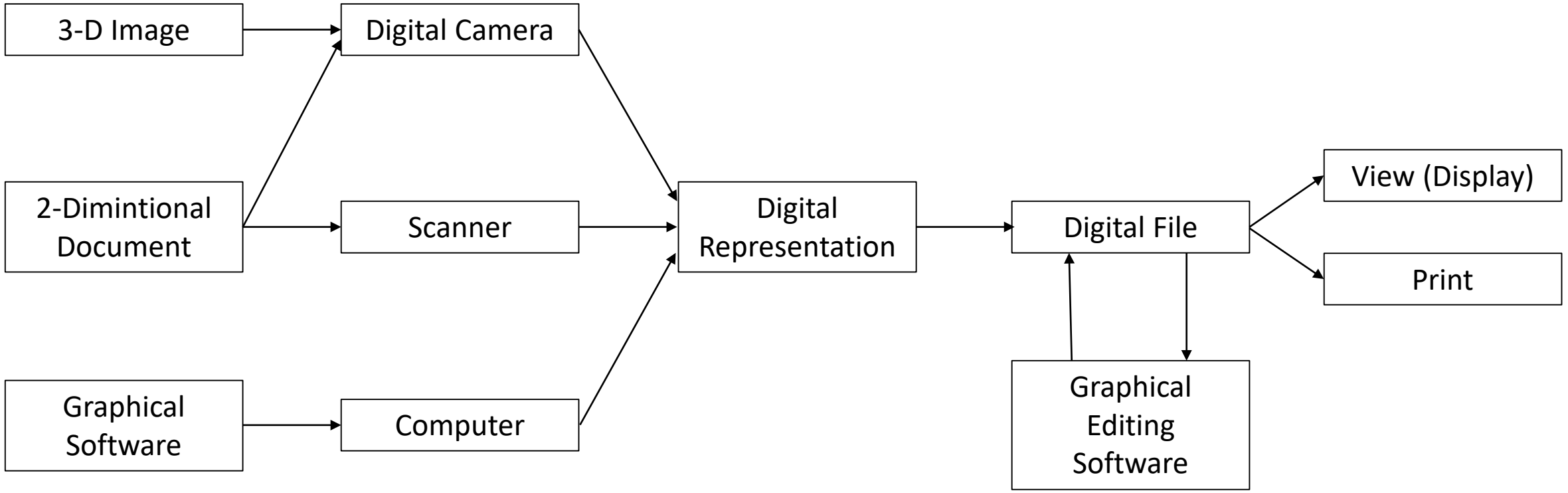








Questions?


3-D Image
Digital Camera
2-Dimintional Document
Scanner
Graphical Software
Computer
Digital Representation
Digital File
View (Display)
Print
Graphical Editing Software

Thank You!

Tony Hanson

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