The image input device **14** comprises any suitable device operable to produce the digital image **16**. In the preferred embodiment, the image input device **14** also operates to automatically produce the defect map **18**. In one embodiment, the image input device **14** comprises a film scanner. In this embodiment, one method for generating the digital image **16** comprises transmitting light in the visible portion of the electromagnetic spectrum through a film negative or positive (not expressly shown) and using a sensor (not expressly shown) to record color data relating to the intensity of red, green, and blue light for each location of the film. In addition to capturing color data, the visible light scan also records defective regions as part of the digital image. One method for generating the defect map **18** is described in U.S. Pat. No. 5,266,805, entitled *System and Method for Image* Recovery which is hereby incorporated by reference in its entirety as if fully set forth herein. This method transmits infrared light through the film. Color dyes within the film are transparent to infrared light and the sensor records the defect map **18**. Specifically, defects in the film media and the system are identified because they substantially reduce or totally occlude the infrared light transmitted through the film. The resulting digitized image provides an accurate defect map **18** of the location and shape of defective regions.

In another embodiment, the image input device **14** comprises a flatbed scanner. In general, flatbed scanners reflect light from a document, such as a photographic print, to a sensor that records color data corresponding to each discrete location on the document. The color data forms the digital image **16**. As described previously, the scanning operation also records defects in the document media and system, such as scratches in a platen (not expressly shown). One method for generating the defect map **18** is described in U.S. patent application Ser. No. ______, entitled *Method and Apparatus for Differential Illumination Image Capturing and Defect Handling*, having a priority filing date of Oct. 8, 1999. In this method, light from two different angles is used to detect defects in the document and the system. In overly simple terms, defects in the document and system create a pattern of shadows when light is shined on the document at a first angle. Light from a second angle produces a different pattern of shadows. Comparison of the two views allows defective regions to be identified and produces the defect map **18**.

Other suitable software programs can be utilized in concert with the defect correction program **20** to automatically create the defect map **18**. For example, the defect map **18** could be created automatically by detecting variations in the pixel data values that do not correspond with the content of the digital image **16**.

The defect correction program **20** operates to identify defective regions within the digital image **16** using the defect map **18**. In many applications, the defect correction program **20** is secondary to a conventional image correction program that corrects relatively small defects using data from the defective pixel, such as described in U.S. Pat. No. 5,266,805. In these applications, the defect correction program **20** is generally used to correct relatively large defects that are not adequately corrected using conventional techniques.

The defect correction program **20** incorporates one or more correction routines **28** that operate to correct the defective region using non-defective regions of the digital image **16**. Specific examples of correction routines **28** are illustrated in FIGS. **2** through **4**. It will be understood that the non-defective regions used in the correction routines **28** may include pixels corrected using conventional image correction techniques.

The defect correction program **20** is generally loaded into the data processing system **12**. In one embodiment, the defect correction program **20** forms a part of the image input device **14**. In particular, the image input device **14** includes a user interface (not expressly shown), often referred to in the art as a TWAIN, that allows the data processing system **12** to operate with the image input device **14**. In this embodiment, the defect correction program **20** is incorporated into the user interface. In another embodiment, the defect correction program **20** is a stand-alone program operable to be loaded into the data processing system **12**. In this embodiment, the defect correction program **20** may operate independently using the digital image **16** and defect map **18**, or be integrated into an existing user interface for the image input device **14**.

Output device **24** may comprise any type or combination of suitable devices for displaying, storing, printing, transmitting or otherwise receiving the improved digital image **22**. For example, as illustrated, output device **24** may comprise a monitor, printer, network system, mass storage device, or any other suitable output device. The network system may be any network system, such as the Internet, a local area network, and the like. Mass storage device may be a magnetic or optical storage device, such as a floppy drive, hard drive, removable hard drive, optical drive, CD-ROM drive, and the like.

FIGS. **2** through **4** illustrate various examples of correction routines **28**. The defect correction program **20** identifies a defective region **200** and a non-defective region **202** of the digital image **16** using the defect map **18**. The defective region **200** and non-defective region **202** are made up of individual pixels **210**. FIG. **2**A illustrates a reference line correction routine **28***a*. In this embodiment, the reference line correction routine **28***a* identifies a boundary **204** that defines the edge of the defective region **200** with the non-defective region **202**. One or more reference lines **206** are calculated through the defective region **200**. As illustrated, the reference line **206** divides the defective region **200** into a first defective region **200***a* and a second defective region **200***b*, with a first boundary **204***a* and a second boundary **204***b*, respectively. Additional defective regions **200***x* and boundaries **204***x* would be defined if additional reference lines **206** are defined.

In one embodiment, as illustrated in FIG. **2**A, the reference line **206** comprises a centerline through the defective region **200**. In one application, the centerline is calculated based on a best-fit line through the defective region **200**. In other applications, the centerline is based on an average or general shape of the defect region **200**. For example, if the general shape of the defective region **200** is substantially rectangular, the centerline can be calculated as the long axis of the rectangle.

In another embodiment, the reference line **206** comprises a feature line. In this embodiment, certain continuous features in the digital image **16** that are interrupted by the defective region **200** can be identified. The continuous feature can be identified in the non-defective region **202** surrounding the defective region **200**. One or more feature lines can be calculated to form a continuous feature through the defective region **200**. For example, assume the digital image **16** is an image of a leaf and the defective region **200** covers the edge of the leaf against a blue sky, the edge of the leaf on each side of the defective region **200** can be easily identified. A feature line can be calculated between the points where the edge of the leaf contacts the defective region **200**. The approximation for the feature line can be further improved using interpolation techniques such as