G
Gallery of Images

New data compression methods that are developed and implemented have to be tested. Testing different methods on the same data makes it possible to compare their performance both in compression efficiency and speed. This is why there are standard collections of test data such as the Calgary Corpus and the Canterbury Corpus (mentioned in the Preface), and the ITU-T set of eight training documents for fax compression (Section 2.13.1).

The need for standard test data has also been felt in the field of image compression, and there currently exist collections of still images commonly used by researchers and implementors in this field. Three of the four images shown here, namely "lena," "mandril," and "peppers" are arguably the most well-known of them. They are continuous-tone images, although "lena" has some features of a discrete-tone image.

Each image is accompanied by a detail, showing individual pixels. It is easy to see why the "peppers" image is continuous-tone. Adjacent pixels that differ much in color are fairly rare in this image. Most neighbor pixels are very similar. In contrast, the "mandril" image, even though natural, is a bad example of a continuous-tone image. The detail (showing part of the right eye and the area around it) shows that many pixels differ considerably from their immediate neighbors because of the animal's facial hair in this area. This image compresses badly under any compression method. However, the nose area, with mostly blue and red, is continuous-tone. The "lena" image is mostly pure continuous-tone, especially the wall and the bare skin areas. The hat is good continuous-tone, whereas the hair and the plume on the hat are bad continuous-tone. The straight lines on the wall and the curved parts of the mirror are features of a discrete-tone image.

The "lena" image is widely used by the image processing community, in addition to being popular in image compression. Because of the interest in it, its origin and history have been researched and are well documented. This image is part of

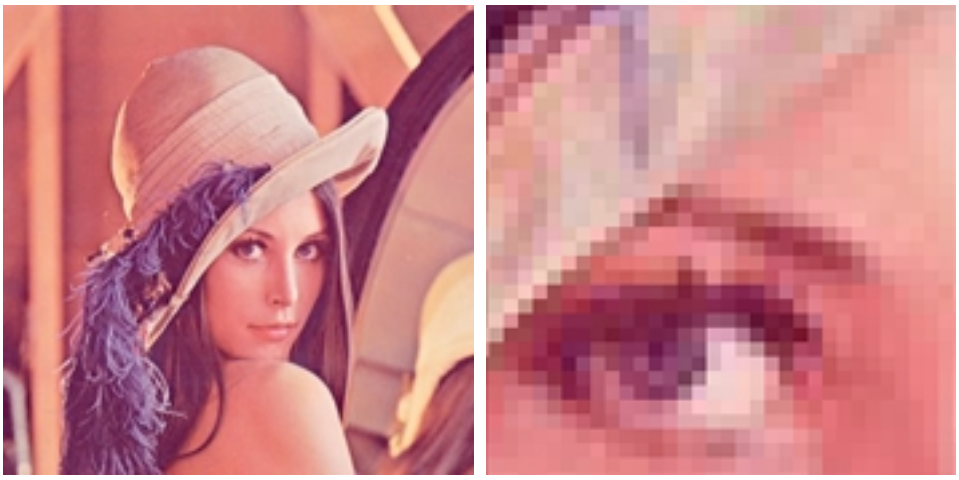

Figure G.1: Lena and Detail.

the *Playboy* centerfold for November, 1972. It features the Swedish playmate Lena Soderberg (née Sjooblom) and it was discovered, clipped, and scanned in the early 1970s by an unknown researcher at the University of Southern California for use as a test image for his image compression research. It has since become the most important, well-known, and commonly-used image in the history of imaging and electronic communications. As a result, Lena is currently considered by many the First Lady of the Internet. *Playboy*, which normally prosecutes unauthorized users of its images, has found out about the unusual use of one of its copyrighted images, but decided to give its blessings to this particular "application."

Lena herself currently lives and works in Sweden. She was told of her "fame" in 1988, was surprised and amused by it, and was invited to attend the 50th Anniversary IS&T (the society for Imaging Science and Technology) conference in Boston in May, 1997. At the conference she autographed her picture, posed for new pictures (one is available on the internet) and gave a presentation (about herself, not image compression).

The three images are widely available for downloading on the internet.

Figure G.5 shows a typical discrete-tone image, with a detail shown in Figure G.6. Notice the straight lines and the text, where certain characters appear several times (a source of redundancy). This particular image has few colors, but in general, a discrete-tone image may have many colors.

> The village of Lena, Illinois is located approximately 9 miles west of Freeport, Illinois and 50 miles east of Dubuque, Iowa. We are on the edge of the rolling hills of Northwestern Illinois and only 25 miles south of Monroe, Wisconsin. The current population of Lena is approximately 2800 souls engaged in the farming business.
>
> From `http://www.lena.il.us/History.htm`

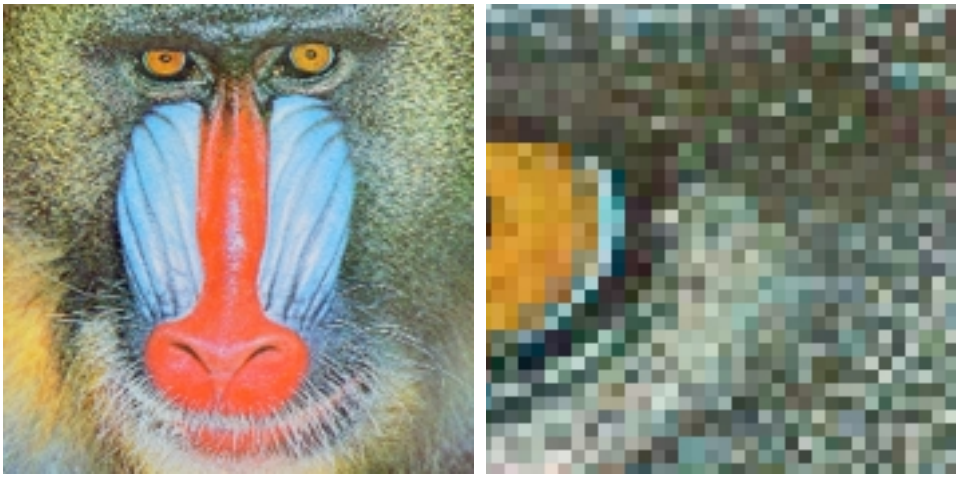

Figure G.2: Mandril and Detail.

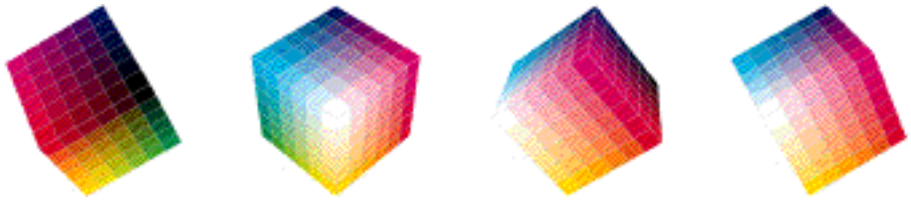

Figure G.3: The RGB Cube.

Figure G.4: Peppers and Detail.

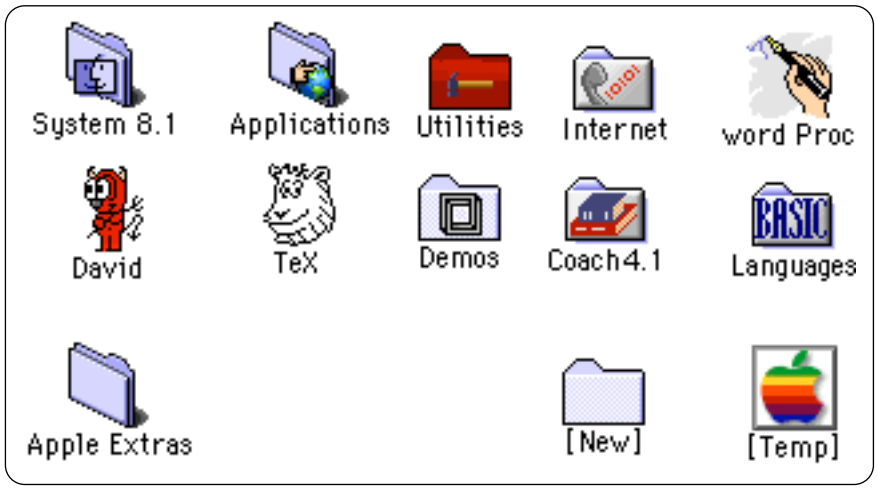

Figure G.5: A Discrete-Tone Image.

Figure G.6: A Discrete-Tone Image (Detail).

An ounce of image is worth a pound of performance.
Anonymous