
IFTS: Image Format Transformation System

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ABSTRACT

This research present IFTS as a software system that tackles one of the most needed functions in computer graphics applications and image processing. It handles the conversion between the most usable BitMaped based image formats: BMB, WPG, TGA, and IFF&LBM. It provides the display functions for any type of image starting from monochrome to True Color image through a friendly easy-to-use interface.

Keywords: IFTS; BitMap Image; Vector Image; WPG; TGA; IFF&LBM; Image format; Format conversion.

1. Introduction:

To many people and applications, the video display screen is the computer itself, it represent the communication bridge between the user and the system. Programs and applications are usually judged by their display quality and the amount of visual result they present to the casual users. Computer generated image

are digital extension of a television image, which is in many means an extension of a real human eye. Generally speaking there are two classes of computer generated image, the first depends on the BITMAP form, while the other depends on the geometric vector drawing. Images in the first class Fig (1), are more realistic than those in the second class Fig (2), since they are represented by graphic primitives like points, lines, circles, polygons...etc⁽¹⁾. These two concepts of image processing together with the related streams of functions such as; image filtering, image enhancement, image smoothing, image conversion and image display, become the most demanding branch of computer technology. Accordingly, many approaches for computer generated pictures have come out to satisfy the requirement of simulating the real-world on the screen, and a number of picture representation format are implied by many graphical packages and applications. Therefore a bridge between these different trends of representation is needed to have a common environment.

In this research a package named IFTS has been developed to handle such format transformation without effecting the internal representation of the image, to satisfy the need of different applications.



Fig-1
Bitamp Image



Fig-2
Vector Image

2. System Overview

IFTS is system that deals with the transformation of image file from one format to another, without effecting the image specifications. the system gives access to the internal structure of the image file in order to be manipulated and displayed at any given steps by varieties of applications.

At this moment IFTS can deal with five different types of image formats based on BITMAP representation. the system consist of three main sections; the user interface, the file

processing, and the memory manager and the display section, each one performs specific task, therefore it is wise to choose different programming languages suitable for each task. The programming languages that have been used are; C++⁽²⁾, Turbo Pascal supported by Turbo vision facilities⁽³⁾, and Assembly language to perform some critical task.⁽⁴⁾ Turbo Pascal make it easier to control; Key-board, mouse, video buffer, and provides good memory management and overlays control. Cross movement and speed up the reading and writing directly into the video buffer. C++ provides, the dynamic memory allocations and management through the use of pointers, besides the fast access to the disk file.

3. Bitmap based format:

Realistic image depends on a bitmap representation and is stored in a file with certain manner called image format. Fig.3, shows the general format of this file. Header is the first part of the image file which contains a number of fields that specify the properties of the image, such as dimensions (in pixels), number of colors, type of storage and other features of the images.⁽⁵⁾

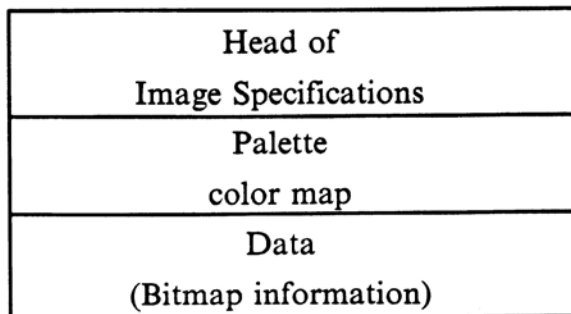


Fig-3

The palette is the color map of the image, each color in the image is defined by the Red, Green and Blue intensity. For instance, in a 256-color image, there are 256 entries in the palette, each one specifies the three intensities for that color, fig-4.

Red	Green	Blue	Result color
0	0	0	Black
256	256	256	white
128	0	0	Dark Red
128	128	128	Medium Gray
255	0	255	Bright Magenta
0	128	0	Drak Green

RGB color values

Fig-4

Bitmap data is simply the data that represents the color of each pixel in the image. This data may be stored in many forms and it may be stored uncompressed or compressed to reduce the size of the file. Compression replace data with some kind of codes or tokens. This also provides some kind of security for the image information.

4. BMP format:

BMP is a new image file format which was taken to be a standard file format among Microsoft Windows applications.⁽⁶⁾ it is common way for dealing with images in which speed of access and portability are more important than the amount of disk space occupied by a picture. Two features of BMP files can be identified, first, it can contain images with up to 24-bit of colors. Second, the images are stored uncompressed, avoiding the longer time needed

to read the compressed data file and avoiding the unpredictable result of comparing 24-images. BMP image format may not include a palette so that the palette of the hardware display is used. Bitmap data is stored in an order reversed to that they are displayed, the first line read is the bottom line of the image.

5. WPG format:

This format is widely used since it is the format adapted for Word-Processing as in work Perfect, where documents can include graphics. In this format data is stored in chunks (blocks) where both Bitmap Graphic fragments as well as vector drawings can be represented. Main features of the WPG format are; no limit for the dimensions of the image, the data is compressed using some kind of REL-compression techniques, it can also support images with 1,4 or 8-bits of color, so that image may not use the maximum number of the supported colors, and it can store Bitmap or Vector images.

6. TGA format:

The Truevision Targa board was among the high-end display device for PC systems that could display True Color images, as apposed to the palette color of a VGA card, It is capable of representing up to 16 million discrete colors, it is a model of expensive high technology. Beside Targa hardware, Truevision also came up with a specifications for a high-end file format that support high quality display of the Targa board. This format was called TGA⁽⁷⁾, it can store images between 1 and 32-bit of colors, so that it may be used in many other applications other than Truevision hardware, such as in Ray-Tracing applications 3D-Studio and 3D animation applications. TGA files are relatively complex because they have numerous options and modes. Some

of their features are; there is no limit for the dimensions of an image, the image data may be sorted compressed or uncompressed, it can support image with 1, 8, 16, 24, 32-bits of colors, the image may not use the maximum number of supported color, it can store Bitmap images only, images can be sorted starting either at the top or the bottom and can be reversed right-left or left-to-right.

7. IFF and LBM format:

Apple-Macintosh and Amiga are two microcomputers that have proved itself in the world of PCs due to their characterized architecture and layout of both hardware and software. In fact they adopt the hardware to serve the applicant program, for instance Amiga has three types of processors working together, the first support the arithmetic and logic operations; the second supports sound facilities while the third support graphics. In this environment of processing Amiga adapts graphic file format called IFF (International File Format). This format is not only applicable to the 68000 Motorola processor architecture that Amiga was designed around, but also to the unique operating system of the Amiga. This file format is capable of storing sounds besides pictures, word processing, animation and applications specific to 68000 code. Features of IFF format are; no limit of dimensions of the image, data may be stored compressed or uncompressed, it can support image with 1 to 8-bits of colors, monochrome image may be of two colors not necessarily black and white, image may be stored as planes or byte oriented and it may store bitmap image with different types of information's. Amiga color images are displayed as a color planes. For 4-bit

images, there will be 4 planes, each defines the status (On/Off) of the pixel color in that specified plane. This is similar to the display structure of EGA display adapter. Another version of IFF file is in which each pixel is stored as one single byte no matter how many color bits or planes are there in the image. This new format is called LBM, and mostly is used with 256 colors image, as in Deluxe Paint Graphics Package.

8. IFTS Implementaion:

Generally to convert files from one format to another is to write a conversion function, for instance, if we have four formats we have to write twelve conversion functions to handle transformation among these formats, Fig-5a. In addition we need four display functions, one for each format. IFTS uses a common intermediate format (General Format) that used as cross reference between the conversion process, so that only 8 conversion functions and one display function are needed, Fig-5b. Four conversion functions to convert from source format to the general format and four functions to convert from the general format to the target formats. By this technique the size of code was minimized and ease the modification process, so that the system becomes simple, fast, and give more efficiency to the conversion process. In General Format pixel is stored in a single byte which leads to decrease the access time to the image file. This mode of storage is more suitable for VGA display monitors. General format and the global data structure that represent the image are loaded into a memory buffer area where various converting functions can operate.

This package takes the full advantage of VGA display architecture to display any type of image started from monochrome to True Color image. It does not display image,

pixel by pixel as in the normal case, but it communicate with the video buffer directly. This makes image display very fast and smooth. Display process starting by allocating a buffer area in the memory, then read the image file, convert the file to general format and load the code into the buffer, keeping the image information in format record, then call the display function before deallocating the buffer area.

The True Color image that use 24-bit of colors and does not have a palette, but instead each pixel is represented by its RGB intensities directly, are not compatible with the structure of VGA display. so, to display RGB colors, a Super-VGA card and drivers with its own protocol is needed. IFTS overcome this by converting the True color image through the Gray-scale, in order to avoid the complexity of the image processing and the extra access time, allowing the True Color image displayed on VGA monitors.

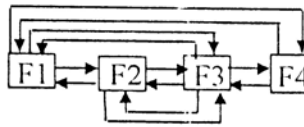


Fig-5a.

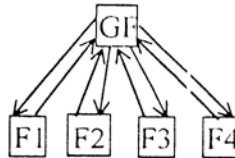


Fig-5b

Image have a variety of sizes, some of them are very large to be contained in the basic memory, in this case IFTS use any types of memory available beside the conventional, like expended memory, extended memory and virtual memory. This also increase the portability of the package among various PC environments.

8.1 Conversion Engine Algorithm:

- * Allocate a buffer area in memory.
- * Read the image file, convert it to general format, load it to the buffer.
- * Store image information in Image Information Record.
- * Call the conversion functions.
- * Deallocated the buffer area.

8.2 Display Engine Algorithm:

- * Allocate a buffer area in memory.
- * Read the image file, convert it to general format, load it to the buffer.
- * Store image information in Image Information Record.
- * Call the display function.

8.3 Loading Algorithm:

- * Input: 1- Source file pointer.
- * Output: 1- Error Code.
2- Image Information Record.

- 1- Get File Header.
- 2- Check if the file is a legal format, if not, return error code.
- 3- Fill Image Information Record with data about the image.
- 4- Calculate line size.
- 5- Calculate required buffer size for the image (in General Format).
- 6- If there is enough memory THEN allocate buffer Else return error code.
- 7- Get palette data if available.
- 8- Repeat the following steps for each line in the image.
 - a- Get a line from file.
 - b- Convert the line to General Format.
 - c- Put the line in buffer.
- 9- Return state.

8.4 Saving Format Algorithm:

- * Input:
 - 1- Destination file pointer.
 - 2- Image Information Record.
 - * Output:
 - 1- Error Code.
 - 2- New created image file.
- 1- If this format is not supported by IFTS THEN return error code.

- 2- Prepare and write file header.
- 3- Write palette if required.
- 4- Calculate line size.
- 5- Repeat the following steps for each line in the image.
 - a- Get a line from a buffer.
 - b- Convert the line into the output file.
 - c- Write the line into the output file.
- 6- Deallocate the buffer.
- 7- Return state.

9. Conclusions and further work:

IFTS practically, proved to be very successful to transfer image one file format to another without any anomalies. As a package, the speed of conversion was very satisfying compared with other existing converting programs. That was due to the careful use of different language tools that are suitable for each task. The user interface becomes very friendly to the user through its well designed menus and functions, supported by the help facilities. The structure of the package is clear enough to allow other format conversion functions to be added easily.

IFTS future development should include interfacing with printer, scanner, and using other techniques such as, dithering and quantization to display the 24-bit colors image. The package should also cover the conversion of Vector based format.

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Book Review
Herbal Medicine
A Guide for Health- Care Professionals

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The consumption of herbal products continues to increase. As more and more consumers use herbs, it becomes much more important to ensure that the herbs are used properly and safely.

The book aims to highlight the action of certain herbal ingredients and to substantiate their pharmacological action and potential hazards by animal and/or human studies.

This book is considered as a valuable source for pharmacists, doctors and other health-care professionals. It defines the term herbal remedy, herbal ingredient and herbal constituent of the most important herbs in 141 monographs with special emphasis on herbal remedies that are sold through pharmacies in UK. Other herbs, which have recently been the subject of scientific interest such as Ginko, have also been included.

All the 141 monographs are presented in an alphabetical order with respect to their preferred common name, whereas the

index includes preferred common names, other synonyms and the Latin binomial names.

The book includes three Tables in Introduction and 20 Appendixes after the Monographs summarizing the safety aspects of these herbal ingredients and their active principles.

The Introduction of the Monographs highlights some aspects related to the UK and European legislation of herbal products as well as quality, safety and efficacy of herbal remedies. This book represents the most accurate information available on safety and efficacy of herbs.

The book has plenty of references for additional reading and I found it to be an excellent and indispensable source of scientific information on medicinal plants.