Table 1:

File type	Writable	Must be specified	Description
rawycbcr	✔	✔	Raw Y/Cb/Cr data; entire Y component, followed by Cr component, followed by Cb component. (must be specified for read operations)
rawycrcb	✔	✔	Raw Y/Cr/Cb data; same as rawycbcr, except that the Cb component comes after the Cr component. (must be specified for read operations)
sgimovie			SGI's movie file format. This includes uncompressed RLE, Cosmo JPEG as well as other JPEG, MVC1. It does not do MVC2.
sgirgb	✔		SGI rgb data. This is not a standard file type, but a convenient one. The source code for a library that read and writes these files is typically found on any SGI system in `~4Dgifts/iristools`.
sun	✔		SUN raster
sun_video			Read-only. This is a file type produced by the Sun-Video board software.
svj		✔	A JPEG movie format from Digital Video Computing, GMBH (DVC).
tiff	✔		Tagged Image File Format. When writing tiff files, LZW compression is always used. When reading, the tiff libraries insist on being able to perform seeks on the file. This can affect the performace if the files being read are not internally compressed with LZW but are externally compressed with unix compressor or gzip. In these cases, imageop must make a temporary disk copy of each uncompressed image. We suggest tiff files only use internal LZW

BUGS

This (and vmpegcomp) are extremely difficult to use because of the complexity of the command line. Use at your own risk.

SEE ALSO

vmpegcomp

Table 1:

File type	Writable	Must be specified	Description
abekas		✔	Image dumped from an ABEKAS D1 machine in CCIR601 format (720x486, 4:2:2, interlaced). This is also the same as Àccom CCIR601 format
avi			Microsoft AVI movie file format (RGB subset only).
avs			Advanced Visualization System image file format (not heavily tested)
cperfile		✔	Component per file; i.e., Y, U, V like that used in Andy Hung's compressor (from Stanford). U corresponds to CB and V corresponds to CR.
gif	✔		Graphic Image Format (read-only)
jpeg	✔		Joint Photographers Experts Group.
jmovie			Parallax JPEG movie file (read-only)
miff			Machine Independent file format (from ImageMagick package)
mpeg			Motion Picture Experts Group (MPEG); read only. This works for both elementary video streams and system streams containing a video stream. See vmpegcomp for writing MPEG files.
nvr_idx			NVR index file. ASCII file used to specify lists of image files. See the nvridx manual page for details of the format.
omf			Open Media Framework from AVID.
pix		✔	Alias's RGB file format.
pnm	✔		Portable bitmap, aka PBM or PBM plus.
quicktime			Apple's QuickTime format; read only. This actually encapsulates a number of video types. Supported types are MOOV,
rle			Utah Raster Toolkit; read only.
rawrgb	✔	✔	Raw RGB data; each pixel is three bytes: R followed by G followed by B. (must be specified for read operations)

names. Essentially:

```
for (i = start; i <= stop; i++)
   sprintf(file, "%s%*d%s",
      prefix, ndigits, i, suffix);
```

`read, write` Whenever a file is read or written, its name may imply compression or decompression. Three suffixes are recognized: .Z, .z and .gz. The .Z suffix implies unix compress and uncompress. The .z and .gz suffixes imply gzip and gunzip.- See implicit and explicit read and write file list specifications below .

`sample` Specifies the sample rate of the image. For example, 444 stands for 4:4:4 and 420 stands for 4:2:0. Sample rate for rawrgb is always 4:4:4. Y/Cr/Cb images may be 4:4:4 or 4:2:2 or 4:2:0. Note that 41 1 is a synonym for 420 (the reasons have a twisted history in the video industry).

`size` Specifies width and height of image; e.g., `size=320x240`. Ignored for files that contain size information.

`type` There are several image and sequence types recognized. An important aspect is that each type implies a color space: RGB or Y/CR/CB. That color space becomes an internal attribute of the operator and can only be changed by adding a `color` operator to change color space. For read io operations, the filetype can be discovered from the file header . However , some file types have no header and must be specified with this operator: `abekas, rawycrcb, rawycbcr, rawrgb, sgiyc, cperfile`. Unless inherited from previous operators write io operators must have an explicit file type. See FILE TYPES for a complete list.

`width` Specifies the width of the spatial deinterlace filter .

`WxH=<filter>` Used with the filter operator , this specifies an arbitrary FIR filter . Filters can be 1xN, Nx1 or NxM. Filter coefficients are specified as a list of numbers followed by a divisor . For example, the operator

```
filter 1x7=-12,0,140,256,140,0,-12/256 \
interpolate=vertical
```

will implement the MPEG 2 recommended interpolation filter

FILE TYPES

All formats listed below can be read by `imageop` and `vmpegcomp`. Some of the formats can be written as well and are marked below . When writing a file, the type must be specified on the command line; for example,

```
... io write type=tiff ...
```

Also, some of the formats either do not have a header or don' t have enough information in the header . When reading these formats, the type must be specified. See the *must be specifed* column; for example,

```
... io read=file.rgb type=rawrgb ...
```

DESCRIPTION

This low-level application is a basic image sequence processor used to transform a sequence from one form into another . Input may be a set of individual pictures, such as TIFF or JPEG, or a movie sequence, such as raw rgb frames or Parallax' s JMOVIE.

Imageop requires `io` (read) as the first operation and `io` (write) as the last. Any number of other operations may appear in between, except `io`. During initialization, each operator forms its own copy of the image from specified attributes or inherits the attributes from the previous pipeline operation. For example, with the command

```
imageop \
io read=somefile size=320x240 \
io write=anotherfile
```

the first operator specifies the size, and the second operator inherits the size from the first.

ARGUMENT AND V ALUES

`changefps` This specifes the output frame rate for a reading node which is always first. If your input material is 30fps and you want the output to be 25fps, then specifying `changefsp=25` will do that. For example,

```
imageop io read=movie changefps=25
```

`decimate` This specifies that the filter is a vertical decimation filter (`decimate=vertical`), a horizontal decimation filter (`decimate=horizontal`), or both (`decimate`).

`inclip, outclip`
This specifies the clipping applied to the input and output image. For example, `inclip=320x240+4+4` resamples only the specified pixels. Outclip limits the pixels touched in the output image (this isn' t interesting just now because, there is no way to specify a value for those untouched pixels.

`interpolate` This specifies that the filter is a vertical interpolation filter (`interpolate=vertical`) or a horizontal interpolation filter (`interpolate=horizontal`).

`method` (`deinterlace` operator)
Currently there are four values for the deinterlace method: `copy`, meaning to create the second field by making a copy of the first, field 1 (this typically produces alot of jagged edges on sharp lines); `copyfield2`, meaning to use the second field (this introduces motion artifacts); `black`, meaning to fill every other line with black (usefull for testing); `spatial`, meaning to predict spatially the value of the missing lines (this has wonderful results with `width=13`).

`method` (`resample` operator)
Currently there are two values for the resample method: `nearest`, meaning nearest-neighbor; and `bilinear`.

`prefix, suffix, ndigits, start, stop`
For implicit file lists, the values of these arguments are used to construct file

NAME

Imageop - Process sequences for use with an mpeg compressor

SYNOPSIS

```
imageop [op args...] [op args...] ...
```

OPERA TORS

io

resample

filter

color

deinterlace

ARGUMENTS for OPERA TORS

io:

read or read=<filename>
type=abekas|rawycrcb|rawycbcr|rawrgb|jmovie|sgirgb|cperfile
|avs|vicar|xwd|gif|rle|jpeg|miff|mtv|pnm|sun|tiff|avi|nvr_idx
size=WxH
sample=420|41 1|422|444
prefix=<file name prefix>
suffix=<file name suffix>
ndigits=<number if digits between prefix and suffix>
start=<first file name counter>
stop=<last file name counter>
changefps=<frame rate>

resample:

type=rawycrcb|rawycbcr|rawrgb
size=WxH
inclip=WxH+X+Y
outclip=WxH+X+Y
sample=420|422|444
method=nearest|bilinear

filter:

inclip=WxH+X+Y
WxH=<filter matrix>
decimate
decimate=vertical|horizontal
interpolate=vertical|horizontal

deinterlace:

width=n
method=copy|copyfield2|black|spatial

color:

type=rawycrcb|rawycbcr|rawrgb