NIH IMAGE F.A.Q.

(F.A.Q = Frequently asked questions)
(NIH Image 1.55)

General Information

About this Document

general relating in some way to verbatim mail ayne for it , but was not reviewed since each author wrote their own text. Some of this document was copied from an earlier FAQ list by Juan I. Sarmiento

Frequently Asked Questions

bscribe or unsubscribe as appropriate

Subscribe to the NIH Image mailing list by sending a message containing the line:

subscribe nih-image <your name>

Send this to listserv@soils.umn.edu.

Note: if you send your message to nih-image@soils.umn.edu it will be routed to all on the list instead of getting you subscribed (or unsubscribed)

Similarly, you can also set your subscription to "digest" mode, which
collects all the daily messages (sometimes there will be very many) and send them out once per day. For this send the message below to <listproc@soils.umn.edu>:

set nih-image mail digest

To reset your subscription to "trickle", or many mailings

mode send:

set nih-image mail ack

Note: if you send your message to nih-image@soils.umn.edu it will be routed to all on the list instead of changing the mode

From "John Ladwig" <jladwig@soils.umn.edu> reply on nih-image@soils.umn.edu

> I was at a
> conference for 10 days and I am in the process of sorting
> through nearly 400 messages.

If you know you're going to be offline for a while, our LISTPROC has a
useful feature; POSTPONE, which takes you off the distribution list,
but keeps you subscribed. You can then reset your subscription when
you get back. Syntax follows.

==========

Subject: HELP SET

Syntax: set <list> [<option> <arg[s]>]
Without the optional arguments, get a list of all current settings for
the specified list. Otherwise change the option to the new value for
that list, as follows:

option can be: mail, password, address, conceal
arg for mail can be: ack, noack, postpone, digest
args for password have to be: current-password new-password
args for address have to be: current-password new-address
args for conceal can be: yes, no

'set <list>': get the current option settings for the list
'set <list> mail ack': your message is sent back to you
'set <list> mail noack': your message is not sent back to you
'set <list> mail postpone': no messages will be sent to you until you
change mode again
'set <list> mail digest': your message is not sent back to you.
New messages are not sent to you as they arrive, but are
accumulated into digests that are periodically sent to you.
'set <list> password <current-password> <new-password>': change your
password for live access to the system (i.e. for subscriber
access privileges when telneting to the system).
'set <list> address <current-password> <new-address>': change the address
you are subscribed with; may not be available on all lists.
'set <list> conceal yes': remove yourself from 'recipients' and
'statistics' listings.
'set <list> conceal no': opposite of previous mode.

Can NIH Image capture images from flat bed scanners?

From Sarmienu@RNISD0.DNET.ROCHE.COM

Many scanner work well with Image via the supplied PhotoShop plug-in to grab images directly into Image.

What are "plug-ins?

From Sarmienu@RNISD0.DNET.ROCHE.COM

Images may be captured from some not directly supported grabbers via often supplied PhotoShop plug-ins (e.g. a Photoshop plug-in comes with the Radius VideoVision video grabber). NIH Image only supports Photoshop plug-ins. The Photoshop plug-ins developer's kit is available by anonymous ftp from zippy.nimh.nih.gov, in the /pub/nih-image/plug-ins directory.

Using AV Macs with NIH Image

From message of wayne@helix.nih.gov (Wayne Rasband) on nih-image@soils.umn.edu

NIH Image can capture images using the frame grabber built into the AV Macs
using a plug-in called "Plug-in Digitizer" that is available from zippy.nimh.nih.gov, in the /pub/nih-image/plug-ins directory.

Can AV Macs be used for science?

From message of wayne@helix.nih.gov (Wayne Rasband) on nih-image@soils.umn.edu

The plug-in does not support frame averaging/integration, movie capture, or
highlighting of saturated pixels. The effective grayscale resolution of the
AV digitizer is only 176 levels, compared to 256 for the Scion and Data

Translation cards. It has an automatic gain feature that cannot be disabled
so it should not be used for densitometry.

From message of wayne@helix.nih.gov (Wayne Rasband) on nih-image@soils.umn.edu

Advantages:
1) Relatively inexpensive
2) Real-time 30 fps display
3) Supported by QuickTime programs such as Adobe Premiere
4) Fits in the Power Mac 6100's 7 inch PDS slot
5) Supports color
6) Both NTSC and PAL
7) S-video input and output

Disadvantages:
1) Not designed for scientific imaging (uses a Philips chip set intended for consummer video
2) May have auto-gain feature that can't disabled
3) Not directly supported by NIH Image (can't do averaging, shading correction, etc.)
4) No RGB inputs
5) Slower video output than the VRAM card it replaces on 7100 and 8100 (see page 83 of May '94 MacUser or page S7 of 03.14.94 MacWeek)
6) Can't display 24-bit color on 21 inch monitors because it only has 2MB of VRAM compared to up to 4MB on the VRAM card it replaces

From message of @helix.nih.gov () on nih-image@soils.umn.edu
Since many people are asking questions on densitometry, I might point out a
few things here. Obviously you want as many gray levels being significant.
Hence: You need to buy the best equipment that has the features useful for
density analysis. Based on this you will need:

1) A video or scanner input which has a very high signal to noise ratio

From message of @helix.nih.gov () on nih-image@soils.umn.edu

The whole sketch and table you come up with is likely a bluff on the
part of Philips to make the chip look better than it actually is. I don't
have the data book so you will have to look at the book and look under A/D
differnetial nonlinearity (DNL) in terms of Least significant bit error out
of the 8 bits. They must specify this at video bandwidths, not at 1 Khz or
something. You will always find that the limiting factor for high speed A/D
conversion is the differential nonlinearity. Philips KNOWS that the chip
has enough DNL to make it a 7 or even 6 bit chip. That means

that the chip
gives you a maximum true 128 levels. They can show you graphs of
digitizing, etc and make you believe it has more than 128, but this is
simply not true, it is a bluff.

Micro Power systems, the maker of the A/D in the data translation board
shows less than 1/2 LSB error out of 8 bits at the video bandwith. This is
a 256 level converter. Analog Devices makes chips which spec 10 and 12 or
even more bits at the video bandwidth.

From message of @helix.nih.gov () on nih-image@soils.umn.edu

>The info for the TDA8708A chip is as follows:
>
> DC Integral linearity error +/- 1 LSB
> DC differential linearity error +/- 0.5 LSB
> AC integral linearity +/- 2 LSB
>
> AC integral linearity measured with a 4.4 MHz full-scale sinewave.
>This data comes from Phillips' own data handbook - make of it what you will!
>--Cyrus Daboo

They don't list the DNL at video sampling rates but from the looks of it
I'd say this is a true 6 bit converter. This chip is good for about 64
levels of grayscale max.

From messages of cd102@phy.cam.ac.uk (Cyrus Daboo) on nih-image@soils.umn.edu

AV Macs & Framegrabbing - the inside story.

Please feel free to correct any points in this message you know to be wrong.
Over the past two months I have been agonising over whether to buy an AV Mac for the Physics Lab I work in. The aim would be to grab greyscale images of diffraction patterns and

analyse the relative intensities of diffraction spots.
This requires digitising into 256 grey levels to provide the necessary greyscale resolution.
In order to see whether the AVs were suitable for this I looked in detail at the hardware specs of these machines as described in Apple's developer note. This note gives a circuit diagram of the digitiser hardware, including chip numbers. They have used a number of Philips chips to handle the digitisation. I went out and bought myself the Philips technical notes for these chips, and what follows is a summary of the AV Macs digitisers. It may be that Apple are using these chips in a non-standard way that might invalidate some of the comments I am going to make, but there appears to be no detailed information, other than that found in the developer note, on the built-in digitiser's hardware and performance.

(1) The chip set used for digitisation in the AV Macs are primarily used in standard TV applications where quality and faithful rendition of the digitised image are governed by the response of the human eye which is fairly tolerant.

(2) The 8-bit (256 levels) analog-to-digital converters (ADC) (Philips chips TDA8708 & TDA8709) that digitise the incoming video signal also digitise the synchronisation pulses in the video signal. In particular the first 64 levels of grey are used for the sync pulses, and the top 16 levels

of grey are never used. This means that the effective resolution available for video digitisation is only 176 levels. This may be OK for TV applications but is only suitable for a limited range of scientific purposes.

(3) The ADC's have an automatic gain control (AGC) feature which appears to be enabled. This will automatically alter the gain of the ADCs depending on the average level of the video signal. So as the images get darker the gain goes up, as they get lighter the gain goes down. There appears to be no way to adjust the gain or contrast of the digitised image from software (see Apple's own VideoMonitor where the brightness & contrast controls have little or no effect).

(4) The digitised video is then passed to another Philips chip (SAA7191) for converting the input digital video standard (PAL, NTSC, SECAM etc) into a standard YUV 4:2:2 signal as defined by the CCIR-601 standard. During this process it maps the digitised luminance (brightness) levels from 64 -> 240 (as produced by the ADCs) to 16 -> 235 which will correspond to the black -> white level range. In other words it interpolates from 170 levels of grey to 220 levels of grey. This is definitely bad news for scientific image grabbing
where true 8-bit images are required. The chrominance (colour) levels are mapped in a similar way, however the chrominance is unimportant for greyscale images.

(5) The final chip (Philips SAA7186) converts the YUV 4:2:2 digital signal into RGB suitable for stuffing into video memory. It can apply an optional gamma correction of 1.4 to the digitised image, thus changing the linearity of the luminance signal. The gamma correction may be turned off, but this depends on the

software being used.

Conclusions:

(1) The built-in digitisers of the AV Macs are not suitable for scientific image grabbing where a true rendition of the images' INTENSITY is required at 8-bit resolution. However, it is suitable for scientific applications which are not sensitive to brightness levels eg: finding shapes, areas, sizes of objects, detecting particles and counting them, recognising markings etc.

(2) There is no hardware or software solution to these problems, other than buying a suitable NuBus frame grabber card.

Suggestions for scientists:

MAKE SURE YOU KNOW EXACTLY WHAT YOUR DIGITISER DOES
WHEN IT DIGITISES YOUR VIDEO SIGNAL.

If it is an 8-bit digitiser then its digitisation range must be

from the video signal's black level voltage to its white level voltage giving a 0 -> 255 digital range. If it digitises the sync pulses, it will reduce the black -> white level digitisation range.
Any gamma correction will degrade the quality of your data (unless you can turn it off).
Any AGC will degrade the quality of your data (unless you can turn it off).

Stage controller

From Charles Thomas posting on nih-image@soils.umn.edu

As I've posted before, we successfully managed to get an ancient Ludl Mac-1000
stage drive working from within NIH-Image. The ludl, like your controller, uses
a series of numerical and hexadecimal values to control the various functions.

From Luchka@ccu.umanitoba.ca posting on nih-image@soils.umn.edu

I have incorporated some very old Zeiss stages to work on an old Mac II
with NIH Image. I use controllers from a company called Electronic
Products, Mountainview Ca.. The contollers are serially driven and the
source code can be written in C or Pascal and hung off NIH Image. I use
it for doing autofocus microscopy. If you are interested send me some
mail and I will give you more of the particulars.

From jjvornov@welchlink.welch.jhu.edu posting on nih-image@soils.umn.edu

>In particular I'm interested in controlling only a single axis translation
>stage. Presumably one can get away with a much cheaper interface device than the
>"Newport programmable dual axis control box" (about $5K) because 1) I want only
>a single axis of control, and 2) I need *only* computer control, not the fancy
>push-button interface that the Newport controller provides. Any suggestions?

The first question is, do you already have a stage and motor? If so, is it
a servomotor or a stepper motor? You'll need a different type of controller
and driver for each. If its a servo or low power stepper (0.5 A/phase)
Oriel(203) 377-8282 has some relatively inexpensive controllers. I have a
PTI monochrometer illumination on my scope and I'm in the process of
developing a system to control the illuminators stepper motor with Image
(and LabView). I've ordered a controller from NEAT for the stepper motor.
I'd be happy to post follow-up and finished macros once I get the whole
thing working.

From chenl@charlotte.med.nyu.edu posting on nih-

image@soils.umn.edu

AMSI Corp. (516-361-9499, FAX 516-265-6241) sells a low cost (model
8003-DM, $65, including motor) step motor driver that can be controlled
using RS-232 output. It also sells a microstepper driver (model 7100-DB,
$150, and a matching motor 301SM, $65) that has a resolution of 12,800
steps/revolution and can also controlled using RS-232 output. The BASIC
program that comes with 8003-DM is for PC but can be easily converted to
run on a Mac.

Image Processing References

From (russ@mat.mte.ncsu.edu) posting on nih-image@soils.umn.edu

Well, I'm not shy. Two books that I happen to like and use are:
J. C. Russ (1990) Computer Assisted Microscopy, Plenum Press, NY
(discussion of acquisition, processing and especially measurement)
J. C. Russ (1992) The Image Processing Handbook, CRC Press, Boca Raton
(emphasis on processing of grey scale and binary images)
The first book is more of a textbook, the second is more expensive and more
of a reference comparing different techniques.

Camera with auto/manual gain

One camera used in NIH/DCRT is the Cohu 6515. The camera has a box attachment which allows you to set either manual or auto gain and blacklevel. Cohu can be reached at 619-277-6700.

PC Programs

From Sarmienu@RNISD0.DNET.ROCHE.COM

There is a public domain version of NCSA Image which is supposed to run on the PC but I've not tried it. The FTP site address to try is:

ftp.ncsa.uiuc.edu

You can use FTP get copies from there for the PC.

From russ@mat.mte.ncsu.edu posting on nih-image@soils.umn.edu

>I am a PC-user (not looser) and would like to have recommendations
>both about hardware and software to acquire images from EM's and to use
>them in computer in order to improve the quality and to make different
>measurements automatically.

Choice of a board somewhat depends on choice of software, since not all of
the programs support all of the boards. In addition to the plethora of Mac
programs, we use here several PC products. At the low end, of programs like
Global LAb, Mocha, Image PRo, etc., I like Image Pro Plus (the windows
version) as well as any. It has a fairly complete set of processing and
measurement operations, and pretty good documentation. In many respects, it
is comparable to NIH Image in overall performance (although they don't
match perfectly on a feature-by-feature list). Of course, for the cost of
IP+, you could buy a medium-level Mac and run Image for free...

At the high end, there is really nothing on the PC as complete as the
Universal Imaging stuff (metamorph, or in an earlier life Image 1). But
this can get pretty expensive unless the real-time aspects of analysis are
important to you.

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using a plug-in called "Plug-in Digitizer" that is available from zippy.nimh.nih.gov, in the /pub/nih-image/plug-ins directory.

The plug-in does not support frame averaging/integration, movie capture, or
highlighting of saturated pixels. The effective grayscale resolution of the
AV digitizer is only 176 levels, compared to 256 for the Scion and Data
Translation cards. It has an automatic gain feature that cannot be disabled
so it should not be used for densitometry.

From messages of cd102@phy.cam.ac.uk (Cyrus Daboo) on nih-image@soils.umn.edu

AV Macs &
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AV Macs & Framegrabbing - the inside story.

Please feel free to correct any points in this message you know to be wrong. Over the past two months I have been agonising over whether to buy an AV Mac for the Physics Lab I work in. The aim would be to grab greyscale images of diffraction patterns and analyse the relative intensities of diffraction spots. This requires digitising into 256 grey levels to provide the necessary greyscale resolution. In order to see whether the AVs were suitable for this I looked in detail at the hardware specs of thes

e machines
as described in Apple's developer note. This note gives a circuit diagram of the digitiser hardware, including chip numbers. They have used a number of Philips chips to handle the digitisation. I went out and bought myself the Philips technical notes for these chips, and what follows is a summary of the AV Macs digitisers. It may be that Apple are using these chips in a non-standard way that might invalidate some of the comments I am going to make, but there appears to be no detailed information, other than that found in the developer note, on the built-in digitiser's hardware and performance.

(1) The chip set used for digitisation in the AV Macs are primarily used in standard TV applications where quality and faithful rendition of the digitised image are governed by the response of the human eye which is fairly tolerant.

(2) The 8-bit (256 levels) analog-to-digital converters (ADC) (Philips chips TDA8708 & TDA8709) that digitise the incoming video signal also digitise the synchronisation

pulses in the video signal. In particular the first¸¸7#¸7#$18¸7#$¸7#$18¸¸7¸7#$18ÌO⁄″üL3136„3 136„ñññ∑8∑8∑8∑8.∑fî∑˙∑˙x∏rxó *∏Í π8Ω¯*æ"€ñ

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