

!"#\$%&' "(

(68-567) 24%-'" ./01 2"3)*+, '

9\$: ,;<"= ' /0><?/@A4B

D5EE .">(C9\$

#,(. "F./,&G 9*=B

+, -./ 01'2 %3456 :* %&'() !"# \$

89- :9 -7

:0> #(\$# ? , @A% , #012 3&\$* 45, 67 :'' #&' B#C +5 . ! " #&' () *+, - . -\$/ , #012 3&\$* 45, 67 3\$8 9(+ :; <= " #&' +5
Q# ST . *C U K6% . 85) %G\$6H C+ I JAK% 3\$8+\$AL\$* +5 M\$AEN#5 O> #(3C, - &\$EH 5+0% 0505 P, H : Q# M(R .50!) %3, EFED
. [-5 \$[- M5\$[]%) **CCIR 601** . [-5 \$[- O> [(Q# M\$1% 3C, - .5+05 &\$EH : , #012 S . <VH 3, A6E- H\$- 3\$WKO \$# (SY7\$Z S- O> #(
d gJE[7 Q[# : , [F#5 h+\$<]- .5+05 cfMbyte/s \$# cde Mbit/s , -C, -) L, H : **4:2:0** bH+ 3+05, - SH0aH P, H \$- (^0\$H' GO# #0J2
B[#C I+\$Xm Q# (**VCD** 3\$8 gJE7 \$# **VHS** . -5 \$- M5\$[]%) , AaT . EkET \$- **CIF** gJE7 Q# . WIT) %M\$j ! C SY7\$Z ccd **Gbyte** :SAi \$*
\$[# 3&\$[* 4, ELr 3C, - :\$8 4505 3&\$* 45, 67 3C, - 3, 2, /o% 3\$8 9(+ : , #012 \$- SV#n% +5 ST . *C pqC(. WIT) %M\$j ! C C+ +C n%
.. *C &\$EH 5+0% O> #(M\$*+C
I\$[NHC :3, #0[12 BkJ2 () WkJ2 t HC, kWIT C, - **CCTTT** S*02 +\$- BE_C 3C, - :0> #(3C, - 3&\$* 45, 67 3\$8 gA#OF_C G5, T 5+C H\$A*C
The International Telecommunication Unit- :ITU-T I\$[W GOWTC ST) :**CCTTT** &C) 1 1 K2 4(, u Q# .. *C 4 !
v, w% t HC, kWIT O> #(3C, - O> #(3&\$* 45, 67 3\$8 QEWk2 3C, - 35+C H\$A*C (50!) %4 E%\$H **Telecommunication Sector**
:G' O> [(G5, [T [T S- { O-, % . aV=ST 50!) %SAL\$W! **H.320** GCOM]- . . *C 4 ! SEX2 cyyz M\$* +5 5+C H\$A*C B#C .. *C 45, T
S[T . [*C **p*64 kpbs** [H\$- 3\$WKO 3C+05 ST WIT) %45\$ka*C **ISDN** { OwL &C t HC, kWIT O> #(3C, - 5+C H\$A*C B#C .. *C **H.261**
\$[- 4C, [a8 O> #((. *C (c f*c•• ()zfpC) **QCIF** \$# (}-d*dee (}z fps) **CIF** \$# O> #(|<W% . !\$- H02) %p=1,2,...,30
.50! 45, 67 f• **kbps** &C) -, ! %0&C HC S- #&- C "

Video Format	V Size	Color Sampling	Frame Rate (Hz)	Raw Data Rate (Mbps)
HDTV Over air, cable, satellite, MPEG2 video, 20-45 Mbps				
SMPTT286M	1280x720	4:2:0	24P/30P/60P	265,332,664
SMPTB285M	1920x1080	4:2:0	24P/30P/60P	597,746,746
Video production, MPEG2, 15-50 Mbps				
CCIR601	720x480/576	4:4:4	60I, 50I	249
CCIR601	720x480/576	4:2:2	60I, 50I	166
High quality video distribution (DVD, SDTV), MPEG2, 4-10 Mbps				
CCIR601	720x480/576	4:2:0	60I, 50I	124
Intermediate quality video distribution (VCD, WWW), MPEG1, 1-5 Mbps				
SIF	352x240/288	4:2:0	30P/25P	30
Video conferencing over ISDN/Internet, H.261, H.263, 128-384 Kbps				
CIF	352x288	4:2:0	30P	37
Video telephony over wired/wireless modem, H.263, 20-64 Kbps				
QCIF	176x144	4:2:0	30P	9.1

I JAK% 3\$85,-+\$T 3C,- M\$AEN#5 0> #(3\$8 . " ,7:# M(R

.5+05 &\$[EH ,A[6E- \$f•kbps S- QCIF 0> #(Q# (,A6E- \$#)e• kbps S- :CIF 0> #(Q# :MO< ; -\$. EKET BA[05 3C,- \$%Oai

H.323 5+c H\$A[*C:\$XH' B#,AaX%&C.505 S%5C) \$nHC 3\$8 SIB\$+ ,#\$* 3C,- G+ +\$T %]*02 :ITU-T :**H.320** 5+c H\$A*5\$N#C M\$-H -

3C,- [- S[T **H.324** 5+c H\$A[*C`EH (. *C4 ! SEX2 :. H,AWC W\$%: WWT) aH B\$e! 2 G+ t #(* . EKET ST) #8 Sx< 3C,- ST . *C

G5,[T [T 5+c H\$A*C.. *C4 ! v,w%:gE*)- M\$H\$T \$# dezekbps 150% ' #,& &C BkJ2 {OwL ; \%gT +\$EV- H\$- 3\$WKO \$- {OwL

3C,- (O[1K- **H.261** S- . <V/H) *OV@%. 7,6ED ST . *C**H.263** :**H.324** (**H.323** 3\$85+c H\$A*C B#C 3(5 ,8 +5 0> #(

d•kbps 5([Z \$[2 :f•kbps P,H\$- **H.261** &C ,AX- \$# M5\$]% . EKET \$- :QCIF 0> #(Q# :**H.263** \$- .5+05 BE#D 3\$8 . E- P,H

.50!) %45,67

3\$85+c H\$A[*C`EH ISO &C :Motion Picture Expert Group :MPEG 1\$H \$-) 1 1 K2 4(,u Q# ITU-T 9) 2 \$- G\$% a8

. [EJ-\$= S[T . [*C MPEG-1 4(,[u B[# 5+c H\$A*C BE(C. H505 S)*02 :0> #(+\$6AC (M\$*+C |#802 :3&\$* 4,ELr 3C,- G+) kJAK%

5+c H\$A[*C B[# .5+05 : *OL . EKET \$- c/~Mbps \$2 G+ (-d*d•z pels/sec }z fps) :SIF . =5 \$- h0" (0> #(3&\$* 45,67

. !) %5(@%c/~ Mbps S- \$XH' P,H G\$%& G' +5 ST 505) %G+ CD-ROM 3(+ \$8 gJ\$7 " KD (3&\$*4,ELr G\$%&

5+c H\$A[*C) [A-(. [! M\$[AEN#5 3\$80> [#(%]*02 3C,-) J\$%i (Video CD \$# VCD) CD 3(+ MPEG-1 3\$8 gJ\$7 &C M\$-A*C

G [! S[q, i .50[- &\$[EH 5+0[%G' b [H+5) [- G5,[T [T(([T 3C,- 4 E+ED +C 7C . K* : ! v,w%+\$- BE(C 3C,- MPEG-1

G+ WEB ' #,& &C MPEG-1 gJ\$7 BA7,u (b H+5)- +Ow- MPEG-1 3\$8 gJ\$7 G5,T T(:Intel Pentium I +OV*(,D(, xE%

.5, T , VE%

\$[- 0> #(+\$[6AC 3\$[85,-+\$T 3C,- :C " (0> #(3&\$* 45,67 00E! G5,T 5+c H\$A*C 3(+ MPEG :MPEG-1 G ! ; %\$T &C]-

9) [2 B[# .50[! 45,[67 czMbp \$2 } BE- (GO# #0J2 . EKET) CCIR601 . =5 \$- 0> #(ST , 8 B#C \$- : ! `T,aA%:-\$- . EKET

4+08\$[% ' [#,& &C 0> #(+\$6AC G\$%&C :. !05 M\$-H -) aX% |#=(MPEG-2 5+c H\$A*C 5\$N#C . ! MPEG-2 G ! v,w% S- , N1%

0> #(3&\$* 45,67 3C,-) 2\$H\$x% 3G+05 BEW+a8 MPEG-2 5+c H\$A*C .M\$AEN#5 GO# #0J2 (DVD 3\$8 gJ\$7 : (Direct-TV W\$%)

.. *C +\$u&\$* MPEG-1 \$- (W+ +\$T `EH (SIF) MPEG-1 . =5 \$- H02) %BEW+a8 .. *C HDTV . =5 \$-

.. *C 45,T 3 W |aR G+ 3C SIB\$+ Wm 3\$8 M\$WFE* 3&\$* 45,67 3C,- . 07 3\$85+c H\$A*C :d M(R

Standards	Application	Video Format	Raw Data Rate (Mbps)	Compressed Data Rate (Mbps)
H.320/H.261	Video conferencing/ telephony over ISDN	CIF QCIF	3.7 9.1	>=384 Kbps >=64 Kbps
H.323/H.263	Video conferencing over Internet	4CIF/ CIF/ QCIF		>=64 Kbps
H.324/H.263	Video over phone lines/ wireless	QCIF	9.1	>=18 Kbps
MPEG-1	Video distribution on CD/ WWW	CIF	30	1-5
MPEG-2	Video distribution on DVD / digital TV HDTV	CCIR601 4:2:0 SMPTE296/295	138 <=760 Mbps	3-10 18-45

">9 O'@34A&'B O4A +,-./ D34B -B O'@3&C-E'>2C := ; /-<
C' N% (I JAK% /\$E! C S-) * ,A*5 3C,-) AEJ-\$= 5\$N# G' , 8 ST !) ZC, & MPEG-4 I\$H S- 3, F#5 5+c H\$A*C :MPEG-2 M\$H -
+5 MPEG 4(,[u 9) [2.50[!) % T S\$u C R +0w- /) ! ,8 \$ \% .50!) % T /) ! , -) W\$- 9(+\$- 0> # (.50- 0> # (,#012 +5
G\$[x% ST 3C\$HOF- :. *C 3&\$* O2,% . EJ-\$= (I E'' O2 3C,- 35+c H\$A*C 5\$N# G' , 8 ST .. *C MPEG-7 5+c H\$A*C 3C,- S%5C
. W , VE% G+ M\$AEN#5 O> # (S-) -\$EA*5 \$2 ! \$- SA! C5 G+) 20'' (3 ,#012 h\$ i) & C 3O A@% I E'' O2
:H.261 3\$85+c H\$A* C +(, [% (. [T, Z G C, [< R B E[aK2 (01K- :O> # (3&\$* 45, 67 3C,-) # C A- C 3\$8 Q E Wx2 :'' # \$% & ' B # +5
. E\$ aH S] R C, % [1] S- S W E% B # +5 , A6E- h\$ > R 3C,- .50!) % M\$-45 : MPEG-2 (MPEG-1

+,-./ O1'2 %3456 O'@+F C / ' @ O & +H\$ - =

J B4K D C4L< / J B4K M!(?\$ -I - =

,#O[12 ST W W) % 2 ,7 :. T, Z G C, < R 3C,- . W W 8 O> # (3&\$* 45, 67 3\$8 g H+ O F C , \ T C 1 \$* C (S#50 :. T, Z G C, < R (B E aK2
. [W) [% 5\$ [N# G+) -\$[E H(+5 (B E[aK2 & C 45\$ k A* C G\$ x% C : 2 ,7 B # .. *C) J< , #012 S- . < V H) # R h c, E j 2 \$- 3 , #012 : 3+ \$ R
% [N E A H S [T [H+ C5 , F# [x# \$ [-) # R 3\$8 ,) A L C : G' % \$-45 3\$8 g #, 7 S i O a N% : 50!) % 45\$ k A* C | R, % G C W]- g #, 7 Q # ST) % F W B
+0w- g #, 7 Q # .50! , 2 45\$* : \$8 g #, 7 % V # n% S x W C 3C,- .. *C 4 ! 45 C5 G\$6 H c ; x! +5 ST :. *C B E+(5 . T, Z \$ # (/ \$ E! C . T, Z
50[!) [% T ST) a #, 7 +5 ? O J- , 8 3C,- . H O!) % T ; n A V% +0w- \$ X T O J- (50!) % g E V n2) # \$ X T O J- S- S x J- : 50!) a H T ; % T
Q [# : ? O [J- , 8 3C,- .50!) % O N A V R : 4 ! * \$ K A H C 3\$ X T O J- & C 35C] 2 G\$ E% +5 | R, % g #, 7 +5 : ' < W W ? O J- B #, A X- : (3+ \$ R g #, 7)
* \$ K A H C B # . 85) % G\$6 H C+ | R, % g #, 7 +5 : G' \$- ' \$ w% ? O J- B #, A X- (? O J- G' G\$ x% B E- ,) A L C ST 50!) % E_ O2 . T, Z + C5,-
. ! 8 C O L 45 C5 v , ! , 1 A K% +0w- ST) ! (+ : 50! I \$ N H C | % R (; % T 3 O N A V R Q # \$- H O2) %

P+"A 4A Q&l9 J B4K DCS!9 :!N0)

| [R,%g#,7 & 3,F#5 () J< | R,%g#,7 &) x#: HO!) % E_02 | R,%g#,7 (5 \$- { \$2+C +5 :. T,Z 3\$8+C5,- :)-\$EH(+5 9(+ +5
 . HO!) % SA7,u BEFH\$E% 4 % . * - ?0J- (5 (HO!) % ONAVR g#,7 (5 ,8 +5 4 ! 45C5 ' E<w2 3\$XT0J- B#,AX- :3]-

(BMA) J B4K M!(?\$ O04A 'TB+"A UA'V\$ W>.&+F@ - I - I -=

. ! \$- D_n . E]=0%\$- f_{k-1} g#,7 +5 ?0J- Q# \$- , 3\$W% :f_k g#,7 +5 B_n ?0J- , 8 ST ENT 2,7
 \$8\$wL +(4N% | aR W\$%:BfaK2 3\$wL G5,T ; < Z ' #, & & H02) % D_n BfaK2 .50!) % 4 E\$H B_n . T,Z +C5,- I\$W D_n ST
 . ! \$- \$8\$wL ' Jw%+ = \$# (
 9(+ B[# :,2 ' E=5 h+\$<]- . W) % 45\$ka*C :. *\$wL ; < Z 3C+C5 ST) TOJ- G5,T C ED 3C,- C+ ; %T 3ONAVR 9(+ Q# BMA
 ?0J- , [8 3C,- : W) % SV#n% :) J]7 G\$x% , C, & C +5 4 ! I #,]2 ; < & C 05(@% Q# +5 Bxa% 3\$8 ?0J- %ET \$- C+ 3+\$R ?0J-
 ?0J- B#,AX- G00W]- . ! C5 C+ \$wL ; < Z ST) TOJ- :Bxa% 3\$XT0J- I\$a2) *+, - & C]- W) % S<\$@% C+ BfaK2 3\$wL :4 ! BEE]2
 .50!) % * \$KAH : ' - \$w%
 3C, [- \$[XT0J- ' - \$w2 gA#OF_C & C 45\$ka*C B#C, - \$W .. VEH BEE]2 ; -\$= . - \$/ 3\$XT0J- 1 \$*C, - \$%Oai :0> #(g#,7 (5 BE-)]=< (. T,Z
 : ! \$-H 45\$* M\$nAH Q# : ?0J- Q#) nEnZ . T,Z ST) % \$FWB . W 5\$N#C) nE=5 3\$8 BfaK2 H02) aH . T,Z GC, <R (. T,Z BfaK2
 :\$[8 ?0J- ' - \$w2 9(+ & C 45\$ka*C \$- . T,Z GC, <R & C C+) \$%d ; 5! . W) % 9) 2 :\$wL ; < Z \$-) TOJ- G5,T C ED 3C,- gA#OF_C
 . 85) % G\$6H

'@ P+"A UA'V\$ Z /& 1C %3'X>2C 'A J B4K D04L< 1C QG'Y9 :=N0)

GC [E%:. [*C+ . a[* BE\$[D ,#0[12:. [*C 3+\$(R g#,7:. *C+ . a* -\$,#012:. *C) J<g#,7 ,#012:6m . a* -\$,#012
:6[m . a[* BE\$[D ,#0[12 ((. H4 ! g*+ ?0J- ,8 `T,%; @%&C 4 ! BEE]2 . T,Z 3\$8+05,-) . *C 4 ! 45& BEaK2 3\$XAT,Z
. 85)%G\$6H C+ . T,Z GC E%&C 45\$KA^C \$- 4 ! 45& BEaK2 ,#012
9(+ B[HC \$[- g[6m G50[- SAV- SxE\$Z +5 . *C 45,T BEE]2 G+ SWE%& t D +5 . T,Z I i) nE=5 +0w- gA#0F[ST 50!)%SYZ)%
.50!) aH 4 #5 4 ! 45& BEaK2 ; x! +5 :45\$*

Q6+(_9+,-./\~RRB-B] . &3 P^M/4B'9] . O64A D34B -B6/ / -B NK649 :[NO)

N.-l\$ -B / J B4K DC4L< 1C %3'X>2C 'A +,-./ D34B -B ---l-=-

?0J- (,T\$%S- g#,7,8 9(+ B#C +5 .50!)%SAL\$W! **block-based hybrid** G5,T T I\$H S- O> #(G5,T T 9(+ B#,A(C A% ; # -2 (. T,Z GC,<R &C) <T,2 &C 45\$KA*C\$- ?0J- (,T\$%,8 .. *C 8*8 ?0J- B# Wm 3C+5 IC T ,8 .50!)%gEVn2 (MBs) \$8 50[%+5 .50![T :50[% (5 &C) [x# +5 H02)% ?0J- (,T\$%,8 .50!)% T :. *C 4 ! 45C5 G\$6H } ; x! +5 ST +Ow\$8 :DCT ,[8 3C,[- 50[% B#C .50![) [%M\$[aiC ?0J- ,[8 3(+ gEnA[V%+Ow- **JPEG** S- S<4 (DCT G5,T T , -) W% 9(+ Q# **Intra** +C5,[- Q[# :Inter 50[%+5 .50!)%45\$KA*C`EH S\$45 ,#& 3\$8 g#,7 +5 * (\$W%+Ow-]- (5(+)%+\$x- g#,7 BE(C +5 ?)- (,T\$% ?)- (,T\$% :9(+ B#C :\$" 01L .50!)%45\$KA*C . T,Z GC`E% 3\$wL G5,T T 3C,- **DCT** 9(+ (50!)%BEE]2 C A<+5 . T,Z 3\$wL ,u< (**Luminance** 3\$8 Sk_o%sn7) H&)% BEaK2 :) J<g#,7 +5 G' \$- ' \$w% ?)- (,T\$% B#,AX- \$- C+ 3+\$R g#,7 &C 3+\$R **DCT** &C 45\$KA*C\$- BEaK2 3\$wL h+01W< ,E7 +5 .50!) aH BEE]2 \$8 45C5 ,)ALC . !\$- ; <=&C 4 ! BEE]2 Z &C ,AaT G5& BEaK2 :. #Xh+5 . HO!)% T :**JPEG** \$- S-\$6%runlength 9(+ &C 45\$KA*C\$- (4 ! 4`EH0T :SA7\$# ; # -2 3\$8 Sk_o% (50!)% ; # -2 I E[" 02 +5 S[T +Ow\$[a8 . HO!)%M\$*+C **video multiplex** S- 4 ! T . T,Z 3\$8+5,- h\$i) &C\$- 4C,a8 4 ! T . E- SA! + . W< ,EE]2 :G5,T T) #<+\$T (400K_5 ,#012 . EkET 1 \$*C , - H02)% :4 W< `EAH0T **step** 0&C H< : ! 45C5 v, ! **JPEG**

H.261 +,-./ D34B -B W>.&+F6C ---=

t #(<,[* 3C,- **H.261**)#O> #(4 W< T ; %! : t H< ,kWT O> #() JJaC BE- 3\$85+C H&A*C &C 3C Si0aN%**CCTTT** :cyyz M\$* +5 ,[YH+5 3\$[85,-+\$T .5,[T O#012 (HO!)%SAL\$W! `EH **p*64** 5+C H&A*C\$- ST) **p*64 kbps** :ISDN 3(+ 3,#012)20" 3\$8 W<V8 s<2,%5+C H&A*C B#C\$- ST)#8 gAVE* B#C,-\$W .. *C t H< ,kWT O> #(gAVE* (3,#012 BkJ2 :5+C H&A*C B#C 3C,- 4 ! SA7,u

:S#SD P,H\$- **ISDN** { \$2+c Q# 3C,- .. *C }z \$2 c &C p 05(@%. W! \$- SA! 05 C+ 5+c H\$A*C B#C b H+5)- G5,T TC((T . E!\$= #\$.
 .. *C d \$2 Q# p
 3C+05 **CIF** . [%7\$- 0> # (.. 7,u ,YH +5 3 ,#012 Bk12 3C,-)#0> # (3\$8 . %7 G00W]- C+ **QCIF** (**CIF** 3\$8 . %7 :CCTTT
 [T %EJT . ! \$- SEH\$ / +5 g#,7 }z \$2 Q# BE- H02) %g#,7 P,H.. *C **Cr&Cb** 3C,- ; V5ED c f*c•• (Y 3C,- ; VxED }-d*dee
 ,ATC [Z dy/y) S[EH\$ / +5 g#,7 }z \$#,n2 . i , * \$- .. *C 3+\$EALC **CIF** pw* +5 5,xJai (WIT ; ai **QCIF** pw* +5 # \$- 8 4 WIT
 M\$[H\$T Q[# 3C,- .5+c5 y/cc~**Mb/s** P,[H **QCIF** (}f/~- **Mb/s** P,[H 4 [6H 45,[67 **CIF** (.50!) %) H\$A6D ST . *C 3+c n%
 3C,- **CIF** :\$%0ai .. *C 8\$EAZC :d :c " 8\$T (cde **kb/s**) p=2 M\$H\$T Q# 3C,-) (. *C l&-) XRO2 ; \$- " 8\$T :c/- **Mb/s**
 .50!) %SE" 02 (p=f) }e• **kb/s** &C ,A6E- P,H\$-) #8 M\$*+C
 4505 G\$[6H } ; x! +5 ST +OwH\$a8 WIT) %45\$ka*C :. T,Z B\$A K2 \$- **DPCM** (**DCT** 3\$80F_&C) <T, 2 Q# &C **H.261** 0 WIT T
 BE[(C +5 ?)- (, T\$% ,8 3C,- **Intra** 50%.50! T **Inter** \$# **Intra** 50% (5 &C) x# h+0" S- H02) % ?)- (, T\$% ,8 .. *C 4 !
 : [W') [% " E[D M\$*+C 3\$8\$wL ,/C +5 ST \$wL +\$6AH &C \$2 50!) %45\$ka*C \$8 g#,7 %\$45 ,#& +5 \$ (\$W%]- (50!) %45\$ka*C g#,7
 . WIT 3 ,EuJR
 \$[XTO]- 4 (, [u : ,#0[12 ; %\$[! +\$AL\$[* B[#C . [WIT) [%45\$ka*C \$8 4505 G5,T T 3C,-) <C, %SJVJ* 3C 4505 +\$AL\$* Q# &C **H.261**
 . [! \$- **Cr** \$# **Cb** :y 3\$8 SH0aH ; %\$! H02) %ST . *\$8 ; VxED &C e*e %i0aN% ?0]- Q# . ! \$-) % ?0]- (?)- (, T\$% :(**GOB**)
 Q[# .50[!) % ; Ex62 (**Cr** & **Cb**) **Chrominance** ?0]- (5 ((y) e*e 5\$]-C \$- **Luminance** ?0]- \$2 • &C ?)- (, T\$% Q#
syntax :**H.261** 5+c H\$A[* .50!) % **GOB** B# Wm ; %\$! ,#012 Q# .50!) %)_0A% ,w* B# Wm +5 \$8 ?)- (, T\$% ; %\$! **GOB**
 G' M\$-H - **EOB** . %) i Q# (?0]- Q# &C (**DCTCOEFF**) **DCT** 3\$8Sk_0% ; %\$! ?0]- ,8 . WIT) % I #,]2 C+ 4 ! T . E- SA! +
 3\$[8?)- (, T\$% (**GOB** W' , *) T &C **GOB** Q# .. *C ?)- (, T\$% W' , * Q# (?0]- f 3\$84505 ; %\$! ?)- (, T\$% ,8 . ! \$-) %
) % G' M\$-H - \$8 **GOB** &C)_0A% 3C\$#G+ ' ST . *C ,#012 W' , * Q# ; %\$! ,#012 :. #SXH +5 .50!) % SAL\$* G' M\$-H - :**GOB** G'
 . W'

MPEG-1 3&C-E'>2C - [-=

pels (c f*c dz **pels for Cr & Cb at 30 fps**) **SIF** . [-5 \$- ? , @A% 0> # (Q# G5,T 4, ELr +OYW% S- **MPEG-1** 5+c H\$A*C
 .. *C 4 !) ZC, & :c/-**Mbps** P,H\$- (}-d*d*z **for y**
 .50!) %4505 v, ! :**MPEG-1** s*02 5+00% B#C l\$NH 00@H S%5C +5
 8>T< /3 J B4K DC4L< / 4.+` \$ D34B -B O'@3+9 -I - [-=
 3 [- g#,7 &C :) J< g#,7 &C . T,Z GC, <R &C 45\$ka*C , - 4) i ST . *C B#C **H.261** (**MPEG-1** BE-) *\$*C 3\$8 h(\$k2 &C) x#
 B#C .50! 45& B\$A K2 :3]- () J< g#,7 (5 ,8 3 (+ &C H02) % 3+\$R g#,7) JT +Ow- . (. *C 4 ! T \$< ST) WIT) %45\$ka*C `EH
 ,#0[12 : WIT) % T I JAK% 50% S* +5 C+ 0> # (Q# 3\$8 g#,7 **MPEG-1** .50!) % 4 E\$H **MPEG** +5 SAV- (5 B\$A K2 G00W]- ; ai
) [% **B** (**P** ,#012 B# Wm (**I** ,#012 Q# ; %\$! **GOP** ,8 Sx#Ow- H0!) % gEVn2 \$8 **GOP** S- \$8 g#,7 . **B** ,#012 (**p** ,#012 :I
 S[%5C +5 ,A[6E- h\$[E> R \$- 50!) % l\$NH l JAK% ,#(\$12 3C,- ST) &EJai .. *C 4 ! 4505 G\$6H • ; x! +5 3 W gEVn2 B#C . ! \$-
 . H0!) %4505 pEq02

[W\$a8 .50[!) [%45,[67 :(**JPEG** \$[- S-\$[6% 9(+ Q# &C 45\$ka*C \$-) ,#012 50L **1** \$*C , - **I** ,#012 Q# : (**I**) **Intra picture**
 . H0[!) [% E02 **DCT** 3\$8 Sk_0% (5 ,Eu) % +C, = **DCT** ; # <2 . @2 :cf*c f ?0]- (, T\$% Q# +5 e*e ?0]- ,8 :**JPEG** gA#OF_C
 . [# . [* - , k[" 3\$[8 S[k_0% &C **runlength** B# , [AX- \$[2 H0[!) [% O[2, % **zig-zag** h+0" S- (4 ! 4`EH0T \$8 Sk_0% B#C

:GOP , [8 +5 g#, [7 BE(C 3C, - :I , #012 50% . HD!) % T :bWea8 G5, T T 9(+ &C 45\$ka*C \$- , k'' , E7 , #5\$n% (runlength
 .50!) % 45\$ka*C :) 75\$12) -\$EA*5 G\$x% 5\$N# 3C, -

MPEG-1 &3 GOP &'>b'2 :aN0)

3C, [- (H.261 5+c HBA[*C 9(+ S[- SE<[!) . T, Z GC, <R QEWk2 &C 50% B# : (P) Unidirectional Predicted Pictures
 3\$[wL . [W) [%45\$ka[*C . [T, Z +C5, - Q# G5& BfaK2 3C, -) J< I \$# P , #012 &C ?) -(, T\$, 8 . W) % 45\$ka*C :3&\$* 45, 67
 . HD!) % runlength (4' EHDOT :DCT 3\$8 Sk_o% (4 ! ; # <2 :DCT &C 45\$ka*C \$- G5& BfaK2
) % +\$x- ?) -(, T\$, 8 3C, - C+ . T, Z GC, <R 9(+ 90H S* &C) x# 50% B# : (B) Bidirectionally predicted picture
 .5, -

) [J< P (I , #(\$12 &C 4 H(+ " ED . T, Z GC, <R :Interpolative GC, <R (4 H(+ t D . T, Z GC, <R :4 H(+ " ED . T, Z GC, <R
 \$- 3+\$R ?OJ- (, T\$% ST W) % 45\$ka*C 3]- , #012 h\$i) &C &C 4 H(+ t D . T, Z GC, <R . W) % 45\$ka*C (P , #(\$12 9(+ ; \%)
 B#, [AX- BE[- 3, [Eu s[*0A% &C :Interpolative GC, [-R .50[!) % 45& BfaK2 :3]- P \$# I , #(\$12 +5 4 ! ' <wW% ?OJ- B#, AX-
 .. *C 4 ! 45C5 G\$6H ~ ; x! +5 SAXR (5 . T, Z GC, <R 9(+ . W) % 45\$ka*C :3]- () J< , #(\$12 +5 4 ! ' <wW% 3\$XT0J-

8>T< /3 J B4K DC4L< / M!(?\$:c NO)

)-\$EA*5 3C,- . *C 3C S#\$D ZC(**GOP** Q#: HO! TC(:) J<= **GOP** &C 9)&C G(- WEO2)%**GOP** Q# +5 \$8 g#,7 %EJT ST \$NH' &C
) [%` [EH **fest rewind** Q[# .50! I\$NH P (I ,#(\$12 \$# (I ,#(\$12 \$XW G5, T TC(\$- HEO2)%**fast forward** Q#.) 75\$12
 .50! I\$NH I ,#(\$12 \$XW 5, T TC(\$- HEO2
Half-Pel J d3 'A J B4K M!(? \$ -- [-=
 .50[!) [%45& BE[aK2 **half-pel** . =5 \$- **MPEG-1** +5 . T,Z 3\$8+05,- ST . *C B#C **H.261** (**MPEG-1** BE- , F#5 ,)ALC
 ' [E=5 h+0" B#C S- . T,Z B#aK2 .pf@" 5 i 0&C HC S- " #C`7C \$- SH 50!)%I\$NH **pel** gEH " #C`7C \$- :;%T 3ONAVR Q#)WJ#
8\$EAZC half-pel G\$x%+5 \$8 SH0aH E_02 3C,-) J<= g#,7)-\$EH(+5 S- g8 &\$-)_(. 85)%C+ B#aK2 3\$wL " 8\$T G\$x% (. *C ,2
 .5+05 &\$EH :integer-pel . =5 \$- . T,Z B#aK2 . \$Z S- . <VH ,A6E- h\$<*\$@%S- 50L B#C ST . *C

MPEG-2 +,-./ D34B -B 3&C-E'>2C -a-=-

+5 G5, T T %E(C 9(+ .. *C 4 ! v,w%**CCTR601** O> #(G5, T T 3C,- **MPEG-2** 5+C H\$A*C : ! 4+! C S% n%+5 ST +OwH\$a8
 \$[-:(I 50[%] **DCT** gEnAV% ; # <2 &C 45\$ka*C \$- ?)- (,T\$%, 8 ST S-\$6% **GOP** +\$AL\$* \$- :. *C **MPEG-1** 9(+ S-\$6% :**MPEG-2**
 O> [(BE-) *\$*C ,)ALC : ,A6E- **spatial** . =5 &C SA! 4u .50!)% T (B 50%) S7, & (5 B#aK2 \$- \$# ((P 50%) S7, & Q# B#aK2
 :3&\$[* 45, [67 9&05, [D ST 50!)% O<* B#C .. *C **CCTR601** O> #(+5 **interlacing** &C 45\$ka*C :CIF/SIF (**CCTR601**
 5, [xJai S[T . [*C 4 ! v,w%:interlaced ,#(\$12 G5, T M,AW 3C,-) "\$L 3\$8 9(+ B#C,-\$W .50! 4 E+ED)XRO2 ; \$-+Ow-
 .50!)% . 7\$# [c] +5 ,A6E- h\$E>R . 85)%, EEj2 C+ **DCT** (. T,Z B#aK2 (Gc, <R
 . [*C) kJAK% 3\$8 **profile** 3C+05 5+C H\$A*C B#C . Wt M VB C+ I JAK%B! O.(&+ vOw* \$- O> #(3\$8 . %,7 HEO2)%**MPEG-2**
 Q[# .5+05 4+! [!C (mp@ml)) J["C pw[* +5) J["C **profile** S- \$XW . 07 : @. .5+04u)%+\$EALC +5 C+ 3, A6E- 3\$8 . EJ=\$= ST
 :**MPEG-1** \$- SV#n%+5 **MPEG-2** , F#5 gX%[%]*02 Q# .50!)% T -\$- pw* +5) J["C **profile** &C 45\$ka*C \$- **HDTV** M\$NFE*
 :) J["C %[#- .50! T :) J\$ax2 %#- Q# () J["C %#- Q# h+01- ST 5&\$*)% +5\$= C+ O> #(Q# ST . *C **scalability profile**
 4 ! T O> #(Q# . 85 50-X- C+ . EkET HEO2)% :50!)% 45(`7C) J["C %#- S- SxE\$FNB :) J\$ax2 %#- (Wt)% 5\$N#C C+ S#\$D . EkET
 . [EJ=\$= \$[-) #8 4 [H, Eu 3C,- I JAK% 3\$8 H\$- 3\$WKO \$-) #8 Sx<! 3(+ HEO2)% **scalability** 50% &C 45\$ka*C \$- :**MPEG-2** \$-
) H\$-EA[6D **MPEG2** s*02 ST) kJAK% pw* (I JAK% 3\$8 **profile** :f ; x! .50! ; nAW:I JAK% **spatial** 3\$8 . =5 \$- . 7\$#-5
 . Wt)% S'') L C+ HO!)%

MPEG-2 J.'(K 3&+9 O'@profile / f+V2 :e N0)

+, -./ 01'2 %3456 O&'g\$ O'@3&&-f'>2c 4.'2 -c-=

Intel's Indeo Oh+G+R#\$ -l -c-=

O> [#(3\$[8 ; [#7 0&c [Hc (4 [! [E_02 Intel Architecture Labs s*02 ST . *c 3+c 7c l, H 3; 0_OWk2 Q# Indeo O> #(
Microsoft's video for [W\$%) 2-0[1@%+5 3; 0_OWk2 B[#c. [85) [% " 8\$[T , [-c, - cz \$[2 ~ &c G+ 4 [6H 45, 67 M\$AEN#5
.. *c 4 ! 4 H\$NWu Apple's Quicktime (windows
G+ O> [#(:Indeo 3; 0_OWk2 . Wt) %45\$ka*c "Loos less" ("Lossy" 3&\$* 45, 67 QENk2 90H B# Wm &c :Indeo 3; 0_OWk2
G [! 4, [ELr S[- 3&\$[EH 4 6H 45, 67 05c5 B#C, -SW Wt) %45, 67 :video capture board ' #, & &c G' . 7\$#+5 \$- G\$% a8 +Ow-
:NTSC W\$% 35+c H\$A*c . %, 7 90H, 8 \$- :3+`E_ Q#5 \$# :VCR :O> #(BE+(5 Q# &c) A7\$#+5 ^0\$H' O> #(.5+c H G+ QV#5 3(+
.50!) %; # 2 M\$AEN#5 . %, 7 S- :Intel smart video Recorder board Q# W\$% video capture board ' #, & &c
:(WVEH) %c c \$XH') %a2) . *c , #& ; Zc, %; %\$! Indeo 9(+
.s*0A% bH+ +c n% Q# S- ; VxED . Z\$V% " 8\$T 3c, - :yuv 3+c5, - SHDah -c
, [Ej 2 \$8 g#, 7 \$# \$8 ; VxED BE- ST) 2\$ i) &c \$XW G5, T 4, ELr ' #, & &c 45c5 G5, T gT 3c, - :) H\$% 3&\$* 45, 67 (; VxED ,) ALc -d
(.50!) % I\$NHC 3+c5, - GOE*c EANDOT 9(+ &c g#, 7 ,) ALc G5, T 4`EANDOT \$- B#C) .. *c 45, T
. T %aJT 3\$8 U L\$! G5, T 45, 67 3c, - run-length G5, T T -}
.. E-) A\$/ 5c j2 S- h\$ i) &c &c h(\$ka% %i OaN% Q# " 8\$T 3c, - :variable - content G5, T T -•
OET, 2 Apple's Quicktime \$# Microsoft's AVI ; \% :5+c H\$A*c . %, 7 Q# ' &c :c " h\$ i) &c \$- 4 ! M\$AEN#5 O> #(; #8
" KD 3c, - .50! | #02 :G ! pf@12 \$# G ! " KD 3c, - H02) %4 ! OET, 2 ; #8 .50!) %4, ELr . K* QV#5 3(+ (50!) %

50[! TC(:(3&\$*45,67 h\$Ejai t xi) 9(+ 5c]2 Q# ' #, & & O> # ((50! S# N2 C '' (O> # (3\$8. aV= S- # \$; #7 :G5, T
.50! , VE% :4 ! 45, 67 M\$AEN#5 O> # (S- { 0-, %)]=(M\$AEN#5 3\$8 ; VxED '' #aH \$2
: &C W2+\$<i) #<+ST +5 , /o% ; %i S*
g#, 7 P, H (= (; VxED OVZ , - **playback** 0, NVD 0&C HC (< :+OV*(, D(, xE% . i , * (#
, Au+` - **playback** 3\$8 4, NVD +OV*(, D(, xE% . W! \$, 2)]E- & O> # (, #(\$12 ST 50!) % : i \$ **playback** 0, NVD G50- , AxmOT
. W! . #aZ C+ , A6E- g#, 7 3\$8 P, H (
. W!) %g8C, 7 C+ , A6E- 9&C5, D h+ = \$- G\$#, A6% 3C, - g#, 7 , A]#, * 3\$8 P, H) W]# : . *C **scalable** :Indeo 3; 0_0Wk2

Apple's Quicktime ---C--=

: **Apple**.5+(' G\$[j%+C S[- C+ ? , [@A% I\$[a2 O> # (: **end-user desktop** 3\$8 gAVE* 3C, - :gT %W# 8 \$- **Quicktime** MO1 @%
3+C [7C I , [H 3&\$[* 45, 67 3\$8 9(+ &C) x# 3+ C5, - G5, T 4 EHXOT .5, T 45\$ED 3+C 7C I , H+O& S- C+ G' t xi (3&\$* 45, 67 ; ai
. K[* QaT G(-) z **frame/sec** \$2 }dz*d•z : . 5 \$- O> # (BA! C5 G\$x% 9(+ B#.. *C 50RO% **Quicktime** +5 ST . *C
.. *C dzz \$2 d~ BE- W') % . * - 9(+ B# \$- ST 3&\$* 45, 67 3\$8 . <VH. W!) %g8C, 7 C+ +C 7C

Microsoft AVI -[-C--=

,) [L , [-.. [*C **desktop** 3(+ g[T %W# 8 (g[T . [-5 \$[- O> # (5\$N#C : **Microsoft AVI** &C , 8 : **Quicktime** W\$a8
; [Z 4C+ Q[# G00[W]- **AVI** .. *C 4 ! I #,]2 :C N%pw* G(; %Q# G00W]- **AVI** : . *C ; %i gAVE* &C) AaV= ST : **Quicktime**
. [-5 \$- SxP%\$FVB : **AVI** . 5 . 85 '' #aH C+ O> # (: **Super VGA** (**VGA** 3\$8+OAEH\$% 3(+ \$2 . *C 4 !) ZC, & : 3+C 7C I , H \$XW2
g[X% . E[" 01 L Q[# .. [*C 35\$[i G0[# #0J2 M\$WFE[* Q[# &C , AaT \$%Oai :50!) %SV\$#n% , A6E- \$# sL }dz 05(@%+5 **VCR**
.. *C G' **Scalability, AVI**
3&\$* 45, 67 3+C 7C I , H gA#+OF_C B# Wm ; %! **AVI** .5+ C5 G' B# , #& %#- +5 45\$KA*C 5+O%+C 7C . K* S-) FAV- : **AVI** . @2) #<+ST
. HC 4 ! SWEX- . -\$/ 3\$80> # (3C, - , F#5) L , - SxE\$Z +5 HC 4 ! SWEX- . T, Z 3C, - \$8 gA#+OF_C B# &C) L , -.. *C G' t xi (
) AEKET . 85) %<+ , =+EALC +5 3&\$* 45, 67 gA#+OF_C (. EKET :g#, 7 P, H :\$8 4, NVD 0&C HC * \$KAE 3C, - **dialog box** B# Wm **AVI**
) [% ; ai) 2(\$kA% 3\$8 3; 0_0Wk2 1 \$*C , - ST 350R(\$- .. *C SV\$#n% ; -\$= **Quick Time** . EKET \$- : #) % . *5 S- **AVI** \$- ST
. W\$V8 , F# x# SE<I) JEL , 8\$3 +5 : WWT

Intel's DVI -a-C--=

3+C [7C I , [H+O[w- 3, 2 # R 3\$85+C H\$A*C ST \$NH' &C .. *C 3+C 7C . K* 5+C H\$A*C Q# **Intel's Digital Video Interface**
v , [w%\$[NWC +5 9(+ B#C h\$E> R : (. *C 45C5 . *5 &C 35(Z \$2 5+C H\$A*C GCOM S- C+ 50L . Ea8C **DVI** () HC 4 ! 3&\$* 45\$ED
.. *C 4 6H
. W\$aH S] \$w% C+ G' h\$E> R (SEX2 C+ 5+C H\$A*C &C SKVH Q# WXC2) % W\$V8 W\$a=) i 5+C H\$A*C B#C S- ST 35C, 7C

i . '91j -[-

?O[J- M\$[V% 3C, [-) cf*cf ?OJ- BE(C 3C, - C+ . T, Z +C5, - ST EV#OW 3C S\$H, - :O> # (%\$45 Q# &C g#, 7 (5 BA! C5 2 , 7 \$- -c
: [EWT 45\$KA[*C **fread()** (**fopen()** | -C02 &C EHXOK- C+ g#, 7 (5 . W! C ED g#, 7 BE%(5 +5 (c~(c~) ((c~(z) ((z(c~) ((z(z)
+5 .. *C 4 % **A** . *OED +5 ST **EBLK()** | -\$2 35(+ (GCOM]- C+ **S-end** : **S-start** : **BK-location** : **BK-size** : **B,A** 3\$8, A%<+\$D
. -\$/ +Ow- C+ ONAVR 05(@% EHXO2) % . W! C ED) 1 K6% ?OJ- 3C, - C+ . T, Z +C5, - HXC2) % ST . *C)]-\$2 **EBLK** . #, EF- , YH
. #, EF- , YH +5 cf (-cf

d +(5,-) d S- c Q# g#,7 +5 \$8 ?0J- l\$a2 3C,- G+ . T,Z 3\$8+(5,- Sx#0& ENT ; fax2 #C SA! OH c . aV= +5 ST G+ 3C S%\$H,- -d
. [T,Z GC E% .5+(' . * - (: (mv-y) 3C,- 3, EF#5 (mv-x 3C,-) x# . *C &\$EH . T,Z 3\$8+(5,- %ET 3&\$* 4, ELr 3C,- 3]-
. ENT g*+ **quiver** 0 | - \$2 &C 45\$ka*C \$- G+
&C { 0[-, % ?0J- G5, T) >T \$- G+ l (5 g#,7 &C 4 ! 45& BfaK2 , #012 Sx#0& ENT ; fax2 G+ #CSA! OH d . aV= +5 ST) #C S%\$H,- - }
+ => \$wL , #012 :4 ! 45& BfaK2 l (5 g#,7 :) J''C g#,7 (5 . #+(' . * - : l (5 g#,7 +5 : (. T,Z +(5,- s*02 4 ! BEJ2) M(C g#,7
. T,Z GC E% . E85 " #aH G+) J''C l (5 g#,7 (4 ! 45& BfaK2 l (5 g#,7 BE- \$wL , #012 :) J''C g#,7 (5 BE- (; VxED 3\$wL ' Jw%
. ENT S<*\$@%G+ # R () J''C 3\$wL , #(\$12 &C **PSNR** +c n% BEW+a8 . E85 " #aH OJw#+5 **quiver** +0A*5 QaT \$- G+
:50!) % l #, j2 , #& h+01- **PSNR**



.. *C (m,n) ; VxED +5 \$wL +c n% **e(m,n)** G' +5 ST
90[H Sm . EV#OW **PSNR** , #5\$n% (\$wL , #(\$12 BE- ,) ALC : . T,Z GC E% :4 ! 45& BfaK2 , #012 5+0%+5 G+ 50L hC 8\$6% %ET
? . Vfm G' . Ji ? ENT) %4 8\$6%4 ! 45& BfaK2 , #012 +5 **artifact**
. ENB ; EJ@2 G+ AOJ- 4&C HC , EEj2 . ENB +C, 52 \$8G' \$- O*\$WA% 30NAVR 3\$84, NWD (, F#5 AOJ- 4&C HC = \$- G+ = \$2 # " K- -@
getprediction() l\$[W S[T [HOL) %C,7 G+ } . aV= +5 \$a! | -02 S%\$H,- B#C . EEOK- G+ B . *OED +5 **encode.m** %\$H,- --
3\$[wL , #012 +5 ?0J- , 8 3(+ G+ e*e **DCT** ; # 2. 85) % l\$NHC \$wL , #012 3(+ G+ **DCT** ; # 2 S%\$H,- B#C.. *C 4 ! 4 E%\$H
l,7 S- #) % . * - ST G+ BfaK2 3\$wL , #012]- (#+C5 SFH G+ ?0J- , 8 +5 **DCT** M(C %k_o% Wm . ENT M\$aiC :4 ! 45&) aK2
) [% S<*\$@%) J''C , #012 (4 ! 3&\$*8\$, #012 BE- **PSNR** . #+(' . * - G+ 4 ! 3&\$*8\$, #012 \$2 ENT S7\$QC 4 ! 45& BfaK2
? . Vfm +0A*5 sL G' %kE3(85 G\$6H ST E85 pEq02 :3+0A*5 sL , 8 5+0%+5 \$kw_50!) *+,- 4 ! T , #012 . EkET \$2 50!
(#+C4F- ' E-5 **comment** . aV= (5 , 8 3C,-)
&C G00[2) %) # . * - g6m U EK62 , YH &C) 6K- . #q+ %NEAH \$2 HO! 3+c XFH \$2 . *C l&- ST) #8 Sk_o% 5C j2 ; -C Z -f
+0[w- G+ **DCT** G5, [T T 9(+ B#C BEW+a8 . ENT C ED G+ (. *C l&- **30 dB** &C , A6E- **PSNR** ST 5, T 45\$ka*C `EH **PSNR** %-*\$@%
DCT M(C %k_o% Wm (ENT M\$aiC l (5) J''C g#,7 3\$XT0J- &C Q# , 8 3(+ G+ e*e **DCT** : #,- +\$x- l (5) J''C g#,7 3C,- gfnAV%
(5 B[HC +5 l&- 3\$[8 Sk_o% ; -C Z (ENT C ED : WB5) % " K- . #q+ %NEAH ST G+ &\$EH 5+0% 3\$8 Sk_o% ; -C Z 5C j2 . #+C5 SFH G+
, , [1%G+) H[Vx# 3\$8 . E- 5C j2 : ?0J- , 8 +5 **DCT** 3\$8 Sk_o% &C) H[Vx# 5C j2 G5, T T ST ENT 2,7 . ENT SV#\$n% G+ . \$Z
? . !C5 800L G\$Vx# . E- P, H \$- G+ 3, AX- . EkET 9(+ lC T :5, T 800L

(O&CSk&'A'D'91 1C 1/& In N.+l \$ -m+9) Z &CSk-a

.. *C 3+(, q G' pEq02 (hC 8\$6% S&+C . E85 ; #0@2 G+ 50L) #XH () H%E% , #(\$12 C\$AH %ET (**matlab** 3\$8 T -c
&C 45\$ka*C \$- :G5& BfaK2 3\$wL , #012]- (50!) % l\$NHC . T,Z GC , R BfaK2 C A-C :) .0a] %0> # (G5, T T gAVE* Q# +5 -d
, #0[12 3(+ **DCT** M\$[aiC S[- . <VH :\$wL , #012 3(+ **DCT** T &C 45\$ka*C ST . *C 2,7 B#C **1** *C , - B#C .50!) % T :**DCT**
.5+05 3, AaT . E- P, H S- 8\$EAZC : gfnAV%+0w-) J''C
U K[6%G+ G\$AK[*SD . @" ST E85 l\$NHC) 2\$<*\$@% : **matlab** %\$H,- Q# &C 45\$ka*C \$- EEO2) % # ? . *C pE@ " 2,7 B#C \$#'
. WT

(. ENT SV#\$n% G+ " #&\$&' . aV= +5 f (~ 3\$8 . aV= +5 4 % . * - C#\$AH)

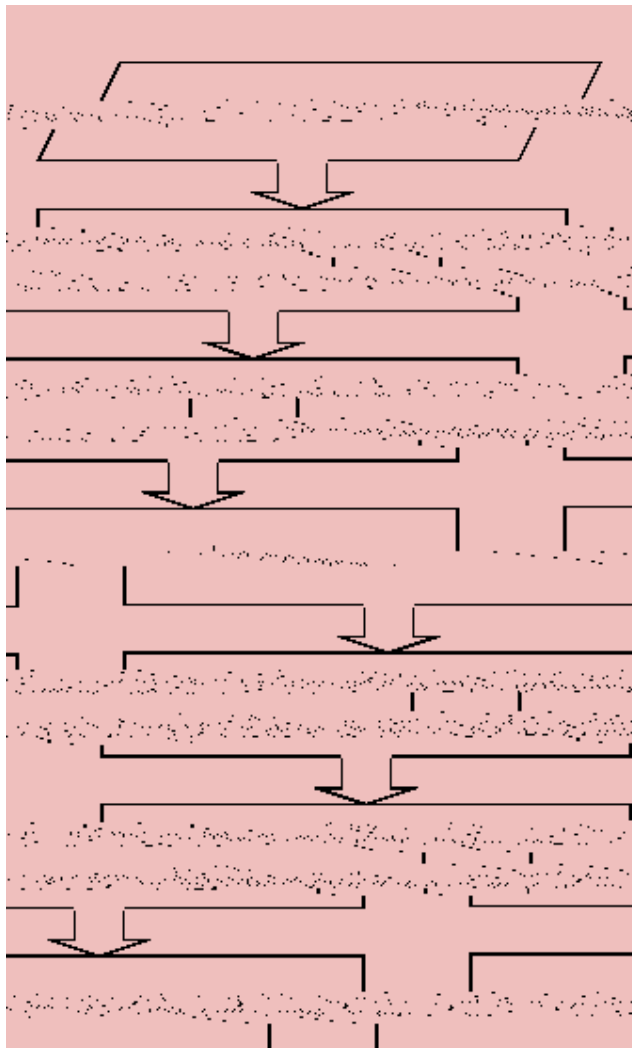
. #+(\$E- 9&C5,D . i,* (. EkEB +5 4 ! , 4Z DCT O#C,q 5C]2 (\$8A0J- 4&C Hc :\$84,NND 4&C Hc ,E/\$2 3C,-)<*\$W% ; E!@2 -=

o<C49 -c

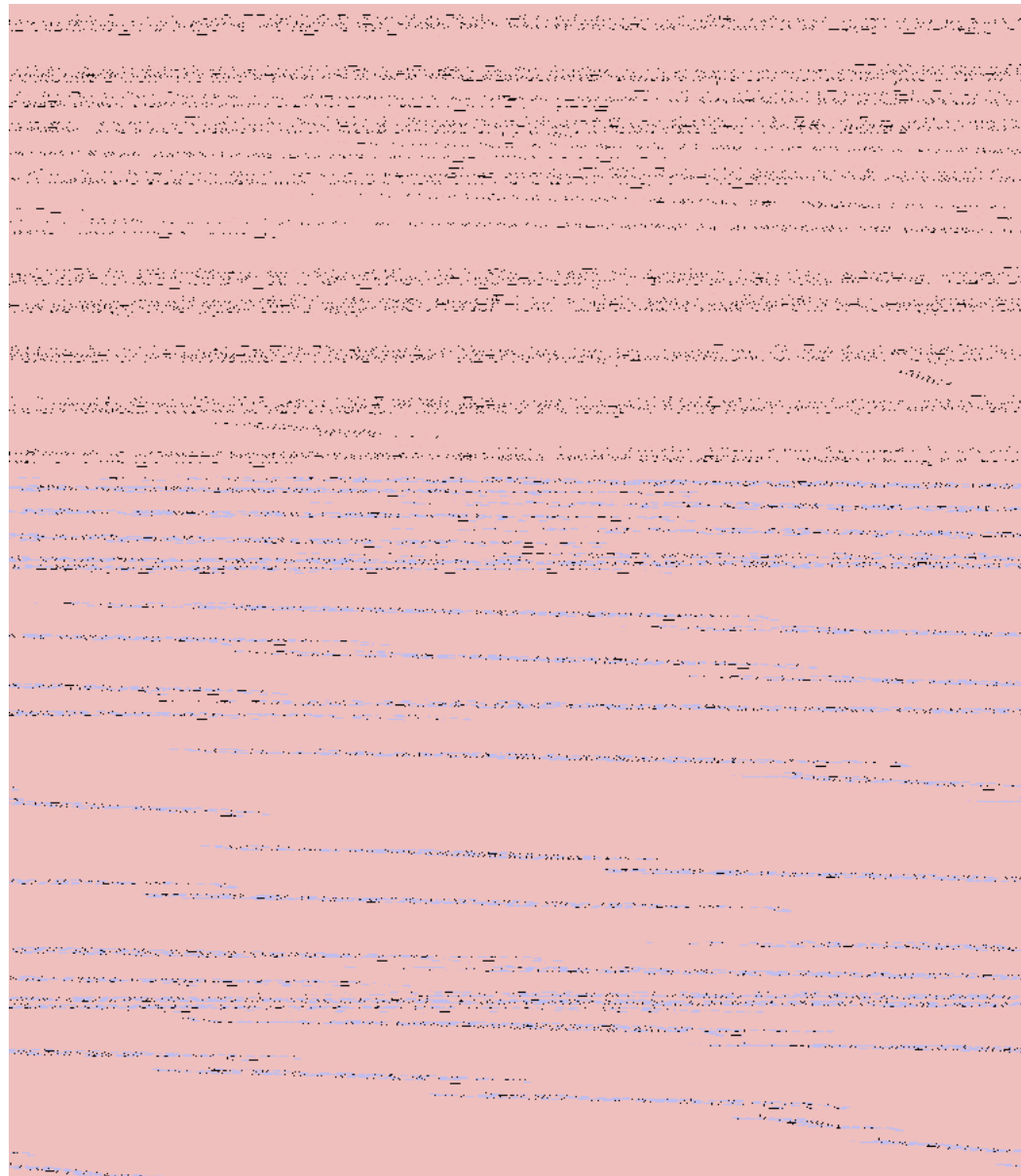


:W,'(p -e

: C8!(p



encode.m oA'\$ qC4k'.3 r+ "A



Appendix B

```
% function []=encode(img,n)
% img read from axvid workspace
% get anchor, track and error image from the axvid workspace
% img1: anchor frame
% img2: track frame
% img3: predicted frame
% error: img3-img2: prediction error
% n: number of coeffs to be kept in the error image
% Example: encode(10);

function []=encode(img1,img2,n)

% get prediction error and predicted image
[img3,imgErr]=getprediction(img1,img2);

% apply DCT to error frame
y=b_kproc(imgErr,[5,5],'co2');
% only keep n coefficients
yy=blkproc(y,[5,5],'mkc',n);
% get idct
yq=blkproc(yy,[5,5],'ic2');
% restore
yq=yq+img3;

% plot the original frame
subplot(2,1,1);
colormap(gray(256));
image(img2);
title('original frame (axvid)');
set(gca,'X',axc,'Y',acy);

% reconstruct the frame
subplot(2,1,2);
colormap(gray(256));
image(yq);
set(gca,'X',axc,'Y',acy);
% calculate PSNR
error= img2-yq;
FSNR=10*log10(255^2*352*240/(sum(sum(error.^2))));
temp=sprintf('original: %8.1f, %8.2f, %8.1f\n',FSNR,n);
title(temp);
trueSize
```