



7HPSRUDOUHGXQGDQF\  
6SHFWUDOUHGXQGDQF\  
A. Spatial Redundancy

7KLVPHWKRGRGXVHGWRUHPRYHWKHUHSWDWHG  
GDWD RI  
QHLJKERULQJSL[HOV

B. Temporal Redundancy

:KHQ ZH UHSUHVHQW WKH LPDJH GDWD LW PXVW  
EH LQ QHHG RI  
UHGXFQJWKHQHHHGELWVLQWKHLPDJH

C. Spectral Redundancy

,WUHSUHVHQWVWKHGLIIHUHQWFRORUSL[HOFRU  
UHODWLRQV

XVHG PHWKRGRGX SDUWLFXODU D  
)RXLUHUHODWHDG WUDQVIRUP x  
VXFK DV WKH 'LVFUHWH &RVLQH 7UDQVIRUP'&7  
LV ZLGHQ\  
XVHG 7KH '&7 LV VRPHWLPHV UHIHUHG WR DV  
'&7 LQ x

x  
)UDFWDO&RPSUHVVLRQ7KHPDLQLGHDRIW  
KLVPHWKRGLVWR x

GHFRPSRVH WKH LPDJH LQWR VHJPHQWV  
(DFK VHJPHQW ORRNHG LQ D OLEUDU\ RI  
IUDFWDOV ,W FRQWDLQV ,WHUDWHG  
)XQFWLRQ 6\WVHP,6 FRGHV ZKLFK DUH  
VHWV RI QXPEHUV

x %ORFNWUXQFDWLRQFRGH 7KLV ORVV\  
FRPSUHVVLRQ PHWKRGR  
FDQUHGXFHWKHLV]HRIGLJLWDOLPDJHVDORQJZ  
LWKDEHWWHU 4XDOLW SURJUHVVLYH RU  
ODHU SURJUHVVLYH +HUH WKH  
ELWVWUHDVPVHTXHQWLDQO\LPSURYHVWKHUH  
FRQVWUXFWHGLPDJH

5HVROXWLRQSURJUHVVLYH,QWKLVSURFHVVLRQ  
WLDQO\HQFRGHV D ORZHU LPDJH UHVROXWLRQ  
DIWHU WKDW LW HQFRGHV WKH  
YDULDEOHWRKLIKHUHVROXWLRQV  
&RPSRQHQW SURJUHVVLYH LQLWLDQO\JUD\  
SL[HOV DUH

HQFRGHGDIWHUWKDWFRORUSL[HOZLOOEHHQFRGH  
G

5HJLRQRILQWHUHVWFRGLQJ VRPH SDUWV RI WKH  
LPDJH DUH HQFRGHG ZLWK KLJKHU TXDOLW\ WKDQ  
RWKHUV 7KLV PD\ EH  
FRPELQHGZLWKVFDODELOLW\LQHHGRIHQFRGHV  
KHVHSDUWV ILUVWRWKHUVODWHU

Meta

information&RPSUHVVHGLPDJHPD\FRQWDLQVRPH  
LQIRUPDWLRQ DERXW WKDW LPDJH ZKLFK PD\ EH  
XVHG WR  
VHDFKRUERZVHLPDJHV6XFKLQIRUPDWLRQQLNH  
DXWKRURU

FRS\ULJKWHWF

x **Processing power** 7KH FRPSUHVVLRQ DOJRULWKPV  
QHHG

YDULRXV UDQJHVDPRXQWV RI SURFHVVLRQJ  
SRZHU WR HQFRGH DQG GHFRGH SURFHVVHV  
6RPH H[WUDRUGLQDU\ FRPSUHVVLRQ  
DOJRULWKPV DUH LQ QHHG RI JUHDWHU  
SURFHVVLRQJ SRZHU 7KH  
ZRUOGRIDFRPSUHVVLRQPHWKRGLVRIWHQHVW  
LPDWHGE\WKH 3HDN VLJQDOWRQLVH UDWLR  
3615 ,W PHDVXUHV WKH  
DPRXQWRIQLVHLQWURGXFHGYLDDORVV\FRPS  
UHVVLRQRIWKH  
LPDJHCRZHYHUWKHSDUWLFXODUMXGJPHQWRI  
WKHRQORRNHU DOVR LV YLHZHG DV DQ  
LPSRUWDQW PHDVXUH SHUKDSV EHLQJ

D. Advantages and Disadvantages of Image Compression

6LJH 5HGXFWRQ )LOH VLJH UHGXFWRQ UHVWV  
WKH VLQJOH PRVV  
VLJQLILFDQWEHQHILWRILPDJHFRPSUHVVLRQ6XEM  
HFWRQZKDWOLOH W\SH \RX DUH GHDOLQJ ZLWK \RX  
FDQ HQGXUH WR FRPSUHVV WKH LPDJH XQWLO LW  
LV LQ \RXU FKRVHQ VLJH 7KLV PHDQV WKH LPDJH  
WDNHV XS OHVV VSDFH RQ WKH KDUG GULYH DQG  
NHHSV WKH VDPH  
SK\VLFDQV]HJLWKRXX\RXHGLWVKHLPDJH  
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RI ILOH VLJH UHGXFWRQ ZRUNV SHUIHFWO\ IRU  
WKH ,QWHUQHWH SHUPLWLRQJ ZHEPDVWHUV WR  
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PXFK EDQGLZLWGRU VWRULQJ VSDFH

x **6ORZ 'HYLFHV** 6RPH RI WKH HOHFWRULF  
GHYLFHV VXFK DV  
FRPSXWHUVRUFDPHUDVPD\ORDGJURZWKXQFRPSUH  
VVHGLPDJH  
YHU\ORZO&'GULYHVIRUH[DPSOHLWFDQMXVWUH  
DGRQO\WKH GDWD DW D VSHFLILF UDWH DQG  
FDQQRW VKRZ ODUJH LPDJHV LQ UHDO WLPH \$OVR  
IRU VRPH ZHE KRWWV WKDW KDQGRYHU GDWD  
ORZO\ FRPSUHVVHG LPDJHV UHPDLQ QHFHVVDU\  
IRU D IXOO\ IXQFWLRQDO ZHEVLWH 2WKHU  
V\WHPV RI VWRUDJH PHGLXPV VXFK DV KDUG  
GULYHVZLOO DOVRKDYH VWUXJJOHG WR ORDGLQJ  
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ILOHVTXLFNQ\,PDJHFRPSUHVVLRQDOORZVIRUWKHT  
XLFNHUILOOLQJ RIGDWRQVORZHUHGHYLFHV

'HJUDGDWLRQ :KLOH \RX FRPSUHVV D PHGLFDO  
LPDJH DW  
WLPHV\RXZLOOJHWLPDJHGHJUDGDWLRQVLQFHQW  
HTXDOLW\RIWKH  
LPDJHGDVIDLOHG,IVDYLQJD\*,)RU31\*ILOHWHKGDWD  
UHPDLQ

HYHQWKRXJKWKHTXDOLW\RIWKHLPDJHGDVEHHQG  
HFOLQHG,\RX QHHG WR GHPRQVUDWH D  
KLJKUHVROXWLRQ LPDJH WR VRPHERG\ ODUJH RU  
VPDOO \RX ZLOO ILQG LPDJHV FRPSUHVVLRQ DV D  
GLVDGYDQWJDJH

'DWD/RVV:LWKVRPHFRPPRQILOHWASHVOLNH-  
3(\*ZKLOH  
DQLPDJHVKULQNVLQVLJHWKHFPSUHVVLQRZLOOU  
HPRYHVRPHRI WKH SKRWRV ILXUHV  
SHUPDQHQWO\ 7R FRPSUHVV WKHVHNLQGV RI  
LPDJHV ZH ZDQW WR HQVXUH WKDW ZH KDG DQ  
XQFRPSUHVVHG  
EDFNXSEHIRUHVWUWLQJ2UHOVHZHZLOOPLVWVK  
HKLJKTXDOLW\  
RIWKRULJLQDOXQFRPSUHVVHGLPDJHSHUPDQHQW  
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A.JPEG

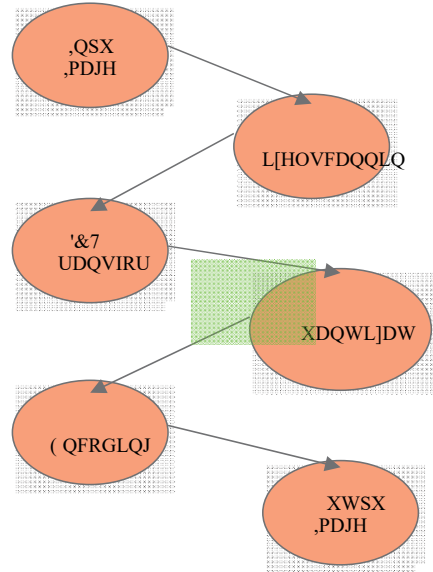
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(DFKEORFN LV FRQYHUWHG E\ WKH WZR  
GLPHQVLRQDO GLVWUHH FRVLQH  
WUDQVIRUPDWRQ '&7 WR WKH LQFLGHQFH GRPDLQ  
7KH  
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HGXFHWKHUHGXQGDQW  
GDWD7KHVHOHFWLRQRi'&7FRHILFLHQWVWVSHUIR  
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VHJPHQWDLRQPHWKRGLQFUHDVHVWHER[HVIU  
RPDSUWLFXODUVHW  
RISL[HOVZKLFKKHOSVWRILQGKWHPLQLPXPXPERXQG  
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SUHVHQWV LQ LPDJHV 7KLV DOJRULWKP  
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GDOWHUQDWLYH E\ ZD\ RI GHWHFWLRQ UDWI RI  
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5HJLRQEDVHGSSURDFKHV  
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)X]]DSSURDFKHV  
IHUUHQHWZRUN

]LJ]DJJHG ZD\ IURP ORZ WR KLJK IUHTXHQFLHV DQG  
RQO\ PLGGOH DQG ORZ IUHTXHQFLHV DUH



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B.JPEG 2000

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QRLVHLQWKHLPDJHV

SDWLHQW VLWXDWRQV DUH PRQLWRUH E\ XVLRQ  
VHQVURV OLNH (&\*

3K\VLVFDVHGSSURDFKHV  
+\EULGWHFQQLTXHV

7KH DXWKRUV LQ >@ SUHVHQWHG D IUDPHZRUN  
IRU VLPXODWRQ WHVWEHG WR LPSOHPHQW WKH  
MRLQWO\ H[SORLW PXOWLSOH LPDJH FRPSUHVVLQR  
WHFKQLTXHV )RU WKDW WKH\ KDYH XVHG 201H7  
VLPXODWRU &ROHFWLRQ 7UHH 3URWRFRQ&73 LV  
D SURWRFRQ IRU ZLUHOHV VHQVURV QHWZRUN DV  
LV SURYLGHV 3EHVV HIRUW DQ\FDVW GDWDJUDP  
FRPPXQLFDWRQ WRRQHRI  
WKHFROHFWLRQRXWHV LQ D  
QHWZRUN 7KHWRW\SHVRIHVVDJHVXVHGLQ&73D  
UHURXWLQJ PHVVDJHV DQG GDWD PHVVDJHV '6& ±  
'LVWULEXWHG 6RXUFH  
&RGLQJPHWKRGLVDQHILFLHQWFRPSUHVVLQRWHF  
KQLTXH,WDOVR FDQ WUDQVIHU FRPSXDWLRQDO  
FRPSOH[LW\ IURP HQFRGHU WR

GHFRGH,WWKLVZRUNLPDJHVVHQRVUQHWZRUNZDV  
RQVLGHUHGWR '6& ,Q WKLVPHWKRG WKH FRGLQJ  
LVUHODWHG WR FRPSUHVVLRQRI GDWD ZKLFK LV  
IURP VHYHUDO FRUUDHODWHG VRXUFHV ZKLFK  
FDQQRW  
FRPPXQLFDWHZLWKHDFKRWKHU'XULQJWKHYLGHR  
FRGLQJ'6& DOJRULWKP VKRZHG DQ HILFLHQW  
UHVXOW )RU DQ LPDJH FRGLQJ LW JDYH D EHWWHU  
FRPSUHVVLRQ UHVXOW WKDQ FRQWHPSRUDU\  
VLQJOH VRXUFHLPDJHFRGLQJ>@  
FODVVLILFDWLRQPHWKRGZKLFKLVEDVHGRQWKHG  
DWDFRPSUHVVLRQ PHWKRG +HUH WZR NLQGV RI  
FRPSUHVVURUV ZHUH XVHG IRU HILFLHQW  
FRPSUHVVLRQ PHWKRG 7KH\ DUH =,3 WKH JHQHUDO  
SXUSRVHFRPSUHVVURU-  
3(\*FRPSUHVVURU7KLVZRUNLVDSO\ WR WKH  
6KDQQRQ LQIRUPDWLRQ WKHRU\ DQG .ROPRJRURY  
FRPSOH[LW\ &RPSUHVVLRQ PHWKRG DOVR XVHG LQ  
WHOHPHGLFLQH DSSOLFDWLRQV /D\HUHG 6HW  
3DUWLWLRQLQJ LQ KLHUFKLFDO 7UHHV  
/63,+7DOJRULWKPLWGLYLGHVWKHHQFRGHGELWVL  
QWRDQXPEHU RI OD\HUV IRU WUDQVPLVVLRQ ,W  
UHTXLUHV PRUH UHVRXUFHV DQG LW OHDGV WR  
RYHUKHDG LQ PDQDJLQJ \$W WKH UHFHLYLQJ HQG  
DOVR  
GLIIHUHQWUHVROXWLRQDQG615DUHUHTXLUHG>@  
3RZHU FRQVXPSWLRQ LV RQH RI WKH GLIILFXOW  
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SRZHU FRQVXPSWLRQ D QHZ PHWKRG KDV EHHQ  
LQWURGXFHG ,W H[SODLQV KRZ ZH FDQ  
LPSOHPHQWVKHFRPSUHVVLRQPHWKRGDQ\$1(76RL  
WXVHVD SURWRURO FDOOHG /HPSOH ±=LY ± :HOFK=/:  
FRPSUHVVLRQ  
DOJRULWKPZDVLPSOHPHQWHG,WLVVYHU\HIIHFWLY  
HPHWKRGIRU WKH ILOHV ZKLFK FRQWDLQLQJ  
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VWULQJ WUDQVODWLRQ WDEOH ZKLFK PDSV IL[HG  
OHQJWK FRGLQJ EA XVLQJ ELWV 7KLV PHWKRG XVHG  
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7KHUH DUH VHYHUDO PHWKRGV DUH DYDLODEOH  
LQ LPDJH FRPSUHVVLRQ SURFHVVHV ,Q WKLW  
VXUYH\ SDSHU VRPH RI WKH PHWKRGVDQG LWV  
SURFHVVVKDYH EHHQ DQDO\]HG 7KH DOJRULWKPV  
XVHG IRU FRPSUHVVLRQ WHFKQLTXHV DOVR  
GHVFULSWLYHO\ %\  
DQDO\]LQJWKHVPHWKRGVFRPELQLQJWZRWHFKQL  
TXHVRUK\EULG PHWKRGORR\ KDV JLYHQ VRPH  
JUHDWHUSHUIRUPDQFH WKDQ RWKHU DOJRULWKPV  
6LQFH WKH PHGLFD LPDJH QHHGV WR FRPSUHVV  
DQG GHFRPSUHVV VR ERWK ORVV\ DQG ORVVOHVV  
WHFKQLTXHV ZHUH  
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(Q'DQ 6XQD :XDQMLQJ 6KHQD DQG +DLSHQJ &KHQD \$S /RZ  
(QHU\ ,PDJH &RPSUHVVLRQ DQG 7UDQVPLVVLRQ LQ  
:LUHOHVV 0XOWLPHGLD 6HQVURU 1HWZRUNV'(OVHYLHU  
6KDQ%DRWDQJD6KHQ7LQJ]KLEDQG:DQJ:HLMLDQJE'\$5HPDLQG  
HU6HW 1HDU/RVVOHVV &RPSUHVVLRQ 0HWKRG IRU %D\HU  
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,PDJH',QWHUQDWLRQDO&RQIHUHQFHQR6ROLG6WDWH'HYLF  
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\$0XUXJDQDQKDPDDQG56':DKLGD%DQXE'\$GDSWLYH)UDFWD  
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&RPSUHVVLRQ XVLQJ 362' *Procedia Computer Science* 2 338–344,  
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+DQDD =DLQ(OGLQ 0RVWDID \$ (OKRVVHLQL DQG +HVKD \$ \$OL  
,3,PDJH  
FRPSUHVVLRQ DOJRULWKPV LQ ZLUHOHVV PXOWLPHGLD  
VHQVURU QHWZRUNV \$ VXUYH\ *Ain Shams Engineering Journal* 6,  
481–4.  
6RQDO 'LQHVK .XPDU \$S 6WXG\ RI 9DULRXV ,PDJH  
&RPSUHVVLRQ 7HFKQLTXHV 'IEE  
+XDPLQJ:XDQ\$OKXVHLQ\$S\$ERX]JLQ'(QHU\)(IBFLHQW'LVWU  
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3(\*,PDJH&RPSUHVVLRQLQ0XOWLKR:LUHOHVV1HWZRUNV'  
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VFKHPHV IRU UREXVW LPDJHFRPPXQLFDWLRQ'  
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SURFHVVLRQV\VVHPIRUWHOHPHGLFLQHDSOLFQDWRQV'IEE  
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&RPSUHVVLRQ DQD7UDQVPLVVLRQ 8VLQJ:DYHOHW  
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*Biology 27th Annual Conference Shanghai, China, September 1-4,*  
SDJH  
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PXOWLKRSLUHOHVV  
QHWZRUNV' *Computer Communications*±(OVHYLHU  
,PSOHPHQDWLRQ RI 'DWD &RPSUHVVLRQ 7HFKQLTXHV  
LQ 0RELOH \$G KRF 1HWZRUNV' *International Journal of  
Computer Applications* ±  
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&RPSUHVVLRQ 7HFKQLTXH 8VLQJ &RPELQDWLRQ  
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7HFKQROR\ &RPELQDWLRQ +H LV FXUUHQW\ ZRUNLQJ DV DQ  
\$VVLVWDQW 3URIHVVURU LQ WKH 'HSDUWPHQW RI  
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'HDUV RI WHDFKLQJ H[SHULHQFH +H KDV SUHVHQWHG  
SDSHUV LQ YDULRXV QDWLRQDO DQG LQWHUQDWLRQDO  
MRXUQDOV +LV UHVFHLYLQJ LQWHUHVVV 0XOWLFDVWLQJ  
1HWZRUNV .H\ 0DQDJHPHQW DQG 1HWZRUN  
6HF\XUL\

0LVV 6 \*HHWKD KROGV D %7HFK GHJUHH LQ ,QIRUPDWLRQ  
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LQ 1DWLRQDO OHYHO &RQIHUHQFHV +HU 5HVHDFK  
LQWHUHVWV LQFOXGH LPDJH  
FRPSUHVVLRQ\$GKRF1HWZRUNVDQG6HFXULW\

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&KHQQDL  
DQG0(GHJUHHLQ&RPSXWHU6FLHQFHDQG(QJLQHULQJJIURP.65  
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