

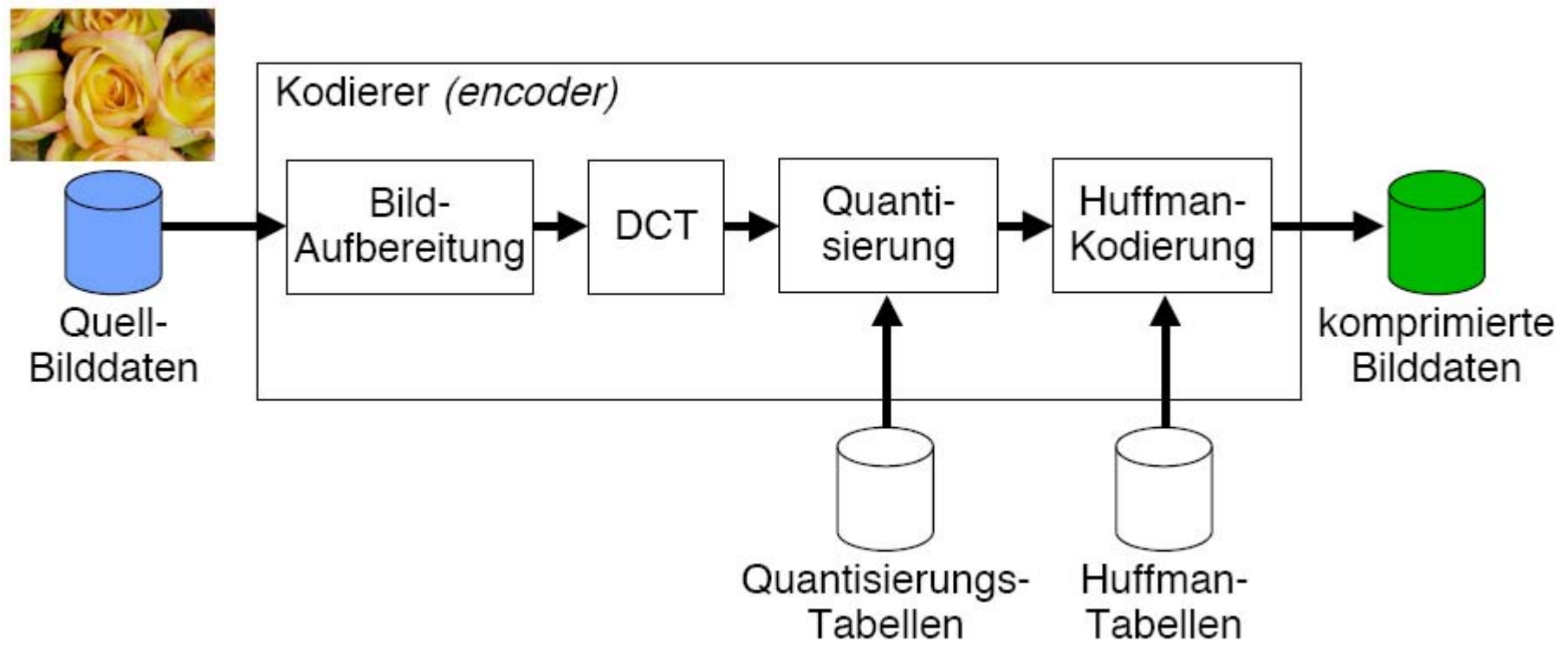
Übung zur Vorlesung
Digitale Medien

Ludwig-Maximilians-Universität München
Wintersemester 2010/2011

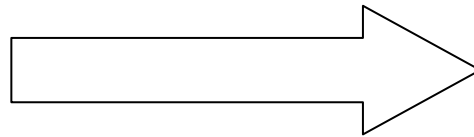
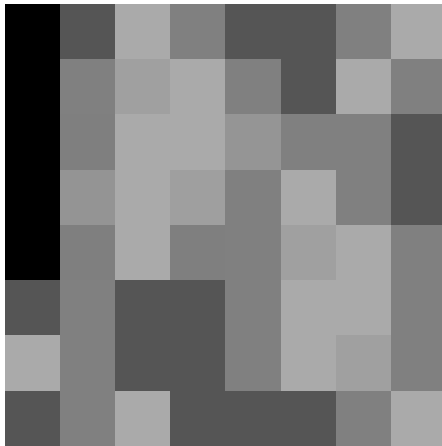
8. Übungsblatt

JPEG Komprimierung

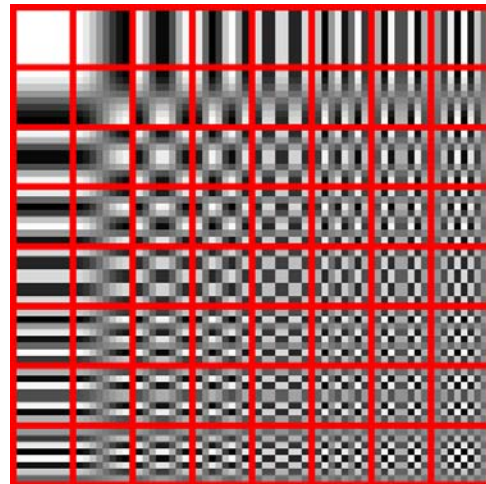
JPEG-Verfahren



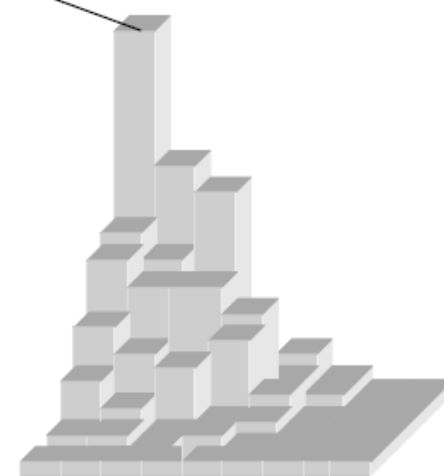
Konvertierung von 8x8 Bildblöcken in den Frequenzraum



Diskrete
Cosinus
Transformation



DC-Koeffizient $F(0,0)$




http://pi4.informatik.uni-mannheim.de/pi4.data/content/animations/dct_2d/index.html

2-Dim COSINE Transformation Visualizer

Program Solution ?


Image space

Target image




191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191
 191 191 191 191 191 191 191 191

Your approximation



128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128
 128 128 128 128 128 128 128 128

Difference



63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63
 63 63 63 63 63 63 63 63

Frequency space

Table of coefficients U00-U07 [-2048,2048]

U00 0	U01 0	U02 0	U03 0	U04 0	U05 0	U06 0	U07 0
U10 0	U11 0	U12 0	U13 0	U14 0	U15 0	U16 0	U17 0
U20 0	U21 0	U22 0	U23 0	U24 0	U25 0	U26 0	U27 0
U30 0	U31 0	U32 0	U33 0	U34 0	U35 0	U36 0	U37 0
U40 0	U41 0	U42 0	U43 0	U44 0	U45 0	U46 0	U47 0
U50 0	U51 0	U52 0	U53 0	U54 0	U55 0	U56 0	U57 0
U60 0	U61 0	U62 0	U63 0	U64 0	U65 0	U66 0	U67 0
U70 0	U71 0	U72 0	U73 0	U74 0	U75 0	U76 0	U77 0

Reset coefficients

Try to solve in order

Example 1 (very easy) Customize input

Select quantization table

Do not quantize Show quantization table

Java Applet Window

<http://www.sfu.ca/~cjenning/toybox/hjpeg/>

JPEG and Hierarchical JPEG Demo

1. Choose a sample image:
 ▼

2. Choose a chroma subsampling format:
 None (4:4:4) Quartered (4:2:0)

3. Choose a quality setting or...
 Low High

...create custom quantization tables:



Luminance

Chrominance



16	12	14	14	18	24	49	72
11	12	13	17	22	35	64	92
10	14	16	22	37	55	78	95
16	19	24	29	56	64	87	98
24	26	40	51	68	81	103	112
40	58	57	87	109	104	121	100
61	55	56	62	77	92	101	99

Done



RGB / RGB-Output



Y / Y-Output

Cb / Cb-Output

Cr / Cr-Output

The first row of monitors shows the input image. The second row shows: ▼

Zoom Level

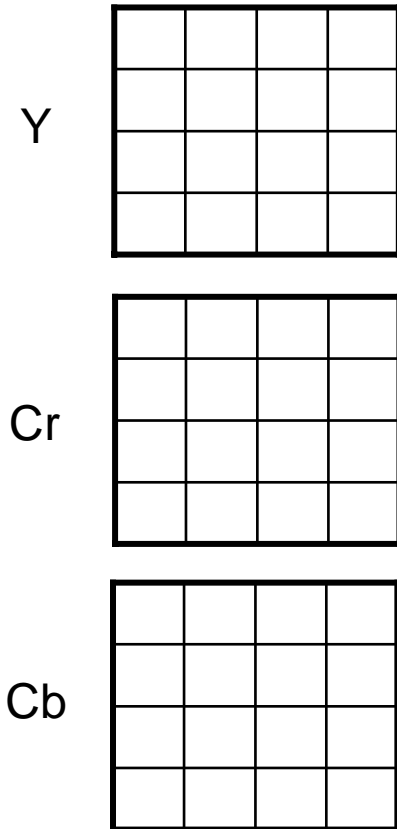
x	y	
0	0	
R	G	B
122	117	89
Y	Cb	Cr
115	115	132

Data Values from Current 8 x 8 Data Block

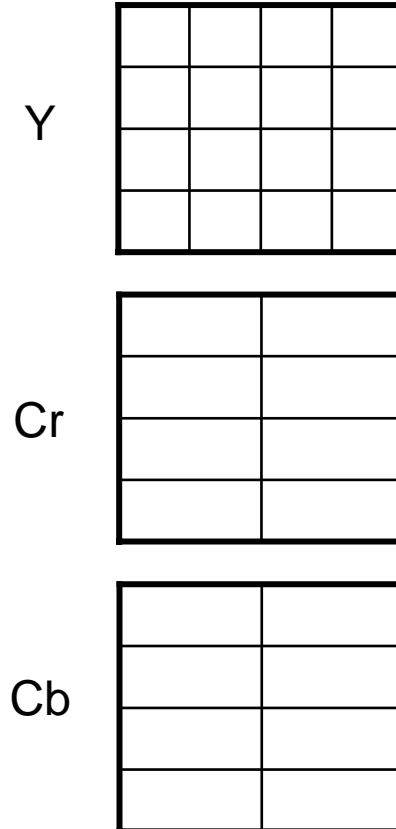
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132

- Beide Chroma-Kanäle immer gleich abgetastet
- x: Anzahl der Luma-Samples, Vielfaches der NTSC-Abtastfrequenz
3.570 MHz; in der Regel „4“
- y: Anzahl der Cr/Cb-Chroma-Samples, horizontal
- z: Falls z=y: kein vertikales Subsampling der Chroma-Kanäle
Falls z=0: vertikales Chroma-Subsampling 2:1

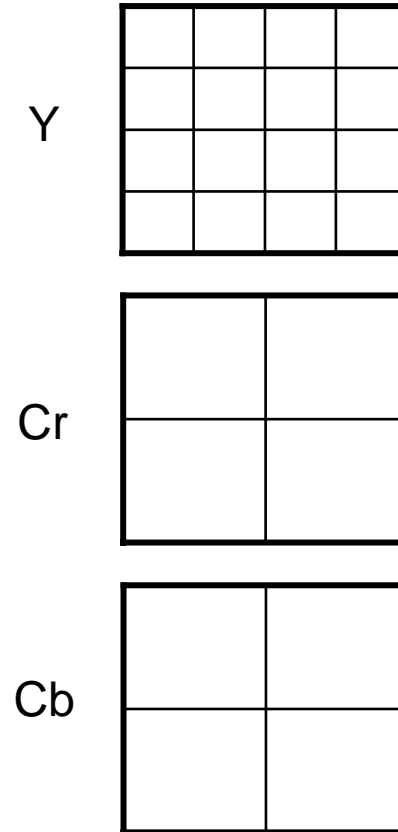
"4:4:4"



"4:2:2"



"4:2:0"



<http://www.sfu.ca/~cjenning/toybox/hjpeg/>

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132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132
132	132	132	132	132	132	132	132

Beispieldateien:

`/home/proj/mi_dm/img/newyork.jpg`

`/home/proj/mi_dm/img/winter.jpg`

oder `material8.zip`

