

PG-2/13 VIS. COMPUTING IMAGING

object

DEDUCT. Synth geom. Eulerides
Anal geom. Descartes
Formal geom. Minkowski

INDUCT. 1945 Pölya
38 DRAW!
Symbolic + Visual Clio

QUALITY MEASURES
(x, y, z) PRECISION $\epsilon \rightarrow 0$
(x, y, z, t) KINEMATIC
(r, g, b) RADIOMETRIC
VR BELIEVABILITY (THINKING OF EMOTIONS, FACIAL EXPRESSIONS...)

TRANSMISSION TIME V
PROBLEM, e.g. STRIPES

MODEL DATABASE [20]
IMAGE DATABASE

CV: .TXT, .VEHL, .ASC, .X3D, .SVG, .RAW, .TIFF, .JPG, .PNG

MEASURE
- PLOŠKA
- VEČERA
- UHL
- OBŠAH 2D ROVNICE
- 3D OBJEKT
- FAK. DŮL.

MEASURE

LINEAR ZLOŽITOST, napr. $\{r_1, r_2, \dots, r_N\}, r_i \in \mathbb{R}, i=1, 2, \dots, N$
 $O(N \log N)$ SORT, napr. SET $\{r_1, \dots, r_N\}$
 $O(N^2)$ KVADRATICKÁ
 $O(N^3)$ KUBICKÁ
 NP
 Euler

OBSERVED COMPLEXITY OF GIVEN SOFTWARE

N/1	10	100	...	1000
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BRUCE FORCE !! PŘESOR PŘESOR
 EFEKTIVNĚ ALG. BUBBLE SORT $O(N^2)$
 OPTIMÁLNĚ ALG. DEC (po druhém)

$O(N^M)$ STRIPING
 $\log N!$ MODEL UP
 DECISION TREE

Architektúra MM systému, formáty, miery kvality, funkčnosť. Viac: kap. 20 in Ružický et al. // Tabuľa PG2-2-LS24 @ M-120, 26. februára.

PG2-3/13

VISION

4 MEANING
3
2
1 LOW LEVEL CORNERS, EDGES, ORIENTATION...

2 PROMINENT PROBLEMS

MINSKY: CV CAST

VISUAL HIERARCHY:
 1. SOLID 2. SHAPE 3. SIZE 4. SHAPE 5. COLOR 6. ...
 2-C 4-M 6-M
 B-t k-y

SEARCH₁ → 1. THIN FG
 SEARCH₂ → ALL FG TAGS → EDGES

IF (MEANING) NEUTRALISE
 ELSE NECH ZAMAZ, PESTAKA...

GENERALISE: 2 THRESHOLDS, MSER

INITIALLY STABLE
 EXTERNAL BECOMING

ALG STRAŽIGE: PRUNE & SEARCH, ITERATION, DIVERGENCE, COHERENCE

Image Proc., Comp. Vision (Segment., Correspond.), Alg. Strategies, typ úlohy na MID: segmentujte. Kap. 1, 8. // Tabuľa PG2-3-LS24 @ M-120, 4. marca.

PG-2-4/13

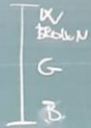
TEXTURING



GRAY RGB
8 8 4

2/2

WHAT COLOR?
TEXTURE?



~ 400 000 ↔ TRUECOLOR ²⁴
RAINBOW

EXPRESSIVE RENDERING



1. SCHEMATICS
2. LESS DETAILS
3. FACTORIZATION

[GOTTRICH]

X ↓

VRML/X3D

LEVEL OF DETAIL (LOD)

SPHERE (CENTER, RADIUS)

INDEXED FACE SET (MESH)



• NOTHING

- RENAISSANCE
1. LAWS OF PERSPECTIVE
 2. SHORTER (GEOM.)
 3. LESS COLOR DETAILS
 3. BLUE ATMOSPHERE, C) PERS.

TRIANGLE COUNT

2

0

GLOBE

D&C

X 1. PROJECTED TEXTURE ⊖ VIEW DEPENDENT

X 2. CUBE MAPPING $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix} =$

3. SPHERIC - " -

X 4. CYLINDRIC - " -

PLANE TO PLANE

|| → X

Texturing, Level-of-details, Expressive Rendering, Laws of Perspective. Book: Szirmay-Kalos, Hughes et al.. // Tabuľa PG2-4-LS24 @ M-120, 11. marca.

PG-2/5

RENDERING SPECTRUM

MBR - MODEL BASED

IBR - IMAGE BASED

TRIANGLE WITH DATA (COLOR, NORMAL, TANGENT...)

TRIANGLE STRIPS/FANS



HABOKEN TREE 2D

IMAGINE 3D...

STANDARD MODELING METHODS

SPECIAL

- PHYSICALLY-BASED

- MAPS, NYU TORCH

- FRACTALS, e.g. BOTANICALLY PERFECT TREES

- CELLULAR AUTOMATA

- GRAPHICAL

GRAPHICS SYSTEM ⇒ GAME ENGINE

PERLIN NOISE

SUCCESS STORY

1D: {0,1,2,3,4,5,6} (tot, tot) mod 7 = 6, 7-3=4

TEXTURES

CUBE MAPPING 6 / BEAMER

SPHERIC - " -

PARAMETRIC

STEREOGRAPHIC

Rendering Spectrum, standard and special modeling, typ úlohy na MID: texturing. Kap. 15. // Tabuľa PG2-5-LS24 @ M-120, 18. marca.

PG2-6

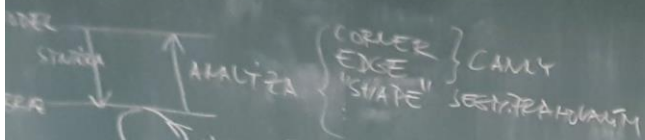
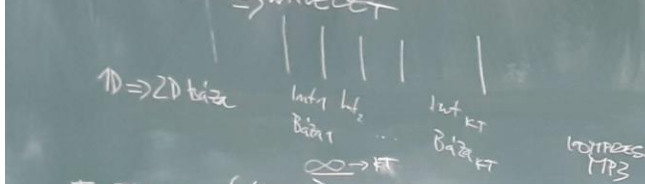


IMAGE PROCESSING
 DUALITY, FOURIER IS/FEC/JTC/SC29
 eg. DCT pre JPG (JOINT PHOTOGRAPHER'S EXPERT GROUP)



FOURIER $f(t) = \sum a_n \sin t + b_n \cos t$

KOMPRESIA BEZ STRAT $\epsilon = 0$ napr. PLE
 STRATAVA, napr. JPG $\epsilon > 0$, "KOMPRESIA FOURIER
 FRAKTALA, .FIF

2 TOP CV PROBLEMS
 → SEGMENTÁCIA
 → KÓRRESPONDENCIA

PROBLÉM: CHYBA SELEKČIA



1/5c	1/4/1/3c
1/3	1/4 1/4
1/5c	1/4 1/5c

$\sum w_{ij} = 1$ ZACHOVÁME CELKOVÝ JAS

PROBLÉM₂: SUM, maska, SALT & PEPPER
 "TOPELIE VOŠKY" 10%, 20%, ... BLUR, SHARPEN
 - ZLEPŠENIE, HISTOGRAM
 - FILTRÁCIA, napr. LOW-PASS, HIGH-PAS SK: DOKONČENIE PUSTY
 FORMA → FILTER