

Advanced 2D computer graphics – NPGR007

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Content and form



- ◆ **advanced parts of 2D computer graphics**
 - main topics: image transform, image compression
 - loosely follows the Computer graphics I course
- ◆ **2/1 Z, Zk**
 - 90 min lecture every week, 90 min lab every other week
 - exercises in C#

Brief lecture plan



- **raster image transforms (2-3)**
 - alpha-composition and blending („ α -blending”), geometric raster image transforms, „warping” and „morphing”
- **spatial data structures (2-3)**
 - effective 2D set representations, fast geometric lookup, nearest-neighbours lookup, BSP tree, quadtree, KD-tree, etc., applications in GIS

Brief lecture plan II



- **image compression (3-4)**
 - image compression basics, lossy methods (orthogonal transforms, DCT, wavelets, fractal compression), JPEG standard
- **video compression (~2)**
 - motion compensation, H. 261 recommendation, standards: MPEG-1, MPEG-2, CD-I, H. 264 AVC recommendation

Sources



- ◆ **J. Foley, A. van Dam, S. Feiner, J. Hughes:** *Computer Graphics, Principles and Practice*, 2nd edition, Addison-Wesley, 1990
- ◆ **J. Gomes et al.:** *Warping and Morphing of Graphical Objects*, SIGGRAPH'95 Course Notes
- ◆ **H. Samet:** *The Design and Analysis of Spatial Data Structures*, Addison-Wesley, 1989

Sources



- ◆ **Hang Hseuh-Ming: *Handbook of Visual Communications*, Academic Press, 1995**
- ◆ **V. Bhaskaran, K. Konstantinides: *Image and Video Compression Standards*, Kluwer Academic Publishers, 1995**
- ◆ **A. Jain: *Image Data Compression: A Review*, Proceedings of IEEE, Vol.69, #3, March 1981**
- ◆ **G. Wallace: *The JPEG Still Picture Compression Standard*, Comm. ACM, Vol.34, #4, April 1991**



Prerequisites

- **any basic programming course (C#, C++, Java)**
- **elementary knowledge of the C# language**
 - C# is used in the labs
- **elementary calculus and linear algebra**
- **Computer graphics I (NPGR003)**



Other sources

- current info:
 - <http://cgg.mff.cuni.cz/prednasky.en.php>
 - <http://cgg.mff.cuni.cz/~pepca/>
- SVN repository for the labs:
 - <svn://cgg.mff.cuni.cz/grcis/trunk>