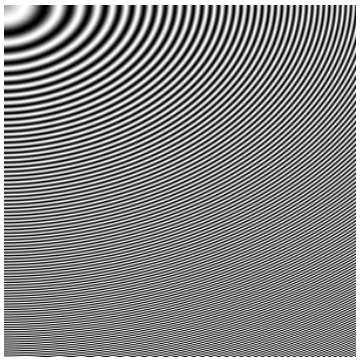
EE4704 Image Processing and Analysis

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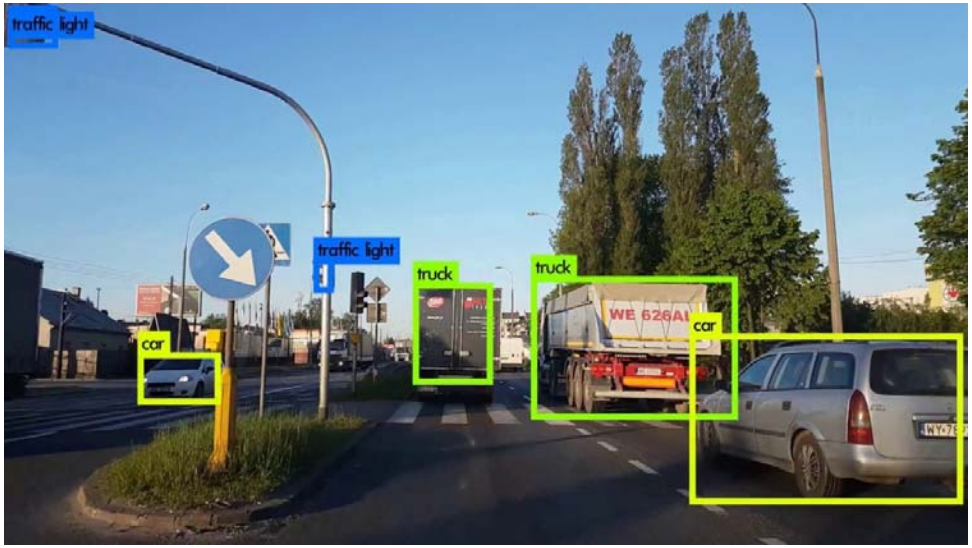

What this module is about

The use of computers to process and analyse digital images has diverse applications in many fields, e.g., industry, science, and defence. This module introduces the principles, techniques and algorithms, and will be of interest to those who wish to proceed to areas such as intelligent systems, multimedia signal processing, computer vision and digital entertainment.

Topics

- Introduction
- Digital imaging fundamentals
- Image acquisition
- 2D Fourier transform
- Noise reduction
- Enhancement of images
- Edge detection
- Segmentation
- Shape representation and description
- Morphological processing
- Image compression

Assessment

- Assignment : 10%
- Project : 15%
- Final exam: 75%

Note:

- Knowledge of MATLAB programming is required.

Reference Books

- RC Gonzalez, RE Woods, *Digital Image Processing, 4th Edition*, 2018
- M Sonka et al., *Image Processing, Analysis and Machine Vision, 4th edition*, 2014
- SE Umbaugh, *Digital Image Processing and Analysis*, 2017
- S Birchfield, *Image Processing and Analysis*, 2016 (e-book)
- W Burger, MJ Burge, *Digital Image Processing: An Algorithmic Introduction Using Java*, 2016 (e-book)
- C Solomon, T Breckon, *Fundamentals of Digital Image Processing: A Practical Approach with Examples in Matlab*, 2011 (e-book)
- RB Fisher et al., *Dictionary of Computer Vision and Image Processing, 2nd Edition,* 2014 (e-book)
- ER Davies, *Computer and Machine Vision*, *4th edition*, 2012 (e-book)
- B Jahne, *Digital Image Processing and Image Formation,* 2017
- R. Szeliski, *Computer Vision, Algorithms and Applications*, 2010 (free online)

Image processing resources are available at numerous websites .....

Resources

Websites:

- http://homepages.inf.ed.ac.uk/rbf/CVonline/
- http://www.tutorialspoint.com/dip/
- https://www.vision-systems.com/index.html
- https://www.visiononline.org/
- http://homepages.inf.ed.ac.uk/rbf/HIPR2/hipr_top.htm

Software:

- MATLAB + Image Processing Toolbox (commercial)
- Adobe Photoshop (commercial)
- NumPy/SciPy (open source)
- Intel OpenCV (open source computer vision library)
- ImageJ (open source)
- GIMP (open source)
- UTHSCSA ImageTool (open source)