02460

Image Segmentation

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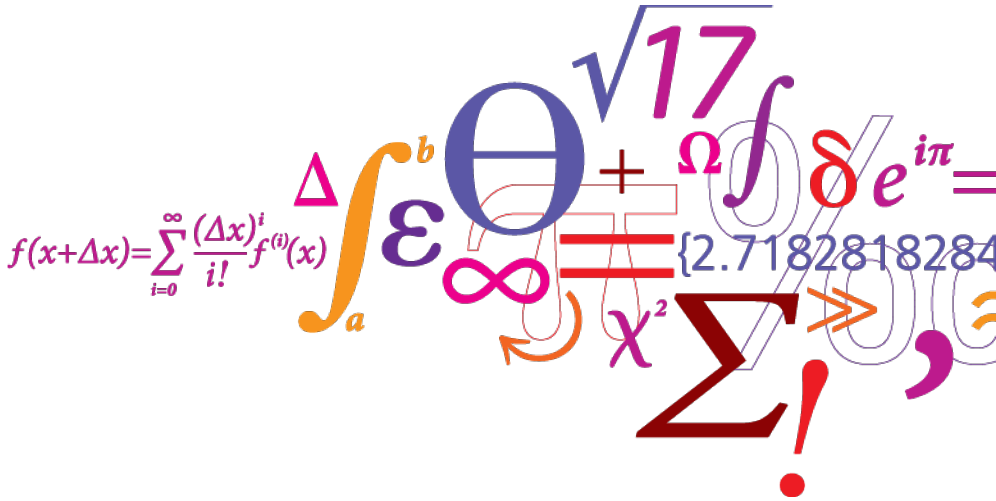


DTU Compute
Department of Applied Mathematics and Computer Science

Perspective

IDUN is a center of excellence funded by the Danish National Research Foundation and the Villum Foundation. The center is divided into two parts: IDUN Drug and IDUN Sensor, focusing on drug delivery and nanomechanical sensors, respectively.

http://www.idun.dtu.dk/

Project setup

Use https://lab.compute.dtu.dk/ as repository

Weekly logbook – (can use wiki)

git clone git@lab.compute.dtu.dk:02460F18-Image/shared.git

git clone git@lab.compute.dtu.dk:02460F18-Image/group1.git

Future meetings 321/119 Thursdays 14.00 to 15.00.

Learning objectives

1) **Define own learning objectives for the project**
2) **Collect scientific knowledge and data related to the project topic based on a specific project proposal**
3) **Carry out a well-founded delimitation of the project and formulate specific hypotheses and aims**
4) Organize and coordinate the work in the project group
5) Plan and carry out the course of the project in collaboration wit the project supervisor
6) Design a machine learning based system starting from analysis of the problem and the project aims, and further select relevant algorithms and methods
7) Assess and summarize the project results in relation to aims, methods and available data
8) Carry out the project and interpret results by use of Matlab, Python or other programming language
9) Structure and write a final short technical article including problem formulation, description of methods, experiments, evaluation and conclusion
10) Presentation of methods and results at meetings with project supervisor and fellow students
11) Organize and present project results at the final poster presentation

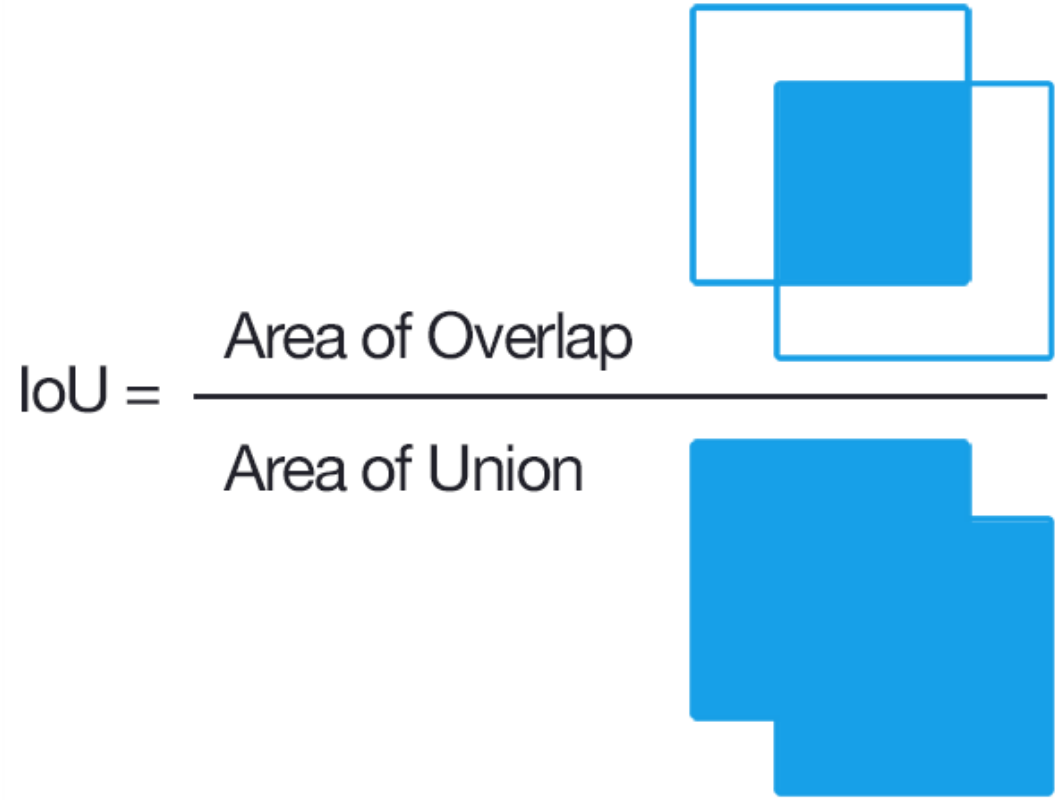
Image segmentation

https://github.com/kjw0612/awesome-deep-vision#semantic-segmentation

Evaluation – Intersection over Union (IoU) for object detection

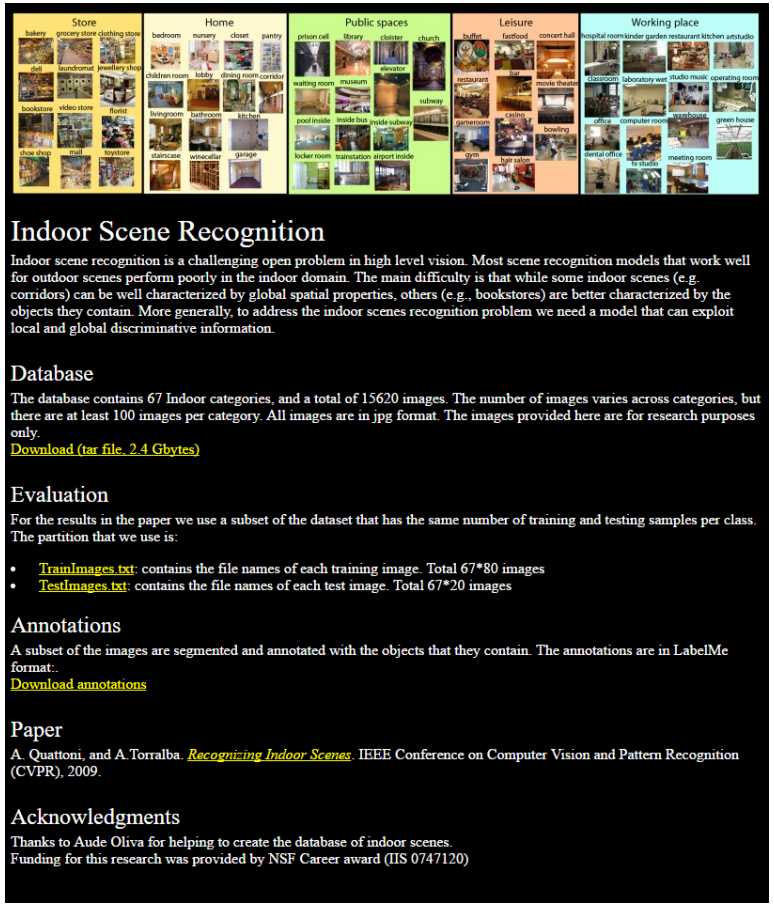
http://www.pyimagesearch.com/2016/11/07/intersection-over-union-iou-for-object-detection/

$$IoU = \frac{\text{Area of Overlap}}{\text{Area of Union}}$$



MIT indoor dataset

http://web.mit.edu/torralba/www/indoor.html



Describable textures dataset

https://www.robots.ox.ac.uk/~vgg/data/dtd/

DTD Overview Citation Download Browse Releases Evaluation

Describable Textures Dataset (DTD)

Download dataset | Download code | Evaluation | Citation

Overview

Our ability of vividly describing the content of images is a clear demonstration of the power of human visual system. Not only we can recognise objects in images (e.g. a cat, a person, or a car), but we can also describe

Downloads

Filename	Description	Size
README.txt	README file describing: • Dataset structure. • Ground truth annotations: key attributes and joint attributes.	185K
dtd-r1.0.1.tar.gz	The package contains: • Dataset images, train, validation and test. • Ground truth annotations and splits used for evaluation. • imdb.mat file, containing a struct holding file names and ground truth labels.	625M
dtd-r1.0.1-labels.tar.gz	Annotations and splits • Ground truth annotations: key attributes, joint attributes. • Splits of the data into train, val and test, as used in our experiments.	1.4M
dtd-r1-decaf_feats.tar.gz	Compressed decaf_feats.mat, containing a 5640x4096 matrix, represented DeCAF features for the images from DTD. Each row represents the 4096 dimensional feature vector for one image, assuming images are sorted by name.	82M

Acknowledgements

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The development of the describable textures dataset started in June and July 2012 at the Johns Hopkins Centre for Language and Speech Processing (CLSP) Summer Workshop. The authors are most grateful to Prof. Sanjeev Khudanpur and Prof. Greg Hager.

Pascal VOC datasets

- http://host.robots.ox.ac.uk/pascal/VOC/

The PASCAL Visual Object Classes Homepage

Development Kit

The development kit consists of the training/validation data, MATLAB code for reading the annotation data, support files, and example implementations for each competition.

The development kit is now available:

- Download the training/validation data (2GB tar file)
- Download the development kit code and documentation (500KB tar file)
- Download the PDF documentation (500KB PDF)
- Browse the HTML documentation
- View the guidelines used for annotating the database (VOC2011)
- View the action guidelines used for annotating the action task images

Getting started with deep learning

http://www.deeplearningbook.org/

Deep Learning

Landmark papers – worth a read

Imagenet classification with deep convolutional neural networks (AlexNet)
A Krizhevsky, I Sutskever, GE Hinton - Advances in neural …, 2012
Cited by 10k+

Very deep convolutional networks for large-scale image recognition (VGG)
K Simonyan, A Zisserman – ICLR 2015
Cited by 3k+