1. Master's Thesis proposal

2. General Information

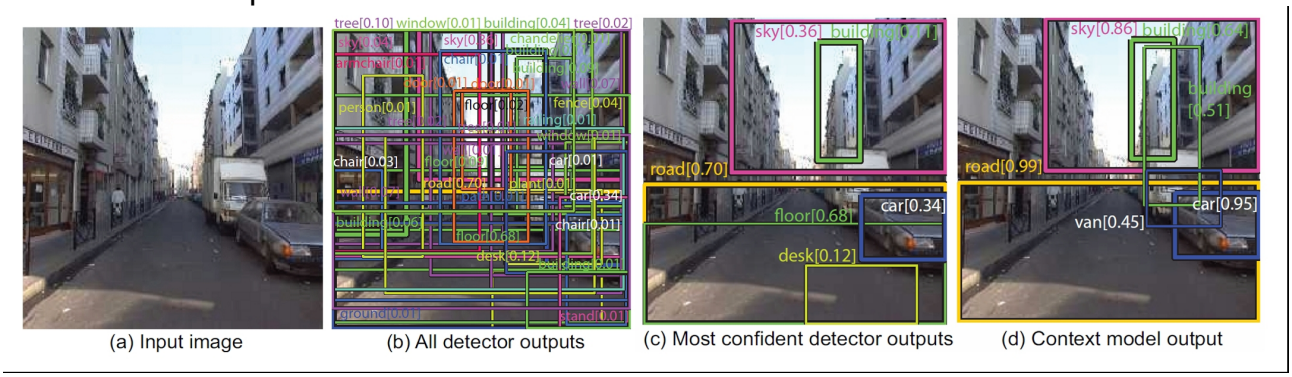
Master's Thesis Title:	Large Scale Semi-Supervised Image Annotation with Structure Prediction Models.
Orientation:	research
M.Sc. Th. Advisor's Dept. & University:	LSI,UPC
M.Sc. Th. Advisor:	Ariadna Quattoni
M.Sc. Th. Advisor e-mail:	aquattoni@lsi.upc.edu
Observations:	
Student's Name: (if already known)	

3. M.Sc. Thesis Description

Main issues / Brief Description:

The goal of this project is to implement an automatic image annotation system using machine learning techniques. More specifically, we will develop semi-supervised structure prediction techniques for the task.

Detailed Description:



In this project we want to build an automatic method for annotating objects that appear in images using machine learning techniques. More specifically, the first goal of the project is to use Structure Prediction methods to learn models for automatic image annotation. As a dataset for both development and testing we will use the SUN 09 benchmark for object detection in context (Myung et all . 2010). This dataset contains 12000 annotated images from a large range of

outdoor and indoor scene categories.

Structure prediction methods can model relationships between multiple labels of an image. This allows us to exploit contextual information around objects to make more accurate predictions. In the first part of this project we will implement a standard structure prediction method (such as Conditional Random Fields) for the image annotation task.

Structured prediction methods are able to learn from large quantities of annotated data. In some situations, in addition to labeled data we might have access to large amounts of unlabeled images. This is particularly true today due to the growth of online image search engines. The second goal of this project is to design methods that can take advantage of this unlimited source of data.

We wish to answer the following questions: How can we use unlabeled data to improve an image annotation system? Can we benefit from a very large collection of images without annotations? We will design semi-supervised learning methods in order to show that it is possible to improve a supervised system using unlabeled data. Specifically, we will use a semi-supervised architecture where the large pool of unlabeled images is used to induce representations which help the supervised system to improve image annotation.

[1] Myung Jin Choi, Joseph Lim, Antonio Torralba, Akan Willsky, Exploiting Hierarchical Context on a Large Database of Object Categories,CVPR, 2010
[2] A. Quattoni, A. Torralba, Recognizing Indoor Scenes,CVPR 2009.
[3] A. Quattoni, M. Collins, T. Darrell, Transfer Learning for Image Classification with Sparse Prototype Representations,CVPR 2008.
[4] A. Quattoni, M. Collins, T. Darrell, Learning Visual Representations using Images with Captions, CVPR 2007 (B).
[5] A. Quattoni, S. Wang, L.P. Morency, M. Collins, and T. Darrell, Hidden-state Conditional Random Fields, IEEE PAMI, 2007 (A).
[6] A. Quattoni, M. Collins, T. Darrell, Conditional Random Fields for Object Recognition,NIPS 2004.

Barcelona, October 22th 2010