

COMS30030 - Image Processing and Computer Vision

www.ole.bris.ac.uk/bbcswedav/courses/COMS30030_2020_TB-1/content

Video Lecture 01

Introduction

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Who is Teaching?



Prof. Majid Mirmehdi



Prof. Andrew Calway



Dr. Alessandro Masullo



Dr. Toby Perrett



Images or Image Frames



A single image



**A bunch of image frames
that make up a video**



What is Image Processing?



What is Image Processing?

How to Brighten Images or Videos



Source images from: MIHO GmbH and minitoo



What is Image Processing?

a. Original fingerprint



b. Skeletonized fingerprint



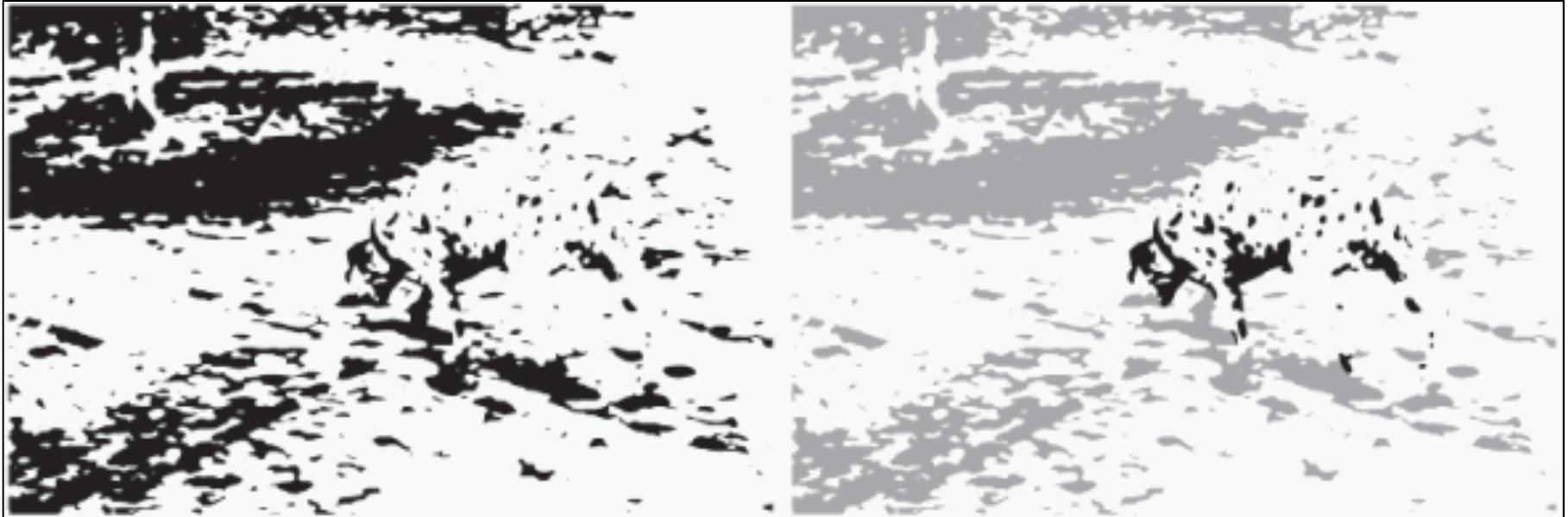
Image Processing... is the digital manipulation of an image to enhance it or extract some useful information from it.

What is Computer Vision?

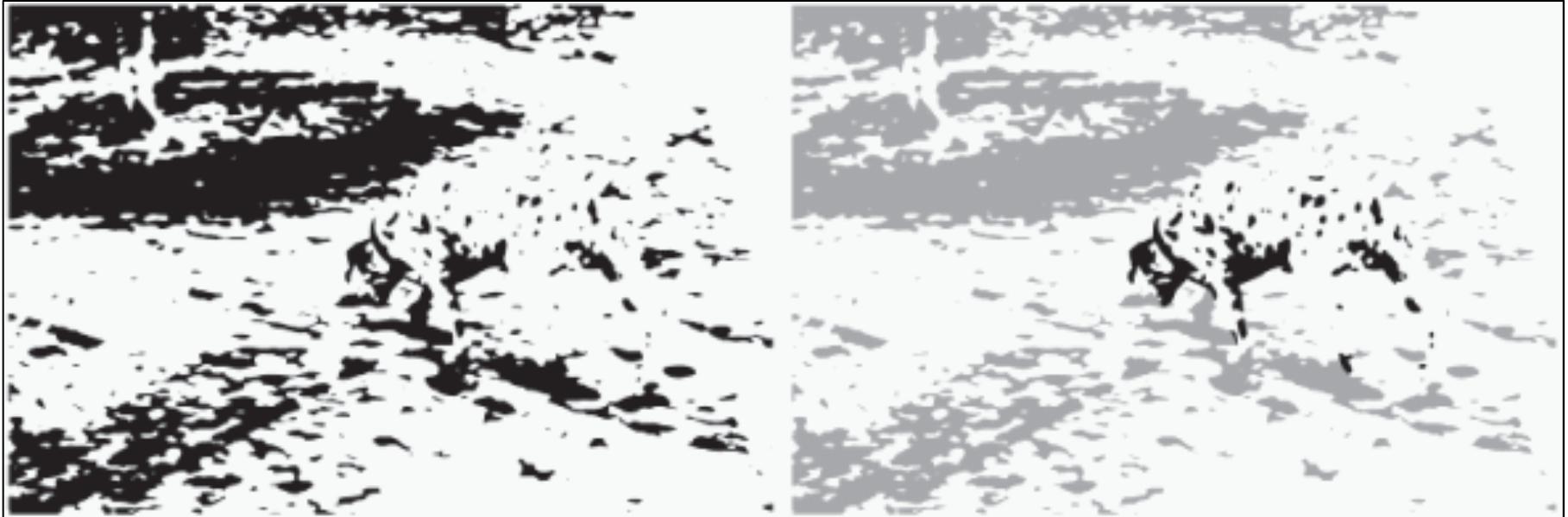


Source image from: www.usone.fr

What is Computer Vision?



What is Computer Vision?



Computer Vision ... attempts to bridge the semantic gap between pixels and their meaning



What is Computer Vision?

Pixels Features Models Meaning

Source image from Dan Ruta on [ion.com](#)



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What is Computer Vision?

Pixels

Features

Models

Meaning



Source image from Dan Ruta on  [ion.com](#)

What is Computer Vision?

Pixels	Features	Models	Meaning
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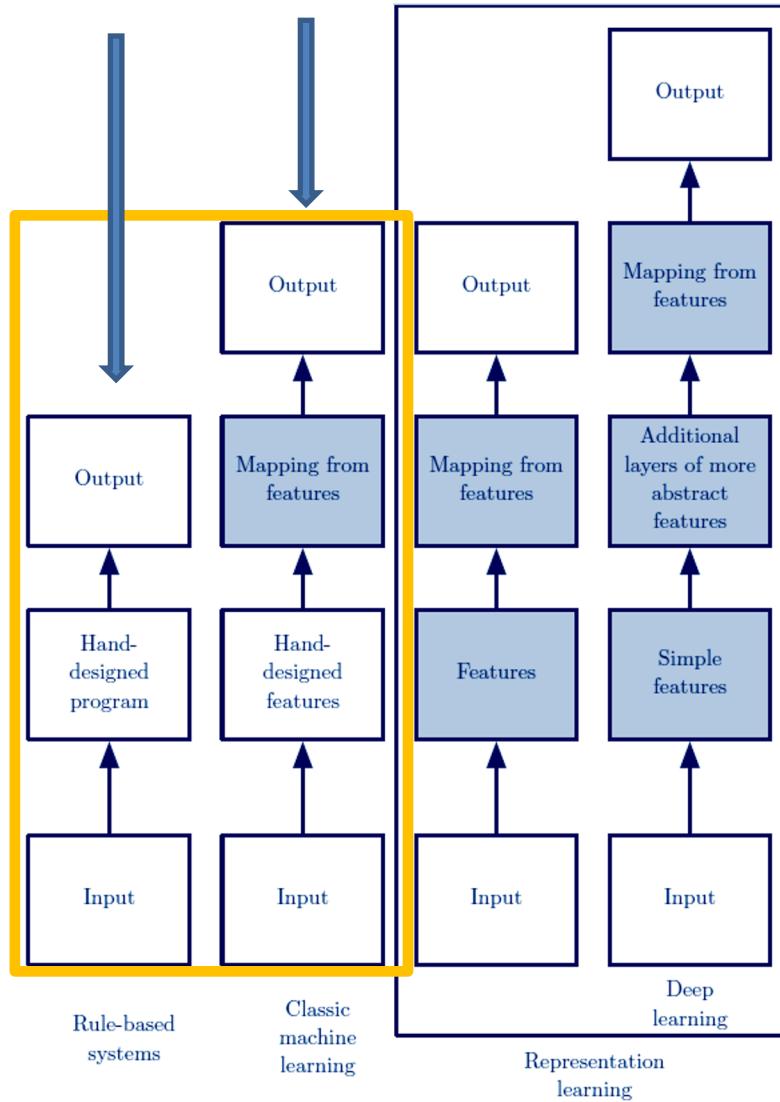
Computer Vision ...

... concerns the study of the theory, engineering and application of artificial systems that extract semantic information from images or other structured, multidimensional data.



The Unit in its Machine Learning Context

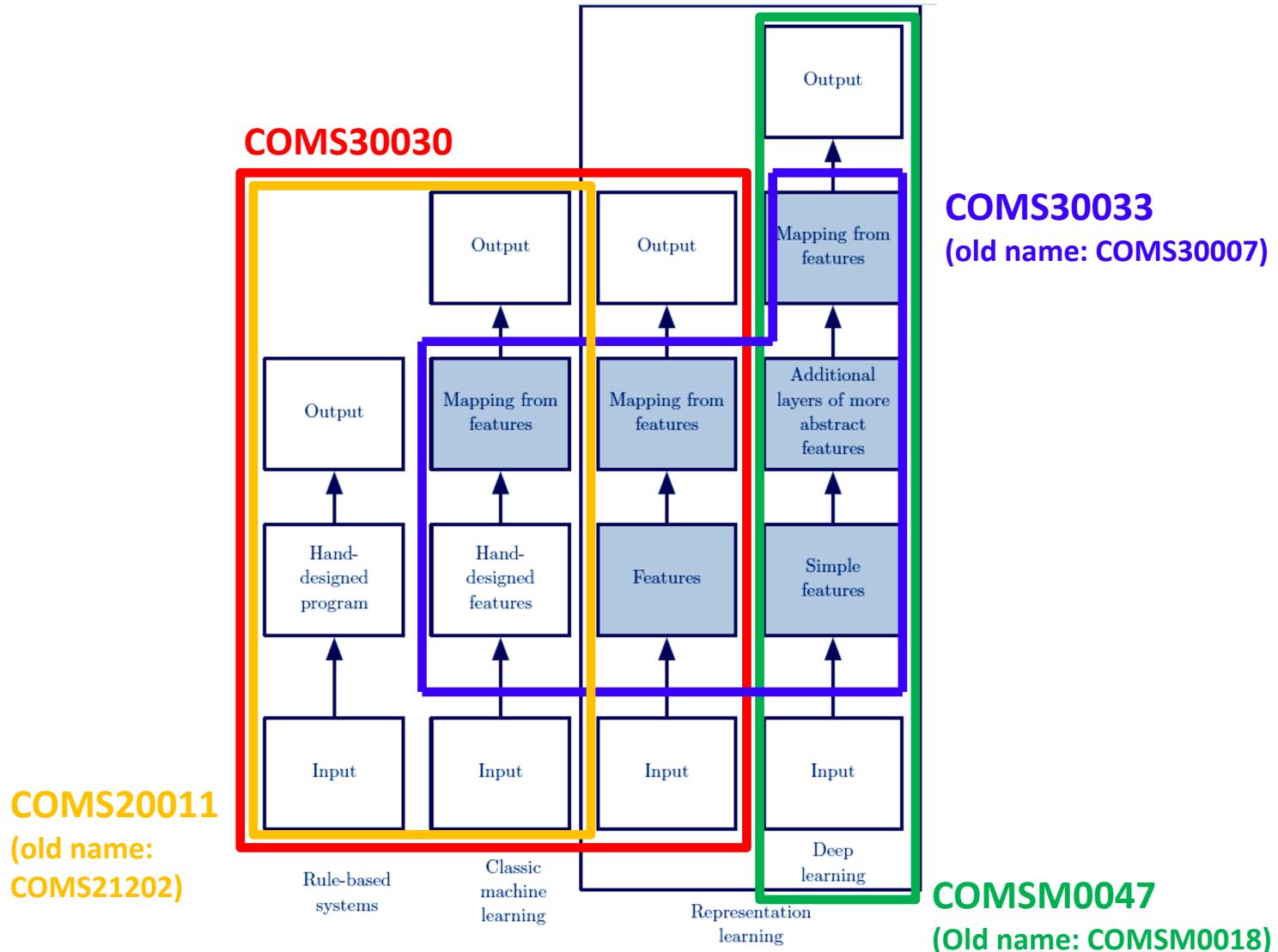
COMS20011
(old name:
COMS21202)



Source modified from: Ian Goodfellow,
www.deeplearningbook.org



The Unit in its Machine Learning Context



Source modified from: Ian Goodfellow, www.deeplearningbook.org



COMS30030 Topics in a Nutshell

- Acquisition and Representation ← Majid
- Image Transforms ← Majid
- Edges and Shape ← Alessandro
- Segmentation ← Majid
- Object Detection ← Toby
- Motion Analysis ← Andrew
- Stereo Vision ← Andrew



What will we do in COMS30030?

A first introduction to classical computational vision: the theory, principles, techniques, algorithms and applications.

The unit is structured in terms of topics. For each topic, we cover the basics of the underlying theory, some practical challenges, important algorithms, and example applications.

Lectures

**principles
algorithms
context**

Seminars

**Problemsheets
Q&As/discussions
examples**

Lab Sessions

**coursework/project
implementation
evaluation**



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Self Study



Delivery and Assessment

EXAM ONLY

Lectures+Seminars

The unit aims at providing a first theoretical introduction to classical computational vision: theory, techniques, and algorithms.

Lectures will introduce a topic and identify the key theory, challenges and applications. Students are expected to follow this up with self study based on a problem sheet, revision and further reading.

The problem sheet will be worked on in the seminars where students will discuss solutions with their peers directed by a member of the teaching team.

ASSESSMENT: 100% Final Exam

COURSEWORK ONLY

Lectures+Seminars+Labs

As well as lectures and seminars there are labs to give you a practical introduction to classical computational vision to help you experience implementing such algorithms.

Implementations will be via OpenCV, which is open-source and freely available for most platforms and languages.

You can choose to work on your platform in a language you are most fluent in (at your own risk!); we will only support the MVB2.11 lab setup and the C++ interface of OpenCV.

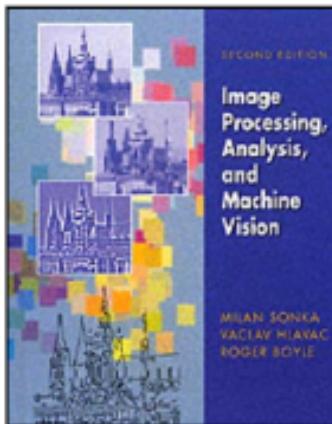
You will work individually during the lab sessions and for your coursework. You will submit both code and a report.

ASSESSMENT: 100% Coursework

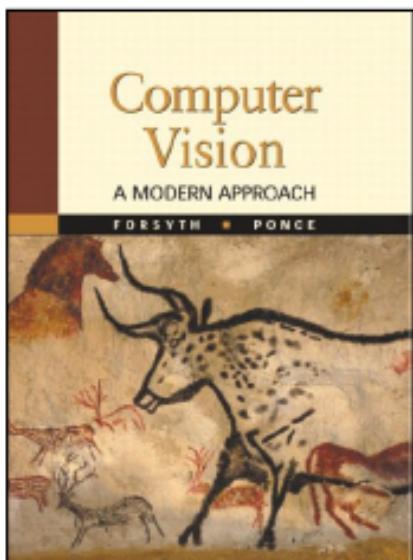
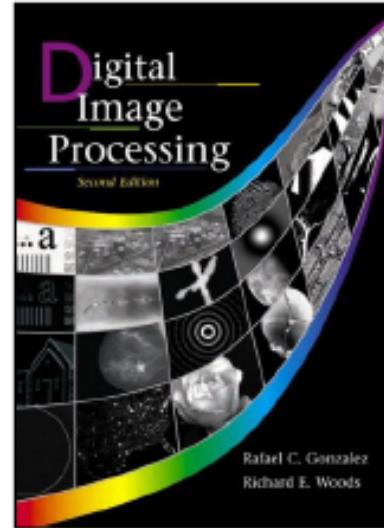


Some Suggestions for General Reading

Image Processing
Analysis and
Machine Vision
by Sonka, Boyle and Hlavac



Digital
Image
Processing
by Gonzalez and Woods



Computer Vision:
A Modern Approach
by Forsyth and Ponce



The Unit Website

Central Hub for all Learning Sessions, Materials, Labs & Coursework, ...

www.ole.bris.ac.uk/bbcswebdav/courses/COMS30030_2020_TB-1/

The screenshot shows the course website for COMS30030. The top navigation bar includes links for Home, Help, System Admin, My Re/Play, PDP, Study Skills, Wellbeing, and Open Courses. A banner at the top features a 3D rendering of a landscape with green fields and a road. The main content area is titled 'Unit Overview' and contains a section for 'COMS30030: Image Processing & Computer Vision'. Below this are links for Overview, Sub-Units, Teaching Staff, Lab Assistants, Forums, Books, Unit Catalogue, and Acknowledgements. A large table titled 'IPCV SCHEDULE' details the weekly schedule from Week 1 to Week 5. The schedule includes various sessions such as 'Lecture Video 1: WELCOME & INTRODUCTION' (Week 1), 'Live Session 1: G1: Seminar/Q&A Session (G1 ONLY)' (Week 1), 'Live Session 2: G2: Seminar/Q&A Session (G2 ONLY)' (Week 1), 'Live Online Lab 1: OPENCV WARM-UP' (Week 1), 'Lecture Video 2: WELCOME & INTRODUCTION' (Week 2), 'Live Session 3: G1: Seminar/Q&A Session (G1 ONLY)' (Week 2), 'Live Session 4: G2: Seminar/Q&A Session (G2 ONLY)' (Week 2), 'Live Online Lab 2: OPENCV WARM-UP' (Week 2), and so on for subsequent weeks.

If you have elected to do the coursework on this unit, please go to the webpage and ensure you know how to login remotely to a lab machine in MVB 2.11 in preparation for the first online lab session.



Example Applications of Computer Vision