



2010 Maymester Course SA 10503 Introduction to Machine Learning & Pattern Recognition

This course is for Engineering, MGMT, Science/Technology and Agriculture students.

When: May 10, 2010 – June 6, 2010 (Maymester 2010)

Where: Istanbul and Bodrum, Turkey

Who's Eligible: All finishing sophomore through graduate students are welcome.

Activities:

Istanbul: Morning lectures by Purdue Faculty member
Afternoon and weekend visitations of historic and cultural sites/ museums

City tour
Blue Mosque
Topkapi Palace
Hagia Sophia
Spice Bazaar
...and many more!



Ortakoy



Hagia Sophia





Bodrum



Morning lectures by Purdue Faculty member
Afternoon visitations of historic and cultural sites/ museums
Ephesus
House of Virgin Mary
Castle of St. Peter
Museum of Underwater Archaeology
Amphitheater
Boat trip



Daily boat trip

What's Included:

Bus rentals (including company visits, sightseeing,
transportation from and to airport)
Hotel room (double rooms)
3 course credit
Daily Breakfast
Cultural events, company visits, expedition and exploration



House of Virgin Mary



PURDUE UNIVERSITY
School of Electrical and Computer
Engineering
SA 10503
(ECE XXX)
INTRODUCTION TO MACHINE LEARNING
AND
PATTERN RECOGNITION

Maymester 2010
May 10 – June 6, 2010

Course Objective:

To provide the student with the basic topics in machine learning and pattern recognition algorithms such as neural networks, support vector machines, decision trees, data mining and related methods for the design of intelligent and adaptive systems, to describe how they are used in applications, especially involving information and advanced technologies, and to provide hands-on experience with software tools.

Course Description:

Intelligent information processing, search and retrieval, classification, recognition, prediction and optimization with machine learning and pattern recognition algorithms such as neural networks, support vector machines, decision trees and data mining methods, current models and architectures, implementational topics, applications in areas such as information processing, search and retrieval of internet data, signal/image processing, pattern recognition and classification, prediction, optimization, simulation, system identification, communications and control.

Classification and recognition are very significant in a lot of domains such as multimedia, radar, sonar, optical character recognition, speech recognition, vision, remote sensing, agriculture, bioinformatics and medicine. We will discuss how intelligent learning algorithms are used in these areas with a number of practical examples from real-world problems.

Prediction is an application domain of classical significance. For example, predicting market prices in the near future is an interesting example. What types of signals are predictable? How do linear versus nonlinear prediction techniques compare? What are the best techniques for prediction? We will discuss answers to such significant and practical questions, with illustrations on a number of real-world problems.

System identification is very important, for example, in order to optimize a company's performance in a defined manner, such as optimization of productivity. For this purpose, it is necessary to do system modeling first. Then, the inputs can be optimized to generate the best output(s) possible from the system. This topic is closely related with system optimization, and techniques such as Six Sigma and Design of Experiments.

Data mining is streamlining the transformation of masses of information into meaningful knowledge. It is a process that helps identify new opportunities by finding fundamental truths in apparently random data. The patterns revealed can shed light on application problems and assist in more useful, proactive decision making. Design of rule-based systems using intelligent learning algorithms is an important topic of this course.

Internet has become a major global mechanism for processing, search and retrieval of information and data, and led to new technologies such as e-commerce, e-business, web-based communications and networking. The algorithms learned in this course are fast becoming major tools for intelligent internet information processing and technology.

As other examples of significant application areas of recent interest, bioinformatics and remote sensing can be cited. Statistical and computational techniques to be discussed in this course have become very important in these and similar areas. In bioinformatics, the application may be DNA sequence analysis, drug design, and similar topics such as proteomics. In remote sensing, the application may be classification and modeling with multispectral, hyperspectral, radar, lidar and optical data.

The algorithms learned in this course are also very important to model and analyze global environmental applications, which are assuming more and more significance.

Prerequisites: Calculus and introductory linear algebra
(probability and statistical concepts used will be introduced
during lectures).

Homeworks: Weekly homeworks including MATLAB and WEKA
exercises.

Examinations: Two hour examinations. Each hour exam will cover the material between the previous exam and the current exam.

Final Project: The final project topic will be chosen by each student according to his or her interest. Typically, it is a computer project using MATLAB or WEKA.

Grade: 30% each exam, 15% homeworks, 25% final project

Textbook: Lecturer's Course Notes, and Ian H. Witten, Eibe Frank, *Data Mining: Practical Machine Learning Tools and Techniques*, 2nd edition, Morgan Kaufmann Publishers, 2005, ISBN: 0-12-088407-0

Computer Requirements: ECN dial-up or a PC or Macintosh computer with 256 MB or more of RAM, and 400MB of disk space. Each homework will include Matlab exercises. Matlab 7.0 and above, and relevant toolboxes exist on ECN.

Web Learning: The course materials including course notes, homeworks and solutions will be provided by email or other means.



Ian H. Witten & Eibe Frank

DATA MINING

Practical Machine Learning Tools and Techniques

SECOND EDITION



Lecturer: Professor Okan K. Ersoy
Office: MSEE 346, Purdue University
Phone: (765) 494-6162
Fax: : (765) 494-3358
E-mail address: ersoy@purdue.edu





Istanbul, a fascinating city built on two Continents, divided by the [Bosphorus Strait](#). This is one of the greatest cities in the world where you can see a modern western city combined with a traditional eastern city, it's a melting pot of many civilizations and different people.

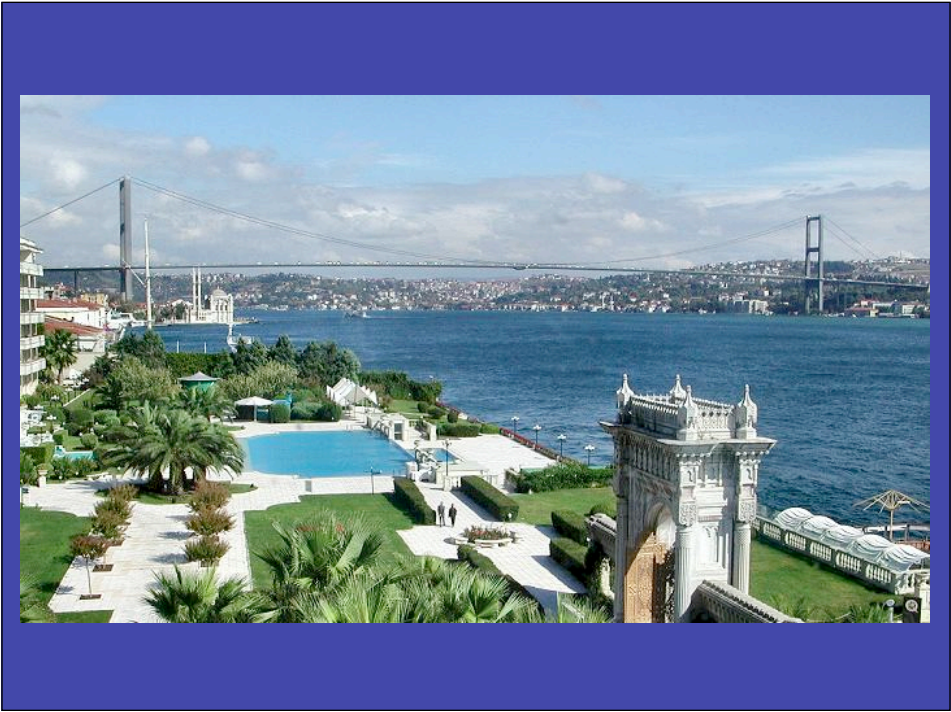
From the foundation of [Byzantium](#) in the 7th century BC until today, Istanbul held always an important role in the history of humanity in this part of the world. Everybody wanted to gain control of this area because of its strategic location; Empires were born here on the ashes of previous ones. Since the Republic in 1923, Istanbul continued to grow and today it boosted its population at around 14 million people living in this spread out city. This makes Istanbul the largest city of [Turkey](#) and one of the biggest cities in the world.

Bosphorus

Bosphorus in [Turkish](#) is known as Bogazici, meaning "inner strait". Since the ancient times it held always an important role because of its strategic location, being the only passage from the [Black Sea](#) into the [Mediterranean](#), along with the [Dardanelles](#) strait.

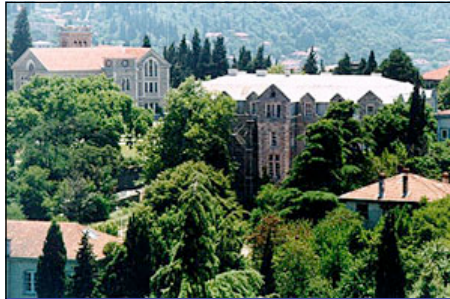
Bosphorus is a very busy waterway with many ships and oil tankers going through it, as well as local fishing and ferries go to the Asian side back and forth. Around 48.000 ships pass through this strait annually, three times denser than the Suez Canal traffic and four times denser than the Panama Canal. Approximately 55 million tones of oil are shipped through the strait each year.







This is the [Bosphorus Bridge](#) in Istanbul, Turkey. Interestingly, as the Bosphorus strait is the boundary between Europe and Asia, the bridge actually connects two continents. In May 2005 tennis star Venus Williams played a show game on the bridge, making it the only game of tennis to be played on two continents ([Wikipedia entry](#)).



Bosphorus University has its roots in Robert College, the first American institution established outside the boundaries of the United States. With the transfer of the Robert College site to the Turkish government and its formal establishment 1971, Bosphorus University became the direct heir to the excellent facilities of Robert College and to its distinguished tradition of academic excellence.

Bogazici University

The University consists of four campuses. Exchange students pursue coursework on the picturesque South Campus, with the Bosphorus Strait and the historical castle of Rumelihisar as eastern boundaries. This campus is the site of the University's most historic buildings.

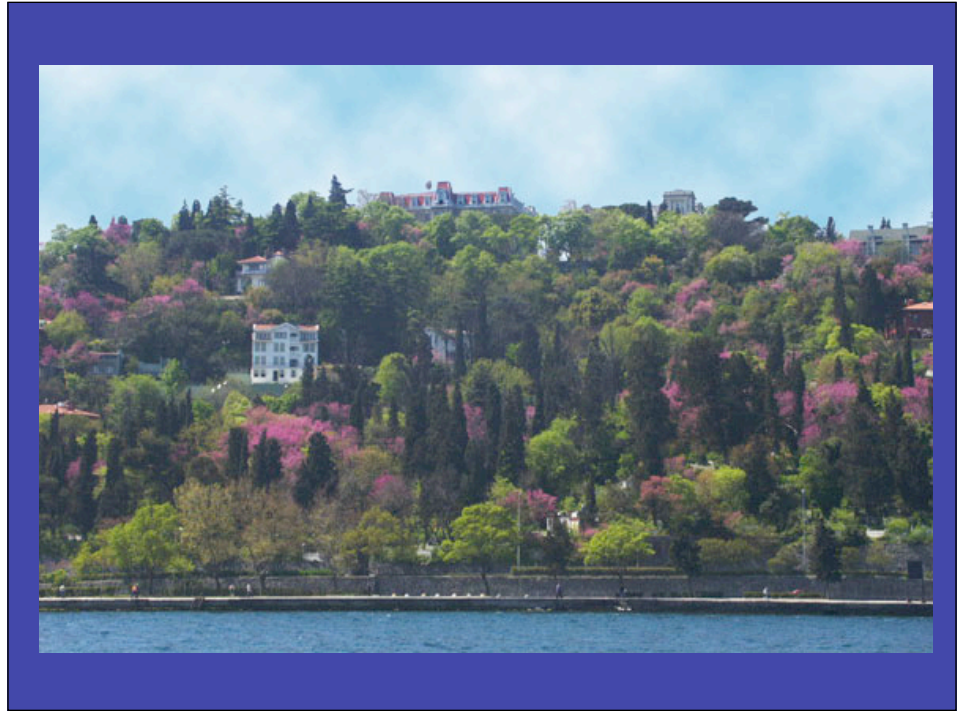




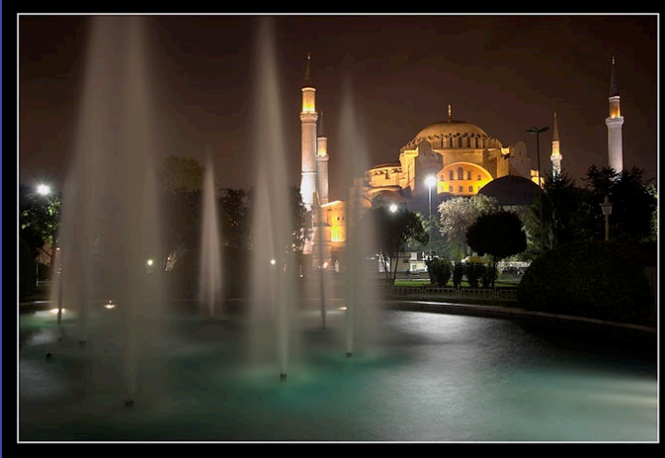
Turkish Delight
(Newsweek article of
August 29, 2005)













Akmerkez Mall (rated No. 1 in the world)
across from the hotel where we will stay



BODRUM

Homer describes Bodrum as "The land of eternal blue" and the words of another resident of Bodrum, Cevat Şakir, who said "The heavenly bliss of life in Bodrum is better than any eternal bliss that may await us" were not without foundation in reality. Throughout history of Bodrum, known as Halicarnassos in ancient times, has always been fought over and people have been unwilling to share its beauty with others.

Built on a peninsula formed by the meeting of the eastern and western harbors, Bodrum, with its narrow streets winding down to the sea, is famous for its castle, its world-renowned yachts, its shipyards and the dazzling white houses and tombs lining the shores of its two harbors.

Bodrum, has the all facilities to meet the expectations of tourists from all income levels, ranging from the rich yacht owners to the penny counting tourists who just want a reasonable room to make his vacation last all summer.



The Underwater Archeological Museum of Bodrum

It is one of the most important and biggest museums of its kind in the world. The relics recovered from excavation which started in the 1960's are on display in this museum located in the Bodrum Castle. The Eastern Mediterranean amphora collection as well as findings resulting from research on sunken ships in the immediate vicinity are on display. The significant of this sunken ships are at Yassıada, Şeytan Brook and Serçe Harbour. The remains of the oldest known sunken ship in the world are also here and well-worth seeing.

**Ancient Theater**

The theater is located in the Bodrum - Turgutreis road. It has an audience capacity of 13,000 seats. The stage area has been uncovered and the seats have been restored.

Cisterns

Cisterns built by the Ottomans and known as "Gümbet" can be seen all over the peninsula. They were built by the wealthy citizens who named the cisterns after themselves.

Bodrum Castle (Saint Petrum)

Built by the Knights of Rhodes in the 15th century and dedicated to St. Peter, the construction of the castle was completed in 99 years. It was built on Zephyrion island, the original site of the city of Halicarnassos. Stones and reliefs from the Mausoleum of King Mausolos were used in its construction. There are 5 towers in this castle; French, English, Italian, German and Snake towers. The castle covers approximately 30,000 sq. meters

Beaches

Ancient City of **Ephesus**



**The Celsus
Library**

Ephesus

Once the capital of Roman Asia, Ephesus is the best preserved Greco-Roman classical city on the Mediterranean a breathtaking sight.

There is as yet no definite knowledge about the exact date of the foundation of Ephesus, but famous historians such as Strabon and Pausanias, agreed in the idea of that Ephesus was founded by Amazons, and inhabited by the oldest settlers of Anatolia-Lelegians and Carians, as early as 3000 BC.



THE HOUSE OF VIRGIN MARY

THE HOUSE OF VIRGIN MARY

The **House of the Virgin** (*Meryemana* in Turkish), located in a nature park between [Ephesus](#) and Seljuk, is believed to be the last residence of the Virgin Mary, mother of Jesus. The peaceful site is sacred to both Christians and Muslims, and is visited by many tourists and pilgrims.



The Pope in the house of virgin Mary

