# Topics in Machine Learning (CS-689)

## 1 Goals, Scope and Syllabus

This course introduces the student to few special topics in Machine Learning mostly related to Support Vector methods. The course is open to any student (PhD, MTech/DD, BTech) working (or starting to work) in this area (and hence CS725 or equivalent is a pre-requisite). A string of good papers in each of the special topics will be discussed in the lectures. Most of the presentations will be done by the instructor and few by the students. The treatment of the subject will be theoretical/algorithmic and a side-goal is to help students learn the required mathematical tools. The syllabus is as follows:

- 1. Introduction to SVMs: Structural Risk Minimization, Gap-tolerant classifiers, Kernels ( $\sim$  3-4 weeks)
- 2. Kernel Learning ( $\sim 2-3$  weeks)
- 3. Multi-task Learning ( $\sim$ 2 weeks)
- 4. Transfer Learning ( $\sim 2$  weeks)
- 5. Robust Learning ( $\sim 2$  weeks)
- 6. Project presentations ( $\sim 1$  week)

References for this course are: [1, 2, 3].

#### 2 Evaluation Scheme

The grades (relative grading) will be decided based on the overall marks obtained in:

S.No.	Exam	Description	Weightage
1.	Project	Choose a topic and present either	30%
		a review or open problems or simple solutions	
2.	Paper presentation	Read a paper (from syllabus)	15%
		and present before the class	
3.	Assignments	Two assignments based on the	40%
		topics covered will be given.	
		These may require some programming etc.	
4.	End-Semester	Simple exam at end of semester	15%
		revising all special topics covered	
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## **3** Contact

The course page is at http://www.cse.iitb.ac.in/saketh/teaching/cs689. html. Office hours for the course are Wed, Fri 7:30am-9:00am. During these hours the instructor will be available in his office (No. 306, Kanwal Rekhi Building) for clarifying specific queries that the students may have. The instructor can be contacted via phone: x7903 or email: saketh at cse also.

# References

- [1] Relevant papers (will be announced in class).
- [2] Bernhard Scholkopf and Alex Smola. *Learning with Kernels*. MIT press, Cambridge, 2002.
- John Shawe-Taylor and Nello Cristianini. An Introduction to Support Vector Machines and other Kernel-based Learning Methods. Cambridge University Press, 2000.