

General Information	A.A. 2018-2019
Academic subject	Pattern Recognition
Degree course	Computer science
ECTS credits	6 (4 + 2)
Compulsory attendance	No
Language	English

Teacher	Name Surname	eMail
	Giuseppe Pirlo	Giuseppe.pirlo@uniba.it
	Dip. Informatica 6° Piano	Room 611

ECTS credits details			
Lectures	4 credits	32h	
Exercises	2 credits	30h	

Class Schedule	
Period	1st semester
Year	2nd
Type of class	Lecture- workshops

Time management	
Total hours	150
Hours of lectures	62
Individual study	88

Academic calendar	
Inizio attività didattiche	Sept. 24th, 2018
Fine attività didattiche	Jan. 11th, 2019

Syllabus	
Prerequisites/requirements	None. Students having attended the Artificial Intelligence class in the first year of the level degree may have some advantage.
Expected learning outcomes (according to Dublin Descriptors) (it is recommended that they are congruent with the learning outcomes contained in A4a, A4b, A4c tables of the SUA-CdS)	<p><i>Knowledge and understanding</i> The students will know the foundations, the main tasks and the main approaches to Pattern Recognition.</p> <p><i>Applying knowledge and understanding</i> The students will be able to apply Pattern Recognition techniques to specific problems in different interdisciplinary areas, to properly set up the techniques for fruitful application, and to set up evaluation experiments.</p> <p><i>Making informed judgements and choices</i> The students will be able to compare different Pattern</p>

	<p>Recognition techniques, and to choose those that are appropriate to tackle specific problems. They will also be able evaluate the experimental outcomes and to trace them to the features of the evaluated technique.</p> <p><i>Communicating knowledge and understanding</i> The students will be able to work in team, bringing to bear their knowledge of Pattern Recognition in order to carry out fruitful cooperation with other kinds of expertise from other members of the team.</p> <p><i>Capacities to continue learning</i> The students will be provided with methodological foundations that will allow them to understand the latest developments of Pattern Recognition. The lectures will make use of recent scientific papers and authoritative websites that will enable the students to stay</p>
<p>Contents</p>	<p>Statistical Signal Processing</p> <p>Transforms: Fourier, Hilbert, Adamard, Haar,etc... .</p> <p>Sampling.</p> <p>Markov Processes.</p> <p>Hidden Markov Models: Forward-Backward (AFB), Viterbi (AV), Baum-Welch (ABW), Computational issues, Topology.</p> <p>Gaussian Mixture Models</p> <p>Wrapping Funtions.</p> <p>Zooning</p> <p>Mapping and classification.</p> <p>Membership Functions: Abstract level, Ranked level, Measurement levels.</p> <p>International Datasets.</p> <p>Transfer functions: Log-norm, Delta-log, Sigma-log.</p> <p>Multiple classifier systems: Abstract level approach: majority vote; Ranked level: Behavioural knowledge space, Dempster Shafer; Measurement Level: Max probability, Sum and product rule.</p> <p>Applications: Historical document processing; Forensic; Multilingual Recognition; Writer identification; Online recognition.</p>

Course Program	
Bibliography	<p>-Gernot A. Fink; Markov Models for Pattern Recognition: From Theory to Applications. Springer 2008.</p> <p>-L. R. Rabiner (1989); A Tutorial on Hidden Markov Models , Proceedings of the IEEE 77 (2) :277-286.</p> <p>-Introduzione all'Analisi Spettrale ed Algoritmi FFT; Adriatica Editrice 1987</p> <p>-C. Y. Suen, Frontiers in Handwriting Recognition, Centre for Pattern Recognition & Machine Intelligence Concordia University, Published by CENPARMI. ISBN 1-895193-00-1, 1990, pp. 1-211.</p> <p>-S. N. Srihari, III International Workshop in Handwriting Recognition, Buffalo May 25-27, 1993, supported by United States Postal Service and CEDAR Buffalo USA. pp.:1-465.</p> <p>-Proceedings of the IV IWFHR, December 7-9, 1994 Taipei, Taiwan, Republic of China.</p> <p>-J. H. Kim Proceedings of 6th IWFHR, Seoul, Korea, 1998.</p> <p>-L. Schomaker, Proceedings of 7th IWFHR , 11-13 September 2000 Amsterdam, The Netherlands.</p> <p>-S. N. Srihari & M. Cheriet, Proceedings of 8th IWFHR, August 6-8, 2002 , Niagara-on-the-Lake, Ontario, Canada. IEEE Computer Society order Number PR01692, Library of Congress Number 2002108205, ISBN 0-7695-1692-0.</p> <p>-H. Fujisawa & G. Lorette, Proceedings of 9th IWFHR, 26-29 October 2004, Central Research Laboratory of Hitachi, Ltd. (HCRL), Kokubunji, Tokyo, Japan.</p> <p>-G. Lorette, H. Bunke & L. Schomaker, Proceedings of 10th IWFHR October 23-26, 2006, La Baule, Centre de Congress Atlantia, France.</p> <p>-C. Y. Suen, Eleven International Conference on Frontiers in Handwriting Recognition, Montreal Quebec Canada August 19-21, 2008. ISBN 1-895193-03- 6.</p> <p>-B.B.Chaudhuri, . Chaudhuri, Proceedings of the 12-th International Conference on Frontiers in Handwriting</p>

	<p>Recognition, Kolkata, India, Published by the IEEE Computer Society, 10662 Los Vaqueros, Los Alamitos, CA, 90720-1314, IEEE Computer Society Order Number P4221 BMS Part Number: CFP10311- PRT, Library of Congress Number 2010931536, ISBN 978-0-7695-4221-8, 2010.</p> <p>-D. Impedovo, G. Pirlo, Proceedings of the 13-th International Conference on Frontiers in Handwriting Recognition, sept. 18-20,2012. Published by IEEE Computer Society, Conferene Publishing Services (CPS), http://www.computer.org/cps. ISBN-13:</p>
Notes	When necessary, the teacher will provide the students with supplemental material.
Teaching methods	Lectures, exercises in the classroom
Assessment methods (indicate at least the type written, oral, other)	Oral
Evaluation criteria (Explain for each expected learning outcome what a student has to know, or is able to do, and how many levels of achievement there are.	<ol style="list-style-type: none"> 1. Ability to identify the appropriate methods to approach a problem 2. Ability to apply a suitable method to solve a problem in a specific applicative scenario.
Further information	