

Curriculum of the research and teaching activities

Matteo Golfarelli

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I Curriculum Vitae

Matteo Golfarelli, was born in Forlì on 18 October 1970, he received his Laurea degree (with honours) in Computer Science in 1995 at the University of Bologna, where he also received his PhD in 1998.

Since 1995 he carries out its research at the department of Electronics, Computer Science and Systems (DEIS) – University of Bologna and received his PhD in 1998 with a thesis entitled “Extraction and management of knowledge in Autonomous Agents Systems” [TSD]. He spent part of his PhD courses at Brown University, where he joined the Artificial Intelligence group headed by Prof. Tom Dean.

From November 1998 to November 1999 he holds a fellowship from Fondazione Cassa dei Risparmi di Cesena on topics related to Information Systems.

From December 1999 to June 2000 he holds a fellowship from Centro di Gestione della Spesa di Cesena – University of Bologna – on the theme: “Data Warehouse design”.

From July 2000 to February 2005 he worked as Associate Researcher (area ING-INF/05) at the Computer Science University degree course – University of Bologna.

Since March 2005 he is an Associate Professor at the same degree course.

II Teaching Activity

II.A. University courses

He gave the following seminars at the University of Bologna:

Class: “Database systems”, – Computer Science –

A.A.: 96/97, 97/98

Topics: Conceptual and logical design in relational database systems.

Class: “Software engineering” – Computer Science –

A.A.: 95/96, 96/97, 97/98

Topics: Object programming.

Class: “Software engineering” – Computer Science –

A.A.: 98/99, 99/00

Topics: Object programming.

Class: “Advanced database systems” – Computer Science –

A.A.: 98/99, 99/00

Topics: : Data Warehouse, Web-based Information Systems.

Class: “Information Systems II” – Faculty of engineering.

A.A.: 99/00, 00/01, 01/02, 02/03

Topics: Data Warehouse.

Class: “Information Systems I” – Faculty of engineering.

A.A.: 99/00, 00/01, 01/02

Topics: Data Warehouse.

Class: Graduate course in Mathematics – Faculty of Mathematics

A.A.: 97/98, 98/99, 99/00, 00/01

Topics: Relational Database design

He has been in charge of the following practice lessons at the Computer Science degree course – University of Bologna.

Class: “Software engineering”

A.A.: 00/01

Topics: Object design.

Class: “Advanced Information Systems”

A.A.: 00/01

Topics: : Data Warehouse, Web-based Information Systems.

He has been in charge of the following courses:

Class: “Database and Information Systems” – Diploma degree for diagnostics applied to restoration preservation of cultural heritage – University of Bologna

A.A.: 00/01

Class: “Computer Architectures” – Computer Science

A.A.: 01/02

Class: “Information Systems” – Computer Science

A.A.: 01/02, 02/03, 03/04, 04/05, 05/06, 06/07

Class: “Information Systems” – Internet and Economics

A.A.: 02/03, 03/04, 04/05

Class: “Information Systems and Information Management” Master in Human Resource Management – University of Bologna

A.A.: 04/05, 05/06

Class: “Laboratory of Database Systems” – Computer Science

A.A.: 05/06, 06/07, 07/08

Class: “Database System” – Internet and Economics

A.A.: 05/06, 06/07

II.B. Textbooks

He is co-author of [TD.1], that discusses the methods for user requirements and conceptual analysis of information systems. The textbook deal with topics related to static, dynamic as well functional aspects of design using OMT as basic formalism; finally a formalism for conceptual modelling of multidimensional data is proposed. The textbook has been chosen by several classes, for example:

- “Software engineering”: Computer science degree course – University of Bologna
- “Database systems”: Computer science degree course – University of Bologna
- “Information Systems II”: Computer science degree course – University of Bologna

II.C. Tutorial e invited speeches

He gave a *tutorial* titled “Data Warehouse design” at the *Second International Conference on Enterprise Information Systems (ICEIS 2000)*, Stafford, 2000, and at the *17th International Conference on Database Engineering (ICDE’01)*, Heidelberg, 2001.

In 2000 he gave a seminar on “Conceptual design of Data Warehouse systems” at Munster University (Germany).

In 2004 he has been invited speaker of the PANEL titled “Future Directions in DOLAP Research” at DOLAP’04conference.

In 2005 he has been invited speaker on the theme “New Trends in Business Intelligence” at the *1st International Symposium on Business Intelligent Systems (BIS’05)* (Croatia).

In January 2007 he gave a *tutorial* titled “Classic and New Research issues in Business Intelligence” at the University of Alicante (Spain).

III.D. Organizing and coordinating activities

He worked as coordinator and speaker at the 1st and 2nd “Data Warehouse Design Workshop”, Computer Science – University of Bologna, 1998, 2002.

From 1997 to 2000 he has been member of the Laboratory board of the Computer Science degree course – University of Bologna aimed at planning and coordinate the purchase of software and hardware equipment.

From 2000 he is member of the Company relations board of the Computer Science degree course – University of Bologna aimed at promoting and coordinating the relationships between the course and the companies of the area. He also organized the *University-Company workshop* that took place on April 23rd 2002.

Since 2002 he is member of the Didactic board Internet and Economics degree course.

On 2005 he has been member of the examining board for a research associate position in the Computer Science Engineering area at the University of Brescia.

On 2006 he has been the chair of the examining board for a research position in the Computer Science Engineering area at the University of Bologna.

On 2007 he has been member of the examining board for a research position in the Computer Science Engineering area at the University of Bologna.

III Research activity

The research activity of Matteo Golfarelli mainly concerns the following topics:

- *Information systems*
- *Autonomous agents*
- *Biometric systems*

The research results have been published of national and international publications, please refer to the enclosed list. In the following the main results specifically related to Information Systems will be discussed in more details.

III.A. Research activity on Information Systems

The research in this field is mainly on topics related to design and optimization of Data Warehouse: as concern *conceptual design* a design methodology has been defined [CI.8] [RI.3] and a graphical conceptual model, called Dimensional Fact Model [RI.2], has been devised.

As concern *logical design*, the problem of vertical fragmentation of fact table has been studied adopting branch-and-bound [CN.2] [CI.11] and metaheuristics [CI.15] [CI.17], [RI.7] approaches.

As concern *view materialization*, an original approach for optimizing workload including complex queries [CI.10], [CI.12]. Another research related to logical design concerned the estimation of the aggregated view cardinalities [RI.6], [CN.3], [CI.16]. Finally, we studied techniques for characterizing the workloads [C.I. 21], [C.I. 23].

As concern physical design, we devised an algorithm for index selection based on a study of the features of the commercial DBMS [CI.20]. The whole design methodology has been implemented in CASE tool to support the designers [CI.14], [CN.4].

As concern Data Warehouse evolution we defined a versioning approach that allows a semi-automatic handling of changes and multi-version querying [CI. 24], [CI. 32], [RI. 8]. The technique has been prototyped by a case-tool to be used on top of a DBMS [CI. 34].

The results of the preceding research, opportunely merged and extended, give rise to a book [TS.1] edited by McGrawHill.

Within the scope of the European project “Patterns for Next-generation Database Systems”, Matteo Golfarelli worked at the definition of a logical model for the representation of pattern of data. Such pattern are abstraction of data coming from a mining process and enriched with their semantics [CI.22], [CN.5].

In the light of such results Matteo Golfarelli participated to the 2004 Dagstuhl seminar titled "Data Warehousing at the Crossroads". The seminar was aimed at defining future research in the DW field by underlying unsolved problems and emphasizing new ones. He has been invited as speaker to the panel titled “Future Directions in DOLAP Research” organized by the DOLAP workshop. On the same topics he gave an invited speech to the conference MIPRO – BIS 2005 [CI. 27].

III.B. Memberships in research projects

Matteo Golfarelli participated to the following research projects:

Research projects:

- 1995: *MURST 60% project* “Map learning in multi-agent systems”.
- 1996-1997: *MURST ex-60% project* “Cooperation and negotiation in multi-agent systems”.
- 1996-1997: *C.N.R. project* “Intelligent autonomous systems”.
- 1996-2000: *C.N.R. project* “Cultural heritage”, theme “Hierarchical representation of the museum map and planning of path for virtual and spatio-temporal tour”.
- 1997-1999: *MURST ex-40% project* “Methodologies and techniques for data and process in Internets and Intranets”, theme “WWW data analysis”.
- 1998-1999: *C.N.R. project* “Artificial intelligence systems for supporting the representation of distributed knowledge”.
- 2000: *MURST ex-60% project* “Data Warehouse design techniques”.
- 2002-2004: *European project* “Patterns for Next-generation Database Systems” (Thematic Network FET, Action Line: IST-2001-6.1.1).
- 2005-2006 *Cofin Project* “WISDOM Web Intelligent Search based on DOMain ontologies”
- 2005: Research on “Methodologies and techniques for Business Performance measurements” funded by Bank of Forlì and Cesena Institution - joint work with OROGEL s.p.a..

Matteo Golfarelli has been scientific coordinator of the following research activities:

- 2007: “Studying and prototyping of a case tool for Data Warehouse design” on the behalf of Almagiva spa.

III.C. Paper reviews

Journal:

- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- Knowledge and Data Engineering (DKE)
- Information Fusion
- Information System (IS)
- Pattern Analysis and Machine Intelligence (PAMI)
- Pattern Recognition
- VLDB Journal
- Encyclopedia of Data Warehousing and Mining (Idea group Editors)

Conferences:

- DOLAP since 1999
- DMDW since 1999 to 2003
- Int. Workshop on Evolution and Change in Data Management: ECDM’05, ECDM’06
- SEBD dal al
- SoftCOM
- DSE’03 (*Decision System Engineering*)
- ADBIS’04
- ICDE’05
- IDEAS’05, IDEAS’06, IDEAS’07
- DaWak’05, DaWak06, DaWak07, DaWak08, DaWak09

III.D. Memberships in program committees

- ACM International Workshop on Data Warehousing and OLAP (DOLAP'99, DOLAP'00, DOLAP'01, DOLAP'02, DOLAP'03, DOLAP'04, DOLAP'05, DOLAP'06, DOLAP'07)
- International Workshop on Data Warehouse Design and Management (DMDW'01)
- Decision Systems Engineering Workshop (DSE'03)
- DATA GADGETS'2004
- International Database Engineering and Application Symposium (IDEAS'05) (IDEAS'06) (IDEAS'07)
- DaWak 2005, DaWak 2006, DaWak2007, DaWak2008, DaWak2009.
- Special issue of the International Journal of Web Engineering and Technology on Data Warehousing in web, mobile and wireless environments
- Information Resources Management Association (IRMA) International Conference, 2007.

Matteo Golfarelli is **co-chair** of the Business Information System conference (BIS08; BIS09), he is **member of the editorial board** of the International Journal of Data Mining, Modelling and Management (IJDMMM).

Cesena, January 10th 2009

(Signature)