

**PETRU MAIOR UNIVERSITY, TÎRGU MUREȘ
FACULTY OF SCIENCES AND LETTERS
DEPARTMENT OF INFORMATICS**

**Topics for contest for the position 7 – Associate Professor
Department of Informatics
2015-2016**

Discipline: Databases

Topics:

1. Data, information, knowledge. Missing data, outlier data. Knowledge-based systems. Entity-relationship model (ER model). Entities, attributes, instances and identifiers. Unique identifiers. ER diagram. Many-to-many relationship.
2. Relational Algebra. Relational operators. Union, intersection, difference, projection, selection, cartesian product, „teta” join and natural join.
3. Data redundancy. Database normalization. Functional dependencies. Normal forms. First Normal Form (1NF). Second Normal Form (2NF). Third Normal Form (3NF).
4. Scientific data analysis. Statistical data and chronological data. Exporting data from a database. Advanced data analysis in Excel. Graphical representation of the data, functions, statistical functions, data sorting, data filtering, data analysis, statistical calculus. Graphical representation of time series. Prediction of the time series using linear regression.
5. SQL (Structured Query Language). Oracle SQL. Select SQL. Functions. NVL function. Standard deviation, variance. Restricting and sorting data. LIKE operator. Cartesian product. Selecting data from multiple tables: Join, Equijoin, Non-Equijoin, Outer Join, Self Join. Subqueries. Grouping the data. Inserting, updating and deleting data. Creation of database tables. Including constraints. Creation and use of views.

References:

1. Date C.J.: An Introduction to Database Systems 6th Ed, Massachusetts: Addison-Wesley Publishing Company, 1995.
2. Lungu I., Musat N., Rosca I., Sabău Gh.: Baze de date relaționale: Utilizarea limbajului SQL-PLUS, Publisher All, Bucharest 1993.
3. Connolly T.M., Begg C.E.: Database systems: A practical approach to design, implementation, and management, Reading; Menlo Park.: Addison-Wesley, 1999.
4. Teorey T.J.: Database modeling and design: The fundamental principles. Morgan Kaufmann Publishers Inc, San Francisco, California, 1994.
5. Mittra S.S.: Principles of relational database systems, Englewood Cliffs: Prentice Hall, 1991.
6. Pascu A., Pascu C.: Totul despre SQL: interogarea bazelor de date, Publisher Tehnică, Bucharest, 1994.
7. Rische N.: Database design fundamentals: A structured introduction to databases and a structured application design methodology, Prentice Hall, 1998.
8. Fotache M.: Baze de date relaționale. Organizare, interogare și normalizare, Publisher Junimea, Iași, 1997.
9. Lixăndroiu D.: Baze de date relaționale, Transylvania University Press, Brașov, 2009
10. Król D., Madeyski L., Nguyen N.T. (eds.): Recent Developments in Intelligent Information and Database Systems, Studies in Computational Intelligence, Springer, Volume 642 2016.

Discipline: Intelligent Cooperative Agents


Topics:

1. Artificial Intelligence. Definition of Artificial Intelligence. Fields of Artificial Intelligence. Problems for whose solving are necessary methods and algorithms developed in Artificial Intelligence. The A* algorithm applied for solving problems like: finding the shortest path in a graph and game theory.
2. Bio-inspired Computing. Intelligent Computing. Evolutionary Computation. Evolutionary Algorithms and Genetic Algorithms. Solving the TSP (Traveling Salesman Problem) using Genetic Algorithms. Applications of the Evolutionary Computation. Use of Evolutionary Algorithms by Agents and Multiagent Systems. Evolutionary Multiagent Systems.
3. Comparative analysis Intelligent Systems vs. Intelligent Computing. Knowledge-based Systems. Knowledge representation. Forward chaining and backward chaining in Artificial Intelligence. Agents. Multiagent Systems. Expert Systems. Definition of Expert Systems. Components of the Expert Systems. A comparative analysis between Agents and Expert Systems. Analysis of the necessity of Agents' endowment with intelligence.
4. Cooperative Multiagent Systems. Collective intelligence in Multiagent Systems. Cooperative solving of difficult problems. Contract Net Task Allocation Protocol. Blackboard Systems used for difficult problems solving.
5. Advanced data analysis in multiagent systems using statistical methods. Parametric tests: "T" - test and his variants. "F" - test. Nonparametric tests: Wilcoxon test, Mann-Whitney test. Linear correlation and regression. Metrics for the evaluation of intelligence of Agents and Multiagent Systems.

References

1. Weiss G. (Ed.): Multiagent Systems: A Modern Approach to Distributed Artificial Intelligence, MIT Press, 1999.
2. Dumitrescu D.: Algoritmi Genetici și Strategii Evolutive - aplicații în Inteligența Artificială și în domenii conexe, Albastră Press, Cluj-Napoca, 2000.
3. Russell S.J. and Norvig P.: Artificial Intelligence A Modern Approach 3rd Edition, Prentice Hall, 1995.
4. Cârstoiu D.: Sisteme Expert, All Publisher, București, 1994.
5. Enăchescu C.: Calculul neuronal; Casa Cărții de Știință Press, Cluj-Napoca, 2009.
6. Wooldridge M.: An Introduction to MultiAgent Systems - Second Edition, John Wiley & Sons, 2009
7. Franklin S. and Gasser A.: "Is It an Agent or Just a Program? A Taxonomy for Autonomous Agents," Proc. 3rd Int. Workshop Agent Theories, Architectures, and Languages (ATAL 96), LNAI 1193, Springer, 1996, pp. 21-35.
8. Li K., Li J., Liu Y., Castiglione A. (eds.): Computational Intelligence and Intelligent Systems, Communications in Computer and Information Science, Springer, Volume 575 2016.

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DEPARTMENT DIRECTOR,
Associate Prof. dr.  Béla