SEA TUSCIA
Spin Off - Università della Tuscia

PUBBLICAZIONE SCIENTIFICA

PROGETTO
GEVO WEB
Gestione delle evidenze oggettive

Progetto di Ricerca e Sviluppo – Articolo 1, commi da 198 a 208, Legge n. 160/2019 – Articolo 1, comma 1064, Legge n. 178/2020

Attestazione effettività spese sostenute in Ricerca e Sviluppo, Innovazione Tecnologica, Design e Ideazione Estetica, ai sensi della Legge n. 160/2019, articolo 1, commi da 198 a 208; Legge n.178/2020, articolo 1, comma1064

SETTORE 04.D – PUBBLICAZIONE SCIENTIFICA

INDICE

ISSN 2367-5594

International Journal of Computing and Optimization

Hikari Ltd

Vol. 12, no. 1, 2025

ISSN 2367-5594
doi:10.12988/ijco

INTERNATIONAL JOURNAL OF COMPUTING AND OPTIMIZATION

Hikari Ltd

International Journal of Computing and Optimization

Aims and scopes : International Journal of Computing and Optimization presents high quality peer-reviewed papers and reviews in the area of mathematical programming, classical optimization, meta-heuristics optimization and modern optimization, artificial intelligence, soft computing and computational intelligence, algorithms and theory, distributed and parallel computing, scientific computing, simulation, software engineering, real world applications, etc.

Call for papers : Authors are cordially invited to submit papers to the editorial office by e-mail to: ijco@m-hikari.com . Manuscripts submitted to this journal will be considered for publication with the understanding that the same work has not been published and is not under consideration for publication elsewhere.

Instruction for authors : The manuscript should be prepared using LaTeX or Word processing system, basic font Roman 12pt size. The papers should be in English and typed in frames 14 x 21.6 cm (margins 3.5 cm on left and right and 4 cm on top and bottom) on A4-format white paper or American format paper. On the first page leave 7 cm space on the top for the journal's headings. The papers must have abstract and keywords. The references should be in alphabetic order and must be organized as follows:

[1] D.H. Ackley, G.E. Hinton and T.J. Sejnowski, A learning algorithm for Boltzmann machine, Cognitive Science, 9 (1985), 147-169.

[2] F.L. Crane, H. Low, P. Navas, I.L. Sun, Control of cell growth by plasma membrane NADH oxidation, Pure and Applied Chemical Sciences, 1 (2013), 31-42. http://dx.doi.org/10.12988/pacs.2013.3310

[3] D.O. Hebb, The Organization of Behavior, Wiley, New York, 1949.

Editorial office
e-mail: ijco@m-hikari.com

Postal address:
Hikari Ltd, P.O. Box 85
Ruse 7000, Bulgaria

Street address:
Hikari Ltd, Rui planina str. 4, ent. 7/5
Ruse 7005, Bulgaria

www.m-hikari.com
Published by Hikari Ltd

Int. Journal of Computing and Optimization, Vol. 12, 2025, no. 1

Contents

Featured Articles of Vol. 11, 2024

International Journal of Computing and Optimization
Vol. 12, 2025, no. 1, 1 - 9
HIKARI Ltd, www.m-hikari.com
https://doi.org/10.12988/ijco.2025.9971

Management of Objective Evidence:

the GEVO WEB Project

Anthony Vitali [*], Antonio Verardi [*], Angelo Casarcia [*] and Egidi Gianluca[**]

[*] Servizi 3.0 Italia, via E. Cialdini 6, Latina, Italy
[**] SEA Tuscia S.r.l. via San Camillo De Lellis snc – 01100 Viterbo (VT), Italy

Abstract

The GEVO WEB research and development project aims, among other things, to explore all areas of change in the M.O.S. (Social Organization Model) intending to identify, first, the methods and tools with which to proactively manage the ongoing digital transition in the function of the new needs for knowledge and social awareness that arise. No scientific or social studies or publications have been identified that are useful for determining a real "starting point" for the research and development project.

The R&D activities, therefore, will include the conception/creation/ definition of a "digital environment" based on a mixed technology system capable of allowing interactions (digital navigation), in real time and without limitations or barriers of sector and/or between systems, of actors/users/providers/managers or of all the protagonists of those services and/or related service chains deriving from modern industrial relations and/or collective bargaining in all its forms intended as a significant structural element of the current Social Organization Model (MOS).

Keywords: Sustainability, Social Organization, Prototype, Process

1. Introduction

The purpose will be to make access to data and/or information simple and intuitive, direct and immediate, by the main components of the M.O.S. currently

in force, both incoming and outgoing, with particular attention and consideration for the Party represented by workers/citizens and their families.
The starting consideration, as of today, is that access to data and more generally to any type of knowledge useful or preparatory to making informed decisions regarding "knowledge of one's personal information" and/or "social evolution" is, in fact, impossible in global terms and difficult in sectoral terms due to the total absence of a service/technology/organizational infrastructure, both public and private, capable of allowing it, and there are no future projects in this direction.
The minimum expected result of the R&D project must be the definition/ elaboration of a "concept of a new system" as a whole (Global Vision - General Project) in addition to a macro solution in the form of a methodology/ technology/organizational system designed to digitize the supply chains of complex operations, carried out by multiple subjects whose interacting work produces an effective and recognized final result for a very specific purpose (validation of processes and results) applicable to any present or future service that is the object of this study.
Digitization must occur through the use of mixed technology (advanced and innovative) but with a prevalence, as far as possible, of IT and must allow the elimination of the use of paper documents or manual data loading procedures (existing - detected - measured), local and/or web-based inhomogeneous IT systems and/or other non-integrated (or integrable) systems. The system must include a strategy for their replacement and/or for their conversion, acquisition and subsequent absorption. The project must also allow for the simultaneous tracking of both the data of the operators in the supply chain and the "documents" and/or data (partial or entire) entered by them or originating during the manufacturing process. The expected benefit/objective will be to track all the components of the supply chain in question, connecting the operators with the contents and the relative sources, so as to obtain a single "certain management of the objective evidence" that form the supply chain itself and which consequently allow for the "certification/validation" of the final result in real time (certain and reliable data) regardless of the origins of the data. The research project called GEVO WEB (Management of Objective Evidence), must always follow, in all its phases, a very simple principle, that is, final data in a digital environment, to be considered certain and reliable, must necessarily be the product of a series of actions (service supply chain, partial data) that are equally certain and reliable. Furthermore, the GEVO WEB system must be able to act as a global unification tool, based on the principles of interoperability and interconnectivity between existing systems, to reduce the resilience to change of current users, operators and/or database managers, in sharing/migrating towards new unified, homogeneous and innovative systems such as GEVO WEB aims to be. The GEVO WEB system (digital environment) to be considered interoperable from and towards other IT systems (IT infrastructure), both current and future, private and public, national and/or European, first as a strategy and subsequently, if possible, as a technology.

2. Materials and methods

Objectives of the project

The primary objective consists in identifying one or more macro-areas (services) corresponding to the real and current needs of workers (or citizens in general) and devising a system to digitize the supply chains of all services managed (or not managed as of 2018) by IT systems by identifying one or more solutions for the acquisition and unification of available data.

The final objective, through the exploration of all available services and systems, will be to "imagine" how a simple worker or citizen, through his smartphone, could access in real time all the data and information that concerns him to be able, by way of non-exhaustive example:

A - Plan the path of one's social life starting from the first day of work and up to the first day of retirement, checking day by day the impact of one's choices on the estimated pension result, both in qualitative and quantitative terms.

B - Identify, based on the skills already possessed, new professional paths capable of "driving" personal career choices based on personal needs (change of profession or company), sector crisis or transfer to another EU country.

C - Evaluate the school career of one's children based on formal, non-formal and/or informal study paths, having the possibility of simulating the trend over time of the professional possibilities offered by the job market, planning the choices based on simulations that go from the first day of school to the first day of work and even beyond.

The objectives set for the R&D project teams are both current and concrete and totally without a solution (technological and/or social). Consequently, the certainty of a satisfactory overall result is extremely uncertain. Intermediate objectives seem to be the only solution to identify the extent of the problem and establish a starting point for new research since the resources made available by the client company, also considering the contribution of the partners, appear insufficient in relation to the amount of work to be completed in a limited period.

Operational and technological environments

- Primary areas.

The GEVO WEB project, intended as an overall project of a single or unified or unifiable digital environment, is based on a globalization strategy aimed at creating the conditions for a "friendly environment" in which all the parts that make up the Social Organizational Model (MOS) can meet and interact in real time without the possibility of misunderstandings and/or malfunctions. The primary objectives concerned the creation of a mixed-technology digital environment in which to experimentally merge data and information from the partners' archives to verify the functionality of the principles of supply chain traceability, validation of results, export and import of data from different types of databases as well as the simplification of the identification and access systems to the new system.

A wide range of areas of various nature have been defined in terms of services, both digital and non-digital, within which research first and then experimentation have been able to identify and investigate the nature of conflicts between hardware and software, between different technologies, between operators and human-machine interfaces, between manual procedures and digital needs, between data export and import procedures between various systems. Operational and technological environments - Secondary areas.
The GEVO WEB project, based on a unique intuition and overall vision (single technological environment), in order to facilitate the practical development of the various solutions to the many problems or conflicts, already existing or arising during the testing phase, within and between individual systems, has decided to break down the general research into individual project sections and for each of these has defined a re-engineering strategy for the individual reference system so as to obtain a general plan capable of guaranteeing the unification in a single place of different technologies for a conscious daily use of the web and among these, by way of example only: blockchain, AI, Machine Learning, Algorithms (including biometric and predictive types) and much more. The re-engineering of the IT components must be understood as one of the most important steps for the re-engineering of the entire digital system (or environment) which in turn will constitute the main vehicle for the global restructuring of the digital network on which the distribution, provision and management of user services depends, or the parts constituting the MOS.

Technology in use
- Cloud I mobile.
The GEVO WEB business model is currently being tested and uses cloud technology in combination with a mobile app in the design phase. Planned technology - Blockchain/mobile. The GEVO WEB project includes a new version based on the use of even more innovative technologies such as: blockchain integrated with IoT and AI, in combination with new generation mobile apps.
The system includes the technological integration of predictive algorithms to increase, for example, the efficiency of health protocols, as well as improving prevention actions in general for both workers and citizens. Project interoperability. The GEVO WEB project also includes advanced interoperability and interconnectivity functions, to be able to import/export information and data from and to databases and in general, other IT systems, both public and private. This specific feature allows for the reduction of the resilience to change of operators and managers of systems already in operation, as it is not necessary to make a choice that involves abandoning systems already in use and structured for more complex functions. Specifically, the GEVO WEB system provides compatibility and integrability with public administration systems and/or projects such to create tools such as the Electronic Health Record (FSE) and the Electronic Worker Record (FEL), etc., including the simple computer archive on the PC of private operators and/or the user.

The size of the catchment area to which the research applies. The GEVO WEB project, thanks to the collaboration of the partners or trade unions involved, will collect and manage, through the offices of all the unions, training centers, orientation centers, labor consultants, accountants and accounting experts, etc., the data regarding their activities. The research project and its actors will consequently have access to general data relating to the following information: A - Private sector workers. B - Public sector workers. C - Private sector companies. D - Professional firms of all types. E - Public bodies and associated companies. F - Employees of state-owned companies.

The nature of these typologies, starting from an existing archive located on a local server of the reference Partner, represented the structure of the different data constituting the archive shared with the Partners. To better explain and understand what the entire logic of this archive was based on, an example image is attached depicting the typology of users, roles, permissions and data in their entirety not only reported but also analyzed by the subjects involved.

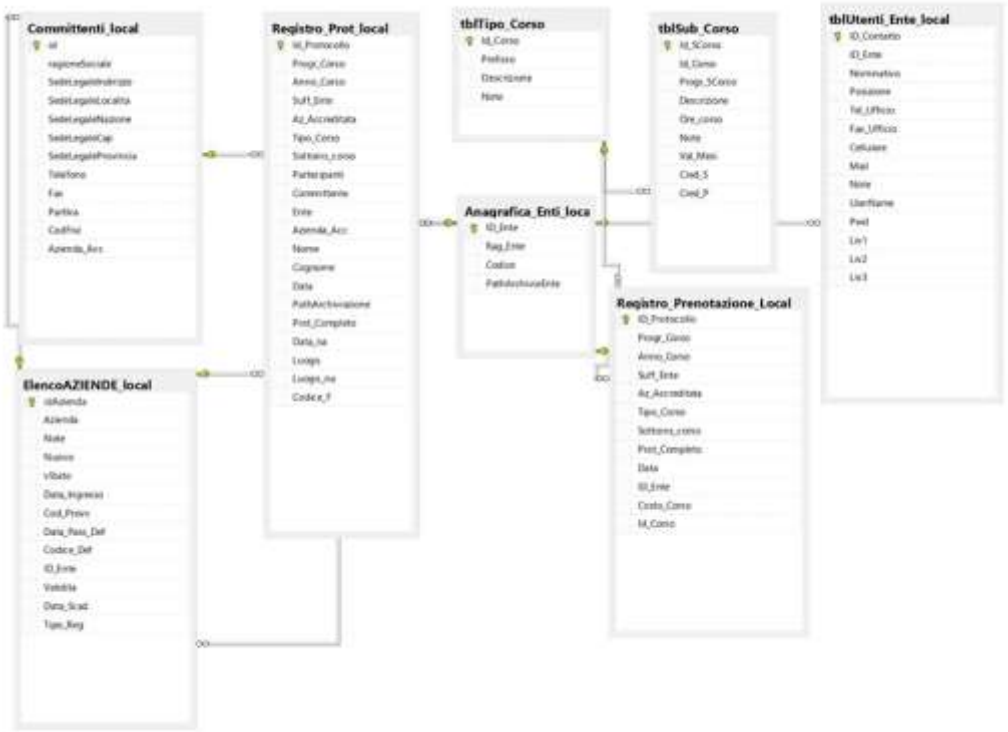

Figure 1. Protocol developed by GEVOWEB project

3. Conclusions

The project envisaged the achievement of the following objectives, based on key concepts:

- Evaluation of the product correspondence with the parameters defined by the Frascati and Oslo manuals
- Experimental activities, with the elaboration of research articles and other innovative results
- Evaluations of the main project variables
- Design activities

New procedures have been developed, new manufacturing processes have been studied through the acquisition of new technical and scientific skills, which have also led to the decision to make systemic and instrumental investments, and new dynamics of market demand and how to position oneself have been learned, reducing times and optimizing processes and creating new products.
The GEVO WEB project has allowed the development of new technical and scientific knowledge, implementing significant technological and organizational innovations. Advanced methodologies have been created, ensuring the digitalization of processes and improving access and management of information. The result achieved is the creation of a replicable prototype system, compliant with the criteria of the Frascati and Oslo manuals, with a positive impact on the transferability and reproducibility of the results.

References

[1] NACEDAL J., WRIGHT S.J., *Numerical Optimization*, Springer, New York, 1999. https://doi.org/10.1007/b98874

[2] SCHMIT C., BlEGLER L.T., Ouadratic programming methods for reduced Hessian SQP, *Comput. Chem. Eng.*, **18** (1994), 817. https://doi.org/10.1016/0098-1354(94)e0001-4

[3] TERNET D., BlEGLER L.T., Recent improvements to a multiplier-free reduced Hessian quadratic programming algorithm, *Comput. Chem. Eng.*, **21** (1997), 963. https://doi.org/10.1016/s0098-1354(98)00009-x

[4] CERVANTES A., BlEGLER L.T., Large-scale DAE optimization using simultaneous nonlinear programming formulations, *AiChE J.*, **44** (1997), 1038. https://doi.org/10.1002/aic.690440505

[5] BlEGLER L.T., GROSSNANN 1.E., WESTERBERG A.W., *Systematic Methods of Chemical Process Design*, Prentice Hall, New Jersey, 1997.

[6] FLOUDAS C. A., *Nonlinear and Mixed-Integer Optimization*, Oxford University Press, 1995. https://doi.org/10.1093/oso/9780195100563.001.0001

[7] ANDERSON J.L. (ED.), Industrial Applications of Chemical Process Synthesis, *Advances in Chemical Engineering*, **23** (1996), 1-62. https://doi.org/10.1016/s0065-2377(08)60201-x

[8] BROOKE A., KENDRICK D,, MEERAUS A., GAMS release 2.25: A User's Guide, GAMS Development Corporation, Washington DC.

[9] ROMeo Trainig Handbook, Getting started with ROMeo, Simulation Sciences Inc., California, 2000.

[10] gPROPS vl.7 Release Notes, Process Systems Enterprise Ltd., London, 1999.

[11] GARRAT T.J., VASSILIADIS V.S., Application of control vector parameterization in large-scale optimal control problems, paper presented at Aspen world 2000, Florida, Feb. 6-11, 2000.

[12] MUDT D.R., PETERSEN C.C., Use of rigorous models in refinery-wide optimisation, *Petroleum Technology Quarterly*, Winter 2000/01, 85.

[13] ONSTOTT B., LINN R., *ROMeo Provides State of the Art Optimization*, World Refining, November 2000, 26.

[14] FLOUDAS C.A., PARDALOS P.M. (ED.), *State of the Art In Global Optimization: Computational Methods and Applications*, Kluwer Academic Publishers, Dorecht, 1996.

[15] ADJIMAN C.S., DALLWIG, S., FLOUDAS C.A., NUEMAEIR A., A global optimization method, aBB, for general twice-differentiable constrained NLPs -1. theoretical advances, *Comput. Chem. Eng.*, **22** (1998), 1137. https://doi.org/10.1016/s0098-1354(98)00027-1

[16] ADJIMAN C.S., ANDROULAKIS I.P., FLOUDAS C.A., A global optimization method, aBB, for general twice-differentiable constrained NLPs - II. implementation and computational results, *Comput. Chem. Eng.*, **22** (1998), 1159. https://doi.org/10.1016/s0098-1354(98)00218-x

[17] GOFFE W.L., FERRIER G.D., ROGERS J., Global optimization of statistical functions with simulated annealing, *J. Econometrics*, **60** (1994), 65. https://doi.org/10.1016/0304-4076(94)90038-8

[18] INGEBER L., Simulated Annealing: Practice versus Theory, *J. Math. Comput. Model.*, **11** (1993), 29. https://doi.org/10.1016/0895-7177(93)90204-c

[19] FLOQUET P., PIBOLOUEAU L., DOMENNECH S., Separation sequence synthesis: How to use the simulated annealing procedure?, *Comput. Chem. Eng.*,

18 (1994), 1141. https://doi.org/10.1016/0098-1354(94)e0023-g

[20] CARDOSO M.F., SALSEDO R.L., FEYO DE AZEVEDO S., BARBOSAR D.A., Simulated annealing approach to the solution of MINLP problems, *Comput. Chem. Eng.*, **21** (1997), 1349. https://doi.org/10.1016/s0098-1354(97)00015-x

[21] HANKE M., LI P., Simulated annealing for the optimization of batch distillation production processes, *Comput. Chem. Eng.*, **24** (2000), 1. https://doi.org/10.1016/s0098-1354(00)00317-3

[22] LI. P., LÖWE K., ARELLANO GARCIA H., WOZNY G., Integration of simulated annealing to a simulation toll for dynamic optimization of chemical processes, *Chem. Eng. Proc.: Process Intensification*, **39** (2000), 257. https://doi.org/10.1016/s0255-2701(99)00100-2

[23] LÖWE K., Li P., WOZNY G., Development and experimental verification of a time-optima! startup strategy for a high purity distillation column, *Chem. Eng. Technol.*, **23** (2000), 841. https://doi.org/10.1002/1521-4125(200010)23:10<841::aid-ceat841>3.0.co;2-e

[24] BEUSTER F., Li P., SCHAFE N., WOZNY G., Parallel simulated annealing with a variable cooling strategy and spplication to optimal batch distillation, *AlChE Annual Meeting*, 31.10.-5.11.1999; Dallas, Paper 237f.

[25] FINLAYSON B.A., *Nonlinear Analysis in Chemical Engineering*, McGraw-Hill, New York, 1980.

[26] BOCK H G., PLITT K. J., A multiple shooting algorithm for direct solution of optimal control problems, *IFAC 9th World Congress, Budapest*, Hungry, July 2-6, (1984). https://doi.org/10.1016/s1474-6670(17)61205-9

[27] STEINBACH M., *Fast Recursive SQP Methods for Large-Scale Optimal Control Problems*, Ph.D Dissertation. Preprint 95-27, Universität Heidelberg, 1995.

[28] CECRVANTES A., BIEGLER L.T., Large-scale DAE optimization using a simultaneous NLP formulalion, *AlChE J.*, **44** (1998), 1038. https://doi.org/10.1002/aic.690440505

[29] LONGSDON J.S., BlEGLER L.T., Decomposition strategies for large-scale dynamic Optimizatioi Problems, *Chem. Eng. Sei.*, **47** (1992), 851 https://doi.org/10.1016/0009-2509(92)80272-e

[30] VASSILIADIS, V.S., PANTELIDES C.C., SARGENT R.W.H., Solution of a class of multistage dynamit optimization problems. I. problems without path constraints, *lnd. Eng. Chem. Res.*, **33** (1994), 2111. https://doi.org/10.1021/ie00033a014

[31] FEEHRY W. F., BARTON P. L, Dynamic Optimization with State Variable Path Constraints, *Comp Chem. Eng.*, **22** (1998), 1241. https://doi.org/10.1016/s0098-1354(98)00012-x

[32] Ll P., Entwicklung optimaler Führungsstrategien für Batch-Destillations-Prozesse, Fortschritt berichte VDI, Reihe 3, Nr. 560, 1998.

[33] LI P., ARELLANO-GARCIA H., WOZNY G., REUTER E., Optimization of a Semibatch Distillation Proc ess with Model Validation on the Industrial Site, *lnd. Eng. Chem. Res.*, **37** (1998), 1341. https://doi.org/10.1021/ie970695l

[34] LI P., FLENDER M., WOZNY G., FIEG, G., Development and Implementation of Dynamic Optima Operation Policies for Distillation Columns, *IFAC 14th World Congress*, **5** (1999), Beijing, 331-336. https://doi.org/10.1016/s1474-6670(17)57184-0

[35] WOZNY, G. LI P., Planning and Optimization of Dynamic Plant Operation, *Applied Thermal Engineering*, **20** (2000), 1393. https://doi.org/10.1016/s1359-4311(00)00014-4

[36] WENDT M., LI P., WOZNY G., Batch Distillation Optimization with a Multiple Time-Scale Sequentia Approach for Strong Nonlinear Processes, In: Proceeding of ESCAPE-10 (S. Pierucci ed.) *Computer-Aided Chemical Engineering*, **8** (2000), 121. https://doi.org/10.1016/s1570-7946(00)80022-x

[37] ENGEL V., STICHLMAIR J., GEIPEL W., A new model to predict liquid holdup in packed columns - using data based capacity measurement techniques, *IChemE Symposium*, **142** (1997), 939.

[38] IERAPETRITOU M. G., ACEVEDO J., PISTIKOPOULOS E. N.. An Optimization Approach for Process Engineering Problems under Uncertainty, *Computers Chem. Eng.*. **20** (1996), 703. https://doi.org/10.1016/0098-1354(95)00203-0

[39] WHITING W.B., Effects of Uncertainties in Thermodynamic Data and Models on Process Calcula lions, *J. Chem. Eng. Data*, **41** (1996), 935. https://doi.org/10.1021/je9600764

Received: January 15, 2025; Published: February 7, 2025