Proposal for Collaboration
between

GETCA Inc.

and

School of Informatics and Computing
German-Jordanian University

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Part I
Summary of GETCA Activities

The society GETCA proposes new technologies for web search engine. To summarize their concepts, they want to evolve the current web search engine which based on word indexation, toward intelligent web search engine based on knowledge indexation.

The goal of GETCA Inc. is not to abandon the nowadays technology of word indexation, which promote Google as the spread-heading, for a new one, but to develop this current technology using intelligent processes involving agent technologies, natural language processing and question answering technologies.

The current products developed by GETCA Inc. are not currently in public usage but only in the stage of testing and validation by their own teams.

Two main products have been developed or in progress : (i) GASET which is the core of the new intelligent web search engine while (ii) GBSET which is intelligent search engine specialized in business applications based on autonomous B2B (Business to business) tools.

Artificial Intelligence Powered Web Search Engine: GASET

GASET project proposes new concepts in search engines based on artificial intelligence technologies. Natural language processing and question answering technologies are used for this purpose in order to implement new search engine systems able to adapt to the user. The interaction mechanisms have been developed through the user interface. They lead to implement dynamical processes that able to analyze the user practices and adapt to them.

Innovative B2B online services users: GBSET

GBSET is expected to propose various autonomous B2B services. The search interface become customized to the specific service involved. The system suppose to dynamically adapt the users needs. Potential business resources and partners are currently studied and could lead to specific interfaces.

Part II
Collaboration Proposal

1 Scientific Context for Collaboration

Two visions for AI powered web search engine and services users based on the information structure can be considered in order to define our contribution to GETCA projects:

- General AI powered search engines can be managed by statistical learning methods. These kind of methods are generally used for huge unstructured data bases;
- When the data bases are more specific as it will appear for services users in the GBSET project, a structured representation of the knowledge can be managed by a dynamic graph such as evolving cognitive maps that able to be adaptive to the user.

Moreover, developments of autonomous, intelligent agents that employ different artificial intelligence techniques such as: artificial neural networks, fuzzy systems and evolutionary computation can be developed in order to assist different user tasks. Specifically, developments of methods for rapid agent learning from both user performance and from the information content of queries and documents, could be implemented to increase the efficiency of the system.

Next section describes a proposal of collaboration based on the classification that we have just proposed.

2 Collaboration Offer Context

In this section, we propose (i) some contributions in the core of the AI powered search engine, (ii) some contributions on the service users area in order to develop specific topics for the GBSET project. We conclude on the academic offer based on GJU team but also on its scientific context including international scientific networks.

2.1 AI powered search engine development contribution

Statistical learning for general AI powered search engine

The project GASET involves artificial intelligence inside search engines, allowing mainly to adapt these search engines to the user, using natural language processing and questions answering technologies. The innovative issues concern dynamic adaptation and to go further

toward these objectives, learning processes could be involved. Statistical learning could be considered according to the huge amount of data to be considered in the case of non specialized data area.

Dynamical structure-based knowledge with intelligent adaptation to the user

When the data bases are more specifically used within the context of a given service, it is possible to propose an algorithm for computing the emergent structures corresponding to the knowledge base associated to this given service. This new algorithm is based on cognitive map. To achieve an innovative system that adapts the user efficiently, we propose to follow the user behavior during his research through the cognitive maps/graphs, then extract a kind of user profile that is able to evolve dynamically and so to adapt to the user during his practice.

The model of the adaptive process proposed here, by the introduction of user traces on the cognitive maps/graphs is similar to swarm intelligence processes in the ant system where social ants deposit pheromone on their environment to structure the perception and the knowledge of this environment for its community.

2.2 Service user development contribution

According to the high-level specialization of the school of informatics and computing faculty members, some development of specific service users (according to the development of GBSET project) can be proposed for the following areas:

- **E-learning and Didactics Area Engineering**
  E-learning and didactics is nowadays a scientific sector which is in high development. With the collaboration of academic institution or Universities, we can suppose that many societies will be developed on the knowledge economy concept. The development of didactics data base and intelligent processes to access and develop such data base is probably an opportunity for the next decade or more.

- **Artificial Intelligence Engineering**
  Artificial intelligence engineering needs for itself intelligent search engines allowing to adapt to the very specific language used in this scientific area. Metaphors of many natural processes are used in this disciplinary (like genetic algorithms) and the development of an adaptive context for search engine could be of great interest for the scientists or for the industries that use more and more intelligent processes in various engineering applications.

- **Territorial Intelligence Engineering**
  Territorial Intelligence is a professional sector which is today in huge development. Climate change and environmental land-use management within sustainable development

become a necessary problem for city and countries management. Efficient search engines dedicated to specific data base like spatial data bases used in GIS will lead to efficient tools to assist people in decision making.

- **Agent based technology**
  Growing complexity of computer systems and networks and the increasing amount of different kinds of information available in the web increases the complexity of locating relevant information, distributed nature of these systems (data, software, users, etc.). The need for self-manageability of a complex systems make the usage of agents based approach is the right choice for sustainable solution.

- **Computer Networks Development and Security Engineering**
  The computers networks development and security engineering are typically consumers of specific language dedicated to their high-level technologies. Structured knowledge development could be of great benefit for the experts of these systems.

- **Medical Assistance based on New Technologies**
  Medical assistance based on expert systems becomes a challenge for the future. The use of multi-agent systems with very high-level specialists in medicine make this area an active research area for intelligence research engine.

- **Image processing Engineering**
  Image processing engineering use also a specific language where structured knowledge could be of great benefit for the experts of these systems.

2.3 Academic Reference Offer: GJU and its environment

The German-Jordanian University (GJU) is a public comprehensive university devoted to academic distinction in teaching, research, and community service. The conduct of research, scholarship, and creative activities is at the core of the University multiple missions of education, research, service, and outreach to the nation, region and beyond.

GJU and some of its members are involved inside scientific networks or international collaborations that are detailed in the next sections.

International scientific networks or institutions

- **RNSC** (French National Network on Complex Systems)
  This huge national network is aimed to organize all the researches in complex systems in France. Several hundred of researchers belong to this network.
  Contact in GJU: Rawan Ghnemat

- **ISCN** (French Institute of Complex Systems in Normandy)
  This new institute is aimed to structure researches in complex systems. It is a new node of the RNSC.
  Contact in GJU: Rawan Ghnemat

International collaborations

- **LITIS - University of Le Havre, France**
  Local contact: Cyrille Bertelle
  Contact in GJU: Rawan Ghnemat

- **LITIS - INSA Rouen, France** (National Applied Science Institute)
  Local contact: Habib Abdulrab
  Contact in GJU: Rawan Ghnemat

- **UMR IDEES - MTG - University of Rouen, France**
  Local contact: Francoise Lucchini
  Contact in GJU: Rawan Ghnemat

- **LIPN - University of Paris XIII, France**
  Local contact: Gérard H.E. Duchamp
  Contact in GJU: Rawan Ghnemat

- **DeMonfort University, Leceister, UK**
  Local contact: Aladdin Ayesh
  Contact in GJU: Rawan Ghnemat

- **Lorand Eotvos University, Budapest, Hungary**
  Local contact: Laszlo Gulyas
  Contact in GJU: Rawan Ghnemat

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