



INNOVATIVE SOLUTIONS FOR KNOWLEDGE

ESTABLISHED
interoperability
CAPABILITY



Pragati Synergetic Research, Inc.

LEADERSHIP

Pragati provides innovative software solutions for analysis of knowledge embedded in complex military and government information systems to facilitate their reuse, interoperability, and quality assurance.

Pragati's patented clustering technology provides unique value through domain- and representation-independent analysis of knowledge bases, ontologies, databases and stylized natural language text.

Mission

Pragati's mission is to support knowledge engineers and system integrators in understanding, enhancing and integrating software systems efficiently and accurately by:

- *Supporting easy navigation of multiple, complex information systems*
- *Exposing serendipitous relationships within and across systems*
- *Enabling context-based information extraction*



VALUE PROPOSITION

To build and maintain reliable systems cost-effectively, the knowledge in the system must be suitably abstracted, structured, and clustered. Such abstractions can also facilitate mapping of concepts from one system to another.

Pragati's unique clustering-based solution maximizes return on investment and reduces the overall software development effort.

Our Approach:

- *Enhances comprehension*
- *Facilitates reuse*
- *Enables interoperability*
- *Improves software quality*



PRODUCT

Expozé Tool Suite

Pragati's flagship product, *Expozé*, is an integrated suite of modules that presents cognitively useful perspectives of software systems.

At its core, is a clustering engine that ingests software systems and groups entities within these systems, based on their syntactic and semantic similarities.

Expozé's differentiating clustering technology:

- *Finds "collaboration groups," i.e., sets of entities that work together, thus providing the context for the terms being analyzed.*
- *Detects partial or "fuzzy" relationships between terms, within and across systems.*
- *Reveals potential mapping regions that are not exposed by simplistic approaches such as substring matching.*
- *Discovers easily overlooked and non-obvious patterns across multiple sets of entities.*



FUNCTIONALITIES

Expozé Tool Suite facilitates:

Comprehension

- Understanding systems both from hierarchical (detail to abstract) and orthogonal (contextually distinct) perspectives.

Knowledge Reuse

- Identification of reuse opportunities in systems through component and template formation.

Mapping

- Mapping and alignment of concepts based on common/overlapping contexts in systems.

Quality Assurance

- Exposing inconsistent and redundant concepts and "infelicitous" knowledge entry patterns.

Information Extraction

- Concept extraction from semi-structured text for creation of ontologies and taxonomies.



PRODUCT FEATURES

Query and Analysis

Expozé allows search across multiple clustered information sources

- *Cluster View*
 - Hierarchical view of clusters showing dominant terms
- *Vicinity Concepts View*
 - View of terms surrounding the query term
- *Term Relationships View*
 - Co-occurrence relationship of all terms in a cluster
- *Entities View*
 - Textual source representation of entities in a cluster
- *Graphical View*
 - Graphical representation of the information source showing terms and their relationships



PRODUCT FEATURES (Contd.)

Reuse

- Discover and capture recurring patterns across entities as templates. Supports template:
 - Extraction
 - Storage
 - Search
 - Adaptation

Mapping

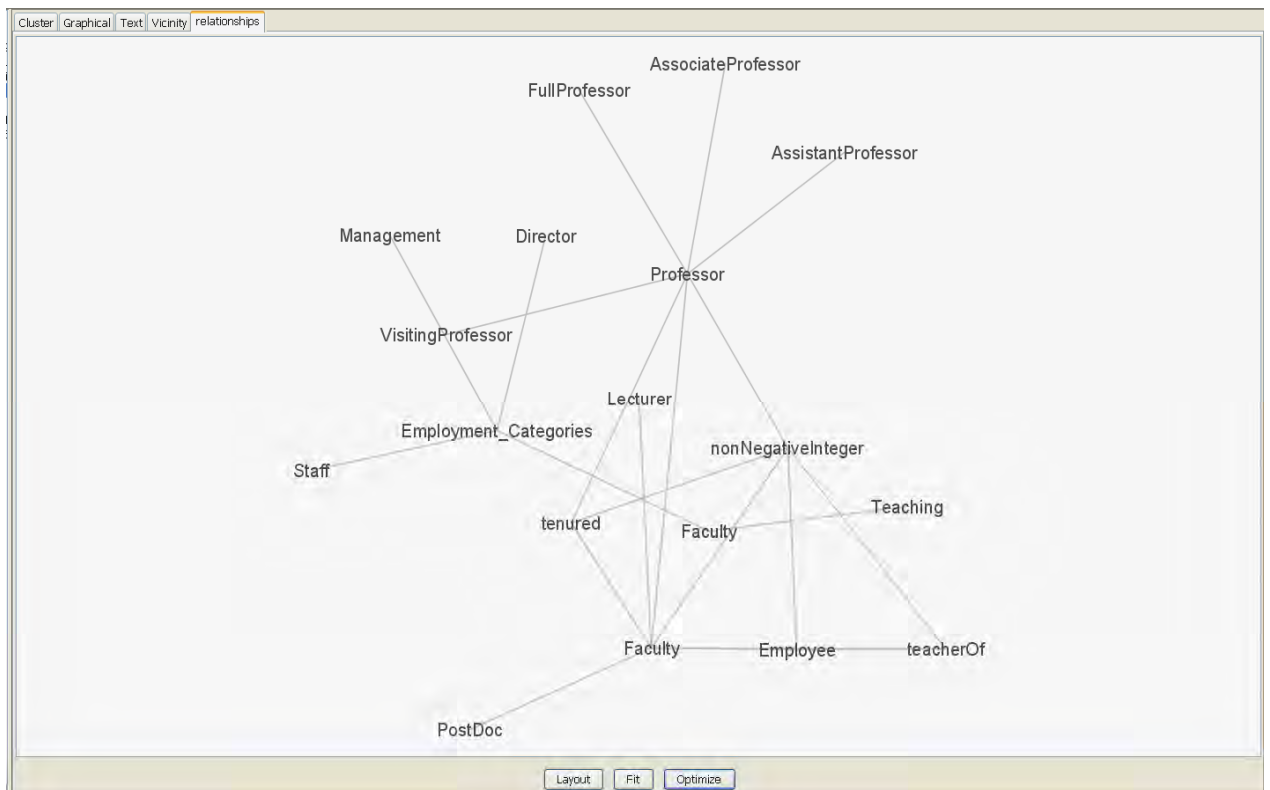
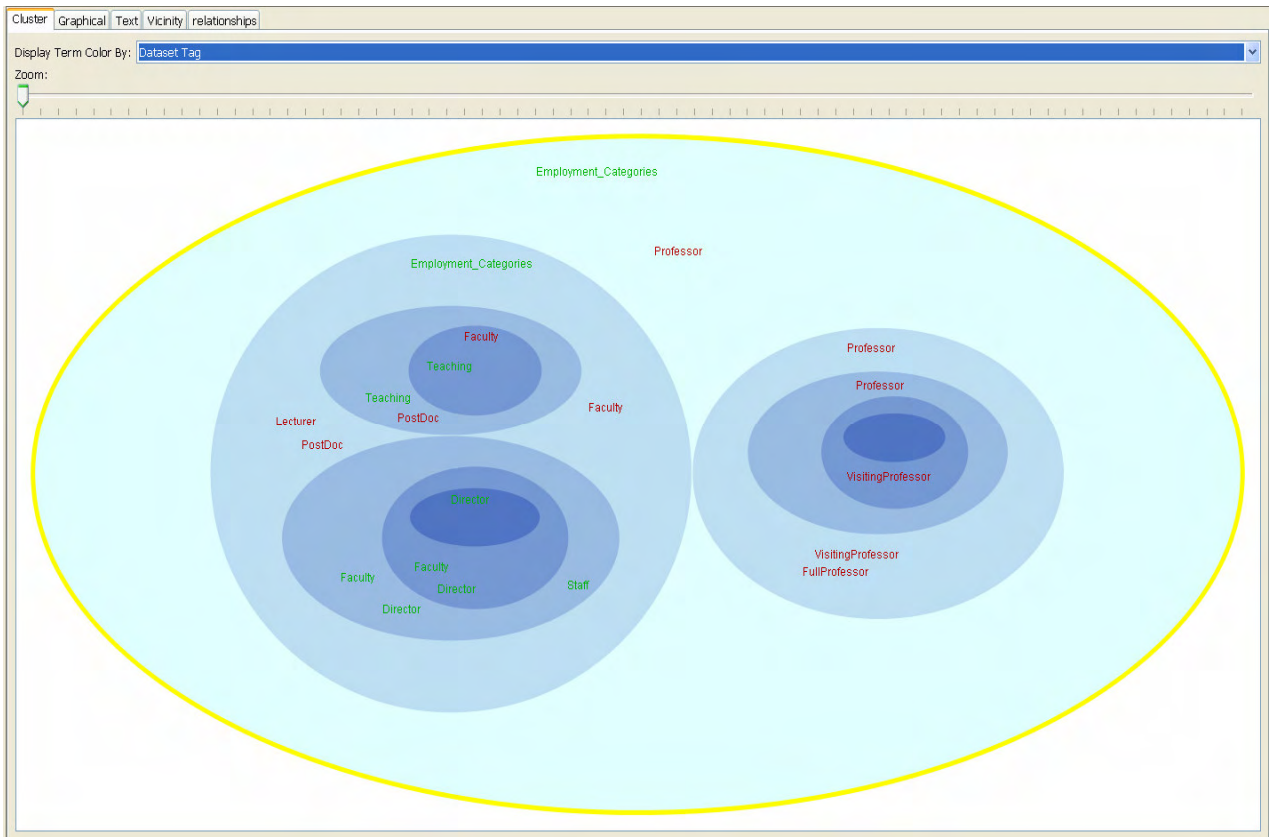
- Identification of potentially related terms across systems based on:
 - Syntax
 - Semantics
 - Context

Application Programming Interface

- Web-services-based programming interface for external applications such as authoring and visualization tools



PRODUCT SNAPSHOTS



CORPORATE EXPERIENCE

Pragati's track record of proven successes spans multiple agencies and disciplines. Here is a short description of a few of our projects and their sponsors:

OWL Ontology Projects: Intelligence Community

Expozé tool suite aids ontologists in performing contextual searches for relevant ontologies and ontological concepts on the semantic web so that they can be reused.

Rapid Knowledge Formation (RKF) Project: DARPA

Pragati's technology aided subject matter experts in building RKF knowledge bases by (a) detecting nearly similar & often conflicting concept definitions from multiple authors, (b) discovering recurring usage patterns for subsequent reuse in knowledge bases & (c) exposing componentizable regions for restructuring of knowledge base for efficiency and maintenance.

COE (Collaborative Ontology Environment) Project: IHMC

Expozé was implemented as a web-based service to IHMC's (Institute for Human & Machine Cognition) concept-maps-based, OWL ontology authoring tool, COE (Collaborative Ontology Environment). Expozé provided cluster-based cognitive assistance to COE authoring, by searching for contextual similarity across groups of inter-related OWL concepts on the semantic web.

Integrated Marine Multi-Agent Command & Control System (IMMACCS): US Marine Corps

Pragati's clustering technology exposed factorizable regions in lengthy Clips rules for IMMACCS and suggested corresponding reorganizations in the IMMACCS core object model.



CORPORATE EXPERIENCE (Contd.)

OnBoard Navigation System (ONAV): NASA Johnson

Pragati's clustering technology suggested alternate partitionings of ONAV's CLIPS rules by exposing subtle inter-relationships across rules in several different files with a view to improving the long-term maintenance and management of the system.

X-Ray Timing Explorer (XTE): NASA Goddard

Pragati's tools identified functional clusters of GenSAA rules from widely separated regions of XTE, that could be reused across various NASA missions. In addition, we exposed incorrect naming conventions in XTE.

Spacecraft Environment Anomalies-Expert System (SEA-ES): The Aerospace Corporation

Pragati's technology exposed inconsistencies and redundancies across the rules in the system. Also exposed reusable regions in the software.

FUSE (Far Ultraviolet Spectroscopic Explorer) Project's Unexpected Events System (UES): NASA Goddard

Pragati's tool clustered the UES system such that various values for different pseudo mnemonics could be easily checked for consistency. Proliferation of mnemonics and pseudo-mnemonics had made this knowledge base very error-prone to human input.

Pavement Maintenance Expert System (PAMEX): Department of Transportation

Pragati's clustering technology presented alternate organizations of the pavement diagnostic search tree. The search space for different types of pavement deterioration was too large in PAMEX for verification, validation and maintenance. Exposing alternate structurings of PAMEX helped knowledge engineers verify the correctness of the system from multiple viewpoints.



CUSTOMERS

Current and past customers include a large number of government organizations, such as:

- *DARPA*
- *Intelligence Community*
- *US Air Force*
- *US Navy*
- *NASA*
- *National Science Foundation*
- *US Department of Transportation*
- *Joint Forces Command*



MARKETS

Pragati's patented clustering technology has been applied across a wide spectrum of application areas, including:

- *Multi-Agent Command & Control Systems*
- *Modeling & Simulation Systems*
- *Intelligence Operations Systems*
- *Space & Satellite Telemetry Systems*
- *Transportation Systems*
- *Tracking & Monitoring Systems*
- *Diagnostic Systems*
- *Bio-Informatics Systems*
- *Educational & Training Systems*
- *Radar Signal Processing Systems*



ENGAGEMENT MODELS

Pragati's technology can be utilized under the following options:

- *Software License including training and maintenance*
- *Turnkey solutions: tailoring & on-site installation*
- *Consulting services: analysis of customer systems*
- *Web-services-based centralized server*



COMPANY INFORMATION

Pragati Synergetic Research, Inc. is an 8a minority, woman-owned, small and disadvantaged business (SDB), headquartered in Silicon Valley, California. Pragati has board members and consultants from prestigious institutions like MIT, Stanford and IIT (India) and it draws upon valuable expertise of Silicon Valley professionals for its software analysis & development.

Its founder and current President/CEO, Mala Mehrotra, was a researcher at NASA Langley Research Center from 1989 – 1993 before she established Pragati Inc. in August of 1993. She has a Masters in Computer Science from College of William & Mary in Virginia, as well as a Masters in Physics from Delhi University India. Since the inception of Pragati, she has worked on several federal contracts, SBIRs, BAAs and grants with agencies such as, DARPA, Air Force, Navy, NASA, and NSF. She has several publications and serves on various important standardization efforts such as, W3C's RIF (Rule Interchange Format) and IEEE's meta-standard XMDR (Extended MetaData Registry) working groups.



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