

Predictive Analysis - Geo-spatial Temporal Data Visualization

converting
information to
intelligence

Intelligence analysts are confronted with an information bottleneck of unprecedented proportions.

The omnipresent digital domain has combined with communication technology to enable new forms of information (e-mail, voice-to-data), expanding the incoming information by an order of magnitude.

Analysts must turn this information into intelligence by quickly, thoroughly and precisely scanning 5,000 documents a day or more for relevance to a growing number of threats, route relevant information to appropriate subject matter experts for analysis, and then issue precise, **actionable** intelligence to war fighters or first responders.

The current generation of information management technology can not give the analyst the tools needed to handle the vast influx of information or recognize meaningful concepts within the information, concepts that could add up to intelligence.

In recognition of this fact, Microlanguage™ built a proof-of-principle prototype *predictive* analysis application on the ObjectFX™ SpatialFX™ J2EE compliant mapping software Platform that demonstrates the power of ObjectFX's data visualization and mapping tools, and the power of Microlanguage's Thematix™ intelligent language processing technology to:

- ▶ **isolate** and extract relevant information from mountains of data
- ▶ dramatically **reduce** the amount of time analysts lose sifting through irrelevant data
- ▶ **eliminate** the need for repeat searches because insufficient quantities of relevant information, or information of little value is retrieved
- ▶ **assemble** discrete and seemingly unrelated bits of information into keys that can unlock plots and preempt threats
- ▶ dramatically improve the **precision** and **recall** of content retrieval and knowledge management systems

threat scenarios
emerge

Microlanguage and ObjectFX have demonstrated the proof-of-principle geo-spatial, temporal data visualization application to the intelligence community¹. This application can:

- ▶ **recognize** thematic and conceptual content in disparate document types (articles, e-mails, sitreps, wire service feeds) within a knowledgebase
- ▶ **browse** a knowledgebase in three dimensions:

1. THEMATICALLY, according to the themes, concepts, or events in the documents;

¹ At the Information Sharing and Homeland Security Convention, Philadelphia, PA, August 19 – 21, 2002, and at the Threat Prediction and Geospatial Intelligence Seminar, November 13, 2002, McLean, VA



2. GEO-SPATIALLY, according to the latitude and longitude of the place that the events in the document occurred; and
 3. TEMPORALLY, according to the time that those events took place.
- ▶ visualize patterns and clusters of potentially threatening activities surrounding potential targets, connect the dots, and issue intelligence to first responders and war fighters

The screenshot displays a web browser window titled "http://localhost:8888/microlanguage/MicrolanguageMap.html - Microsoft Internet Explorer". The main interface features a map of the Northeastern United States, including parts of New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Florida, Alabama, Louisiana, Mississippi, and Texas. The map is overlaid with several windows and controls:

- Thematic Controls:** A sidebar on the left contains a tree-view menu with options like "Terrorist Activity", "Terrorist Names", "Terrorist Cash", "Public Events", "Potential Target", "Bomb Component", "Street Crime", and "Stolen Vehicle". An "Activate" button is at the bottom.
- Relevant Documents:** A pop-up window titled "Relevant Documents" shows a list of documents, including "New York This Nov 07 00:00:00 EST 2002" and "Police Stolen Vehicle Report".
- Map Controls:** A toolbar at the top right of the map area contains various navigation and interaction tools.
- Legend:** A legend on the right side of the map lists various map features like "City", "Medium City", "Large City", "World City", "Limited Access Highway", "National Highway", "Regional Highway", "Medium Place", "Large Place", "State", "CanadaAndMexico", and "WorldWater".
- Microlanguage Powered Search:** A search window at the bottom right displays a "FEDERAL BUREAU OF INVESTIGATION ILLEGAL ACCOUNT ACTIVITY REPORT" with details such as "DATE: 20021107", "ACCOUNT: BA 2437-2347-82347-34", "ACCOUNT OWNER: karol al zavalin", "ACTIVITY: Credit, Vanguard", "LOCATION: First International", and "Date=11/07/2002".
- Temporal Control:** A small window at the bottom center shows "This Nov 07 00:00:00 EST 2002".

Annotations on the left side of the image provide instructions for using these features:

- Thematic Controls:**
 - > Themes are Organized in Tree-View (new)
 - > Select Theme(s) of Interest
 - > Click Activate & Push Pins Appear
 - > Push Pin Color is (new) Coded to the Relative Weight of each Theme
- Click on Any Push Pin:**
 - > Pop up Window Contains List of Relevant Documents with Hyperlinks
- Hover Over Any Push Pin:**
 - > Get a Tool Tip Containing a Mini-Table-of-Contents
 - > Enables Quick Exploration of the Data
- XML Document Tagging:**
 - > Concept Extracted (theme)
 - > Location Derived (geo-spatial)
 - > Date Derived (temporal)
- Temporal Control:**
 - > Manipulate Time Domain to Visualize Patterns and Trends

About Microlanguage

Microlanguage has built its reputation for providing high value solutions on three main strengths: its core technologies, its application development and integration skills, and its commitment to meeting each customer's need for support the first time, every time. For more information or to arrange a personal demonstration of Thematrix, please visit Microlanguage on the Web at www.microlanguage.com or contact Greg Swarts, Director of Marketing and Sales, at 610-995-1017 or via e-mail at greg.swarts@microlanguage.com.

About ObjectFX

ObjectFX provides SpatialFX, an innovative Java-based software platform that enables the integration of dynamic location-based services such as mapping, vehicle routing, address geocoding and other spatial operations into enterprise applications. Users of applications built on the SpatialFX(tm) Platform can see and interact with real-time, integrated views of information in a location-based context, thereby enabling faster, more effective decisions. For more information or to arrange a personal demonstration of SpatialFX, please visit ObjectFX on the Web at www.objectfx.com or contact our government sales team at 410-884-4090.