From Propensity to Sell and Price Predictions to Cognitive Recommendations using Real Estate standard Ontology

Dr. Umesh Harigopal, Antony Satyadas, and Matt Kumar
Umesh Harigopal, PhD  
Managing Partner &  
Chief Innovation Officer  
Innovation Incubator, Inc.

Antony Satyadas  
CEO, Managing Partner,  
& Co-Founder  
Innovation Incubator, Inc.

Matt Kumar  
Chairman, Managing  
Partner, & Co-Founder  
Innovation Incubator, Inc.

Check out our conference app for more information about this speaker and to view the handouts!
Insights we are on a path to generate

• Recommend When to sell a home
• Recommend Who to work with to buy/sell my home
• Owner’s Propensity to Sell
• Best home to buy – local market or any target market
• Predict a home price
• Recommend Best Investments

Challenges that we frequently stumble upon:
• Semantically inconsistent data
• Partially specified data
• Integration of disparate information domains
• Natural language with incomplete sentences
We introduced RESO maturity model @ Spring 2016 RESO

One dimension was around Big Data/Insight Retrieval/Delivery Maturity

- **Structured Queries & EDI**
  - Queries tied to the data structures
  - Rigid data exchange protocols

- **B2B Integration Web Services**
  - Discoverable Web Services
  - Well suited for service to service integration
  - Heavy-weight SOAP/XML with flexibility – strongly typed w/ document attachments

- **Use Case driven APIs**
  - RESTful APIs with JSON or XML payload
  - APIs purpose-built for various use cases – search, lookup, detail, etc.

- **Ontology-based APIs**
  - RESTful or SOAP APIs based on a shared ontology
  - Generic API with generalized querying
  - Leverages the ontology to understand and respond to a request

- **Contextual & Intentional NLP Dialog**
  - Natural language request and response
  - Use context to understand user’s intent and respond with relevant and actionable information
Our Solution Approach – Evolve Metadata to Ontology

- Property
- Listing
- Assessment
- Recorder
- Neighborhood
- Local / Global News
- Personal
- Financial

Data Integration

Natural Language Processing

Derived Knowledge Graph

Machine Learning Models

Query Engine

Analytics Engine

RE Ontology
Ontology Zoom-in: Self-Evolving Ontology

- **Property**
  - has
  - **Pool**
    - Has attribute
      - **Type**
        - is
        - **In ground**
        - **Above ground**
      - **Heating**
        - is
        - **Gas Heated**
        - **Solar Heated**
      - **Ownership**
        - is
        - **Private**
  - **Water Feature**
    - is a
    - **Spa**
  - **Utilities**
    - is a
    - **Gas**
      - uses
      - **Water Heater**
        - is a
        - **Appliance**
Generate complex knowledge graphs for many properties

- Property
  - has
  - Pool
    - Has attribute
      - Type
        - is
          - In ground
          - Above ground
      - Heating
        - is
          - Gas Heated
          - Solar Heated
      - Ownership
        - is
          - Private
    - Association
      - is
        - Cooperative
        - Home Owner’s Association
  - Water Feature
    - is
      - Spa
      - Utilities
        - is
          - Gas
          - Water Heater
          - Appliance
Generate complex knowledge graphs for all information

Demographics
Master Plan
News
Schools
Religious Centers
County
Town
Neighborhood
Industry
Employer
Owner
Tenant
Workplaces
Shopping
Example: Price prediction based on Twitter News Feeds

- Assess influence of different categories of news on home prices
- Learn the degree of influence, time period of influence, and “influence decay” curves from historic and live transaction data
Price prediction back testing results look promising

Raw Price Trend Data for 33142 – Miami, FL

Predicted Price Trend for 33142 – Miami, FL
DISCUSSION & QUESTIONS
Thank You

Contact:

Umesh Harigopal – umesh@innovationincubator.com
Antony Satyadas – antony@innovationincubator.com
Matt Kumar – matt@innovationincubator.com