OmniSearch is a semantic search software specifically designed for cancer biologists. It will assist biologists and bioinformaticians in unraveling critical roles of microRNAs (a.k.a. miRNAs or miRs) in various human cancers. OmniSearch can be used to obtain unified knowledge related to miRs and thus derive unique insights for the regulation and control of cancer disease processes.
Manual integration of information from heterogeneous sources has become labor-intensive and error-prone.
Proposed Solution

- **Start**
  - AIM 1: Create miRNA domain ontologies
  - AIM 2: Develop OmniSearch miRNA Knowledgebase
  - AIM 3: Thorough, iterative evaluation of system performance

**Upper Ontologies and Existing Bio-Ontologies**
- Upper Ontologies: BFO
- Existing Bio-Ontologies:
  - GO
  - SO
  - PRO
  - NEMO
  - HDO
  - FMA
  - PubMed
  - KEGG
  - miRDB
  - Target Scan
  - Target DB n

OmniSearch User Interface
feedback and enhancement mechanism
1. Handles the urgent need of effective miRNA data sharing, data integration, and knowledge acquisition in everyday human cancer research.
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2. Significantly accelerates cancer biology research
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   • establishing data exchange standards and common data elements
   • sustained effort to promote data sharing
   • enhanced support of community-based, research-driven informatics technology development
   • improved mechanisms to support software development
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4. OMIT is the first ontology of its kind that formally encodes miRNA knowledge, providing the community with a systematically structured, precisely defined controlled vocabulary, along with relationships among concepts, thus rendering precise semantics for the domain
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5. Contributes to bio-ontology community by term reuse and ontology cross-referencing
Software Architecture
User Interface Flowchart
<table>
<thead>
<tr>
<th>Year</th>
<th>Project Activities</th>
<th>Milestones by the End of Each Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1</td>
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<tr>
<td>Y2</td>
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</tr>
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<td>• Other software modules; initial OmniSearch package</td>
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<td>Y3</td>
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Collaborating with a wide range of bio-ontology community: Gene Ontology (GO), Sequence Ontology (SO), PRotein Ontology (PRO), Chemical Entities of Biological Interest Ontology (CHEBI), Ontology for Biomedical Investigations (OBI), and Uber Anatomy Ontology (UBERON)
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- **NCBO BioPortal:** [https://bioportal.bioontology.org/ontologies/OMIT](https://bioportal.bioontology.org/ontologies/OMIT)
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- GitHub: https://github.com/OmniSearch

- GUI Tutorial on YouTube: https://www.youtube.com/watch?v=kCFm4YkNvEg
Software Interface


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• NIH NCI ITCR Initiative
• University of South Alabama Team
• University of Oregon Team
• University of Buffalo – SUNY Team
• Gene Ontology
• Sequence Ontology
• PRotein Ontology
Questions?

THANKS!
https://www.youtube.com/watch?v=kCFm4YkNvEg