



# Intelligent and Active Systems That Can Ask the Right Questions

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“Who We Are” Seminars

IIT

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# Bio

- Bachelor's: The University of Texas at Austin, 2004
  - Ray Mooney on Recommender Systems
- PhD: The University of Maryland at College Park, 2010
  - Lise Getoor on statistical relational learning and active learning
- Assistant Professor of Computer Science, IIT, 2010

# Research Interests

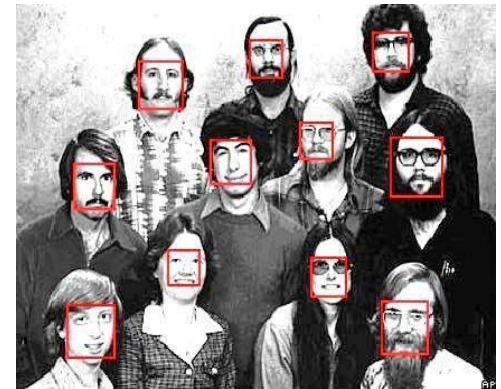
- Machine learning and data mining
- Active learning and inference, interactive machine learning
- Probabilistic graphical models, statistical relational learning
- Social network analysis
- Information visualization



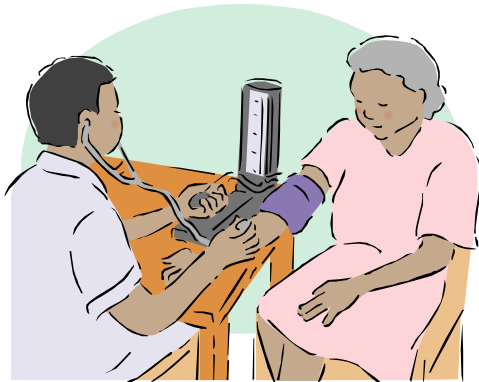
Spam Detection



Speech Recognition



Face Detection



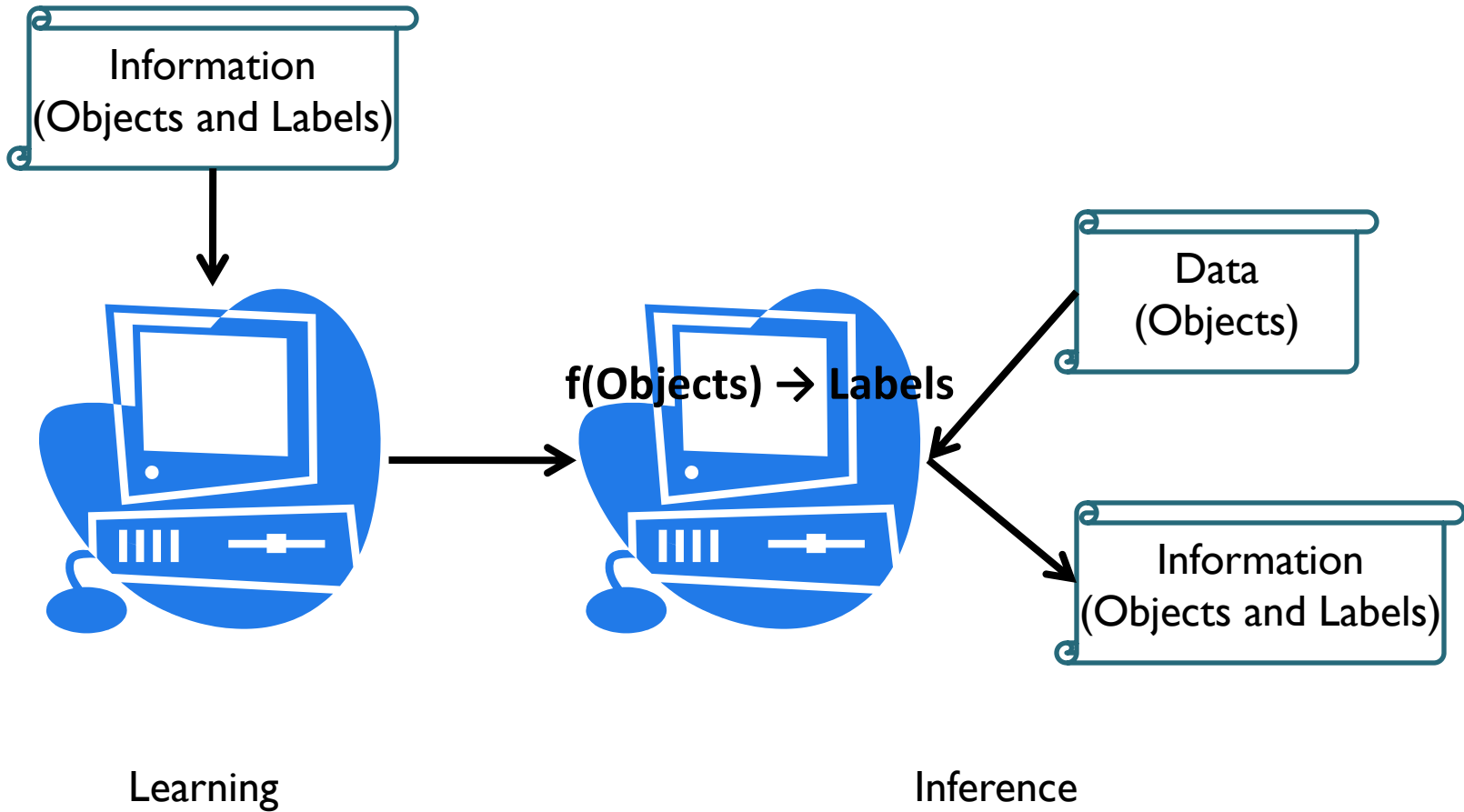
Medical Diagnosis

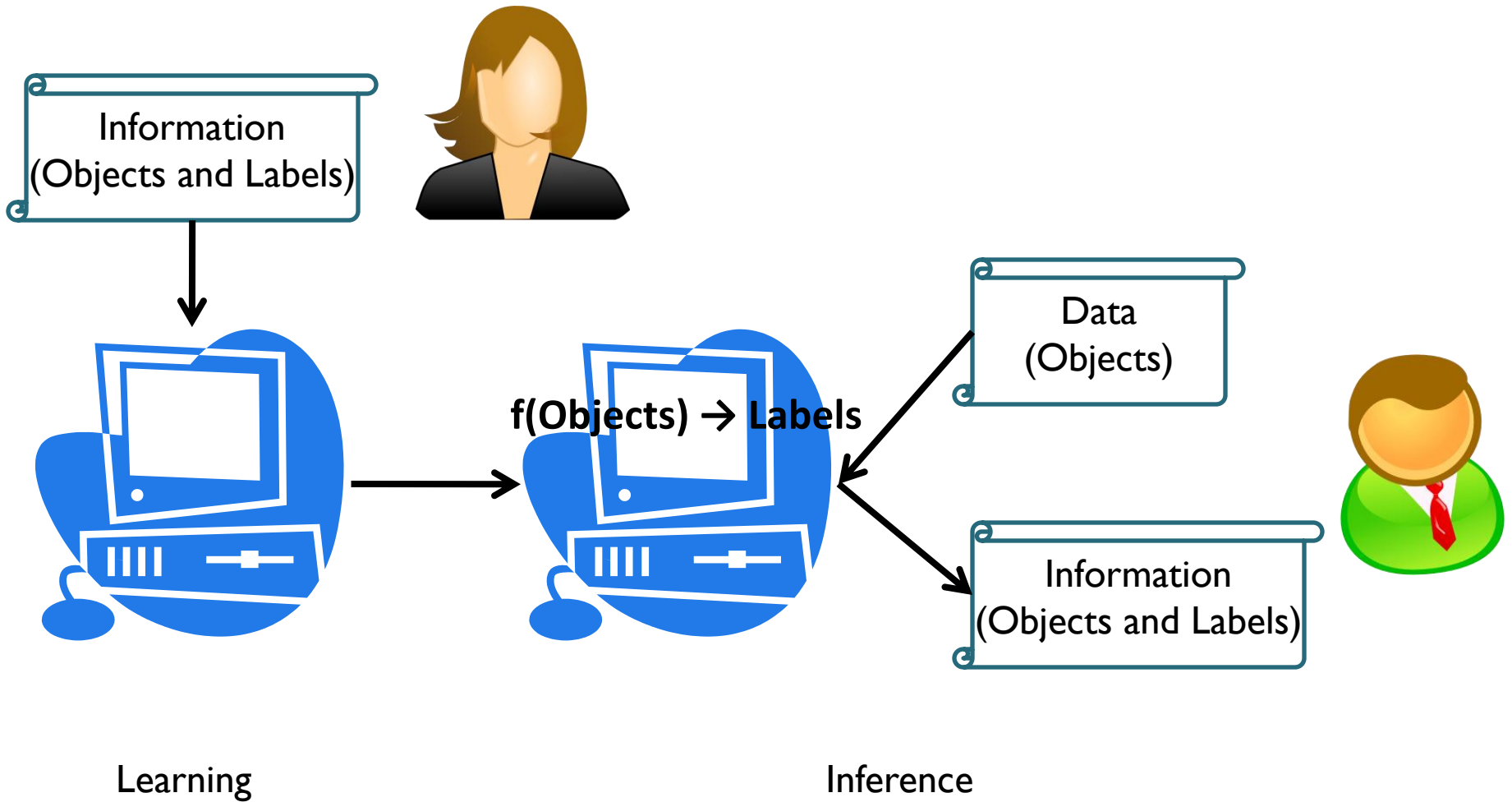


Recommender Systems

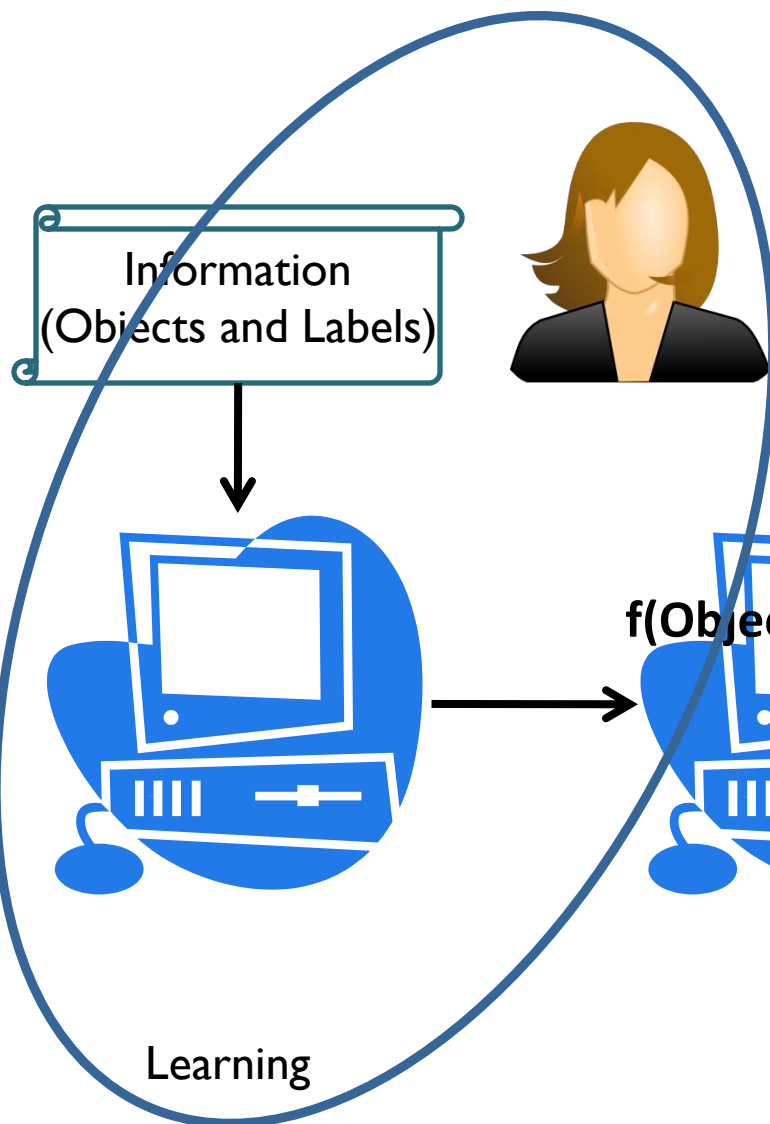


Search Engines

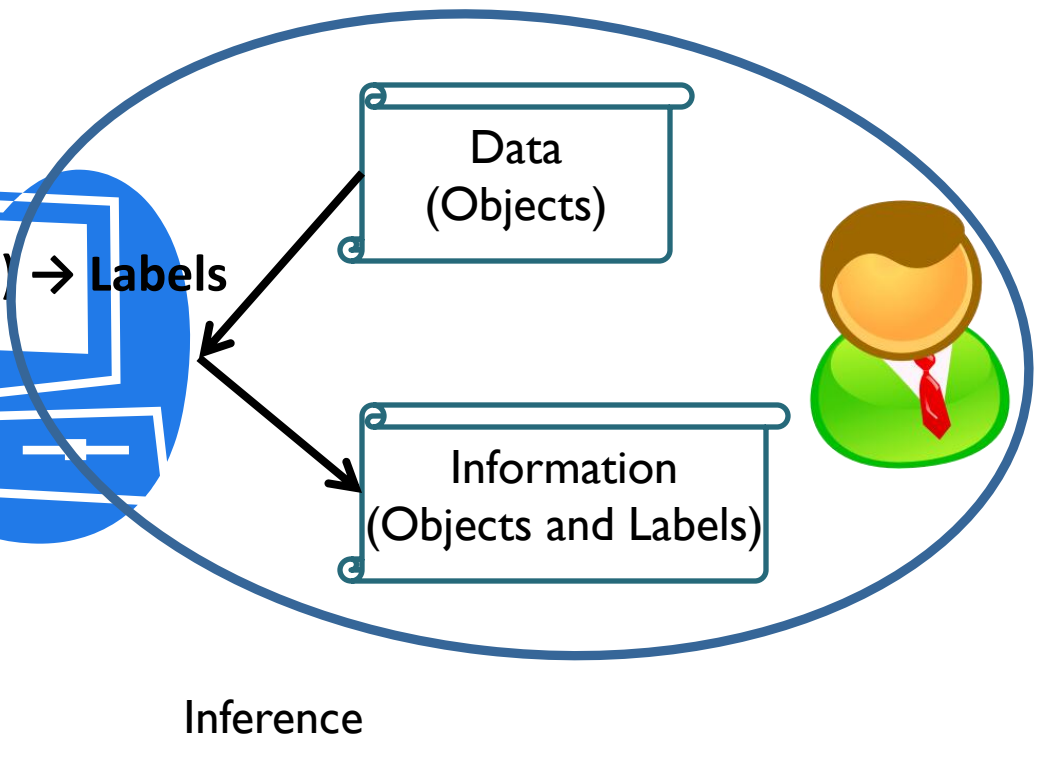




# Active Learning



# Active Inference



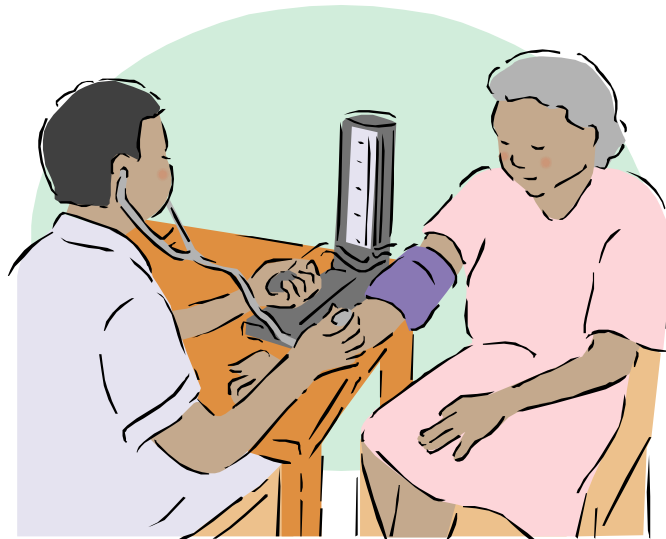
$f(\text{Objects}) \rightarrow \text{Labels}$

Information (Objects and Labels)

# Example I: Heart Disease Diagnosis

## Interview:

Age  
Gender  
Chest pain?  
...



## Blood test:

Cholesterol level  
Fasting blood sugar level  
Blood lipid level  
...

## Treadmill test:

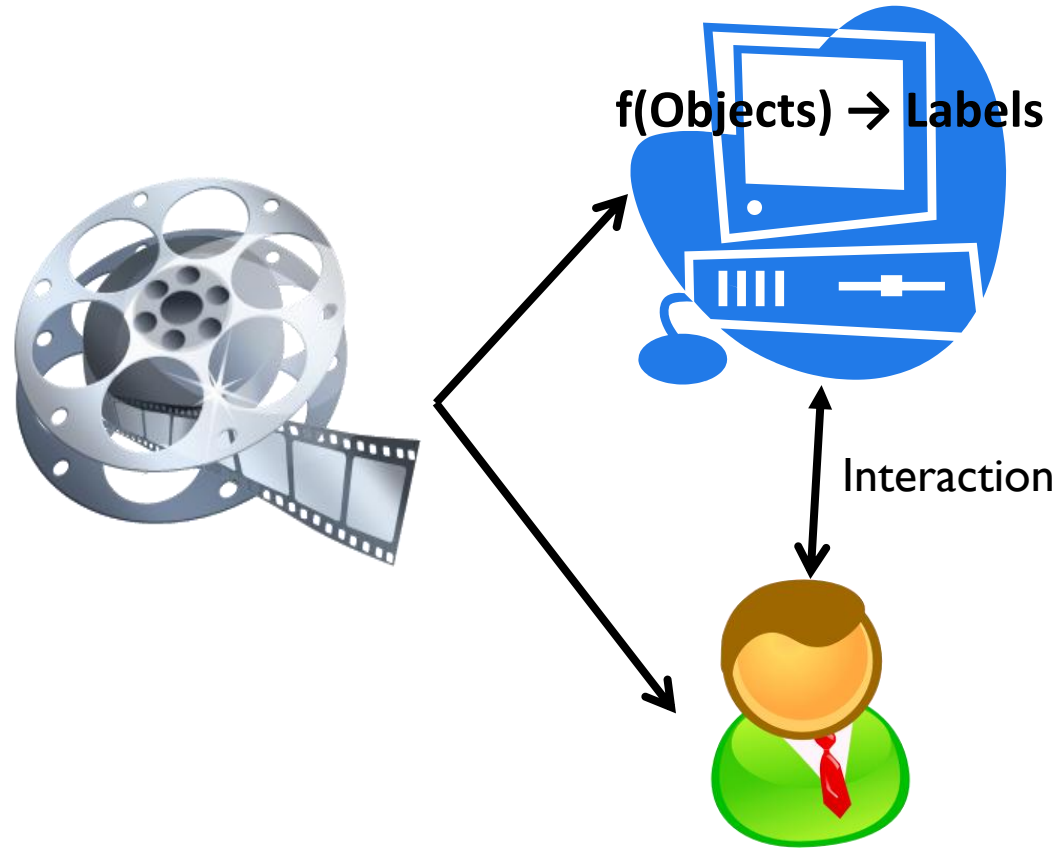
Angina  
ST depression  
Slope of ST  
...

## Coronary angiography:

Detailed X-Ray image  
Blood pressure  
...



# Example 2: Surveillance Video Analysis



# My Research

Develop

Intelligent and Active Systems

that can Ask

the Right Questions

# The Good, the Bad, and the Ugly

- Good:
  - Very natural scenario
  - Information collection and usage can be made very effective, efficient, cheap, and intuitive
- Challenges:
  - Which questions are the right ones?
  - How can we determine if we know something?
  - How can we determine the level of confidence in a piece of knowledge?

# Interaction = Questions?

- Explaining reasons
- Visualization
- Collaboration between humans and active and cognizant intelligent systems

# Contact and More Info

- More info at:
  - <http://www.cs.iit.edu/~mbilgic>
  - Or search for Mustafa Bilgic
- Contact:
  - [mbilgic@iit.edu](mailto:mbilgic@iit.edu)