Intelligent Agents and Financial Risk Monitoring Systems

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Introduction

• Financial Risk
• Real World Problem
• AI Application
• Case Study
• Questions?
Financial Risk

- Very relevant today
- Unchecked investors, excessive risk
- Actions of a few cause effects for many
Real World - Baring Brothers

• Collapsed in 1994 after 230 years in business
• Trader Nick Leeson lost up to $100 million in unauthorized, risky trading
• No oversight was aware of this
• Also see: subprime mortgage crisis
Real Needs

• Improved financial reporting
• Improved auditing
• Enhanced enforcement and regulation
• Improved education of future financial participants
AI Application

• Agents are able to monitor lots of information in a distributed fashion
• Detect hidden problems like fraud or excessive risk
Case Study Prototype

- Lightweight, distributed
- Intelligent agent-based
- Conceptual model
- Knowledge repository
- Goals
  - Demonstrate technical feasibility and appropriateness of intelligent agent techniques
Conceptual Model

• What is it?
• Provides an unambiguous understanding of the institution
• Information structure
• UML
Institution Information Structure

Figure 1. A class diagram of financial institutions.
Knowledge Repository

- Maintain all information relevant to agent tasks
- Enables knowledge exchange between agents
- Creates collaborative, distributed agent environment
Conceptual Model, Cont.

- A model representing a futures transaction.
Where does the prototype fit in?

- We need to continuously monitor all activities during a transaction in real-time.
- It is difficult for humans to do this objectively and without error.
Agent Design

- Monitoring, Data Collection, User Interface
Monitoring

• Performs continuous monitoring of trading agents
• Sends warning messages
• Instructed in initialization to focus on certain transactions
Other parts

• Data Collection
  – Collect data internally and externally

• User Interface
  – Enable users to view current state of various processes and convey opinions
Agent Behaviors

• Reactive
  – Actions based on other agents

• Proactive
  – Actions based on goals

• Cooperative
  – Actions enabling actions for other agents
Implementation

• Java
• Numerous simulations based on historical events
  – Ex: Barings Brothers
Results of Tests

• Leeson Case
• Benefits of lightweight architecture
• Scalability
• Unambiguous, concise communication
• Reusability
Comparisons, Advances

• Multiagent systems

• http://findarticles.com/p/articles/mi_pwwi/is_/ai_n16350063
Conclusion

• Humans have proven to be incapable of adequate risk management
• A society of intelligent agents could/has provided a way to mitigate this
• Several companies have attempted to provide something like this
Conclusion

• How effective can this be?