B552 Projects
Goal: Explore Deeply and Try Your Own Ideas

- Projects get deep into knowledge-based AI: Implement and test a substantial system
- Must apply knowledge-based methods (may be hybrids with other methods)
- Topics will reflect your interests
- Ideally done in pairs; exceptions possible.
- Each member responsible for a clearly-defined part.
- Be creative!

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Project components:

- A substantial computer implementation
  - No need to re-invent the wheel: Fine to start from existing code, clearly indicated, with major new code
- An evaluation of system performance
- A conference-style presentation
- A conference-style paper
- Presentation in class miniconference

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Questions About Knowledge-Based Systems

- Knowledge representations
  - What forms can they take?
  - What are the ramifications of different forms?
  - What are the issues and problems for KR?
- Knowledge acquisition/refinement
  - What knowledge is needed for task …
  - What sources can be harnessed?
  - How can the acquisition process be facilitated?
- Knowledge access and utilization
  - How can knowledge be brought to bear?
  - What power can it give?

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Three Strategies For Generating Project Ideas

1. Starting from a domain task:
   - Think of a task that you find interesting and how an AI system might perform or support it.
   - Where is knowledge important?
   - Where might you contribute (what's a new twist)? Do a quick survey of related work to see what's been done.

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2. Starting from an AI method:
   - Focus on a useful capability to augment a method we've considered, or, e.g., from B551. How could knowledge-based AI help achieve it?
   - Focus on a drawback/issue in a method we've considered. How could you alleviate the issue?

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3. Starting from another AI approach you've used
   - Different AI paradigms have different strengths
   - Combine knowledge-based and non-knowledge-based models in a hybrid to leverage strengths/alleviate weaknesses

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Alternative Approaches

- Full task system vs. component focus
  - For component, pick a part that interests you---e.g., conceptual analysis, script selection---to examine in depth; make remainder extremely simple
- Knowledge focus vs. Process focus
- In-depth processing (few examples) vs. task coverage (more data-driven)
  - For in-depth what's important is *scalability*, not scale

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Samples of Past Project Areas (1)

- Knowledge Representation
  - Representation of affect
- Knowledge acquisition
  - Automating Creation of Concept Maps
  - Case acquisition by unsupervised learning
- Planning
  - A hybrid offensive coordinator for football
  - A case-based opponent predictor for poker
  - Case-based flight control
  - Course advising system

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Samples of Past Project Areas (2)

- Game AI
  - AI for Guardians of Kelthas
  - AI for Civilization
- Creativity
  - Drawing
  - Room design
  - Bar-tending
- Language
  - Sense Disambiguation: Unifying Statistical Methods and Conceptual Structures
  - Grammar emergence in case-based agents

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Samples of Past Project Areas (3)

- Intelligent interfaces/support
  - Generating Unix Commands from Natural Language Requests
  - A CBR-based travel assistant
  - Case-based voice communication for a vehicle computer system
- Recommender systems
  - Movie recommender

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Samples of Past Project Areas (4)

- Search/Categorization
  - Query clustering using OpenMind/Commonsense and OpenCyc
  - Genome annotation using CBR
  - Using CBR to boost IR performance
  - Intelligent Search for K-12 Teachers and Graders

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Computer Cooking

- Create software that creates a recipe for a single dish or a three course menu
- Tasks include recipe selection and modification: "*Cook a main dish with turkey, pistachio, and pasta*"
- Negation challenge: *"I want to have a salad with tomato but I hate garlic and cucumber*".
- Menu challenge: I have ingredients X, Y, and Z, and would prefer soup as a starter.
- For those interested in cooking, planning, or creativity it may be interesting to look at the 2015 Computer Cooking Contest ccc2015.loria.fr (Note: Not all links are active)

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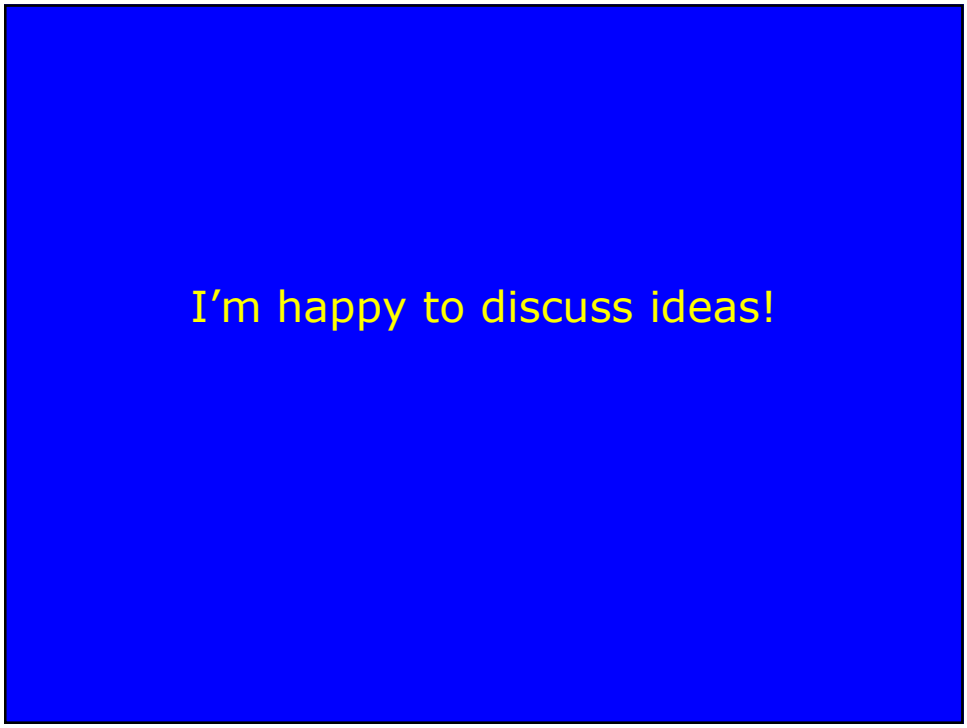

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