Some of the big questions of AI philosophy…

What is AI, really?
- What does an intelligent system look like?
- Does an AI entity need—and can it have—emotions, consciousness, empathy, love?

Can we ever achieve AI, even in principle?

How will we know if we’ve done it?

If we can do it, should we?

Weak & Strong AI

Weak AI hypothesis:
- Machines can be created that will act as if they are intelligent (simulate thinking)
- What AI can do is to develop useful, powerful applications

Strong AI hypothesis:
- Machines can be created that will actually think (rather than simulate thinking)
Weak AI: Turing Test

Alan Turing, 1950:
(http://www.loebner.net/Prizef/TuringArticle.html)

“I propose to consider the question, “Can machines think?”

Turing predicted: by 2000, a computer could be programmed to pass the Turing Test (for a 5 minute test) 30% of the time

Turing Test - Eliza

An early success at fooling some people: Eliza, simulating a Rogerian therapist

…Eliza: the importance of picking the correct application area

Sample interaction:
Patient: Men are all alike.
ELIZA: In what way?
Patient: They are always bugging about something or the other
ELIZA: Can you think of a specific example?
Patient: Well, my boyfriend made me come here.
ELIZA: Your boyfriend made you come here?
Patient: He says I'm depressed much of the time.
ELIZA: I am sorry you are depressed.
That our computers have seduced us has long been a truism. Now, thanks to the ever-inventive internet mafia, it is becoming a literal truth. Russian cyber-crooks have reportedly unleashed a software robot, or bot, that poses as a would-be paramour in sex chatrooms. It entices randy gentlemen to reveal personal information, such as their address or birthday, or even to submit photographs of themselves. The information can then be used to break into bank accounts or carry out other forms of fraud.

It was probably inevitable. As one of Tony Soprano's sidekicks observed in a classic episode of the TV series, the two most resilient sectors of the economy are organised crime and "certain aspects of showbusiness". The aspects, that is, known as the world's oldest profession - now mixing it with the world's newest technologies.

CyberLover, as the dirty-mouthed bot is called, is quite a sophisticated piece of software. It can take on a number of different guises depending on the proclivities of its target, according to security experts at the software company PC Tools. It can play the role of a romantic lover, for instance, or masquerade as a sexual predator.

Can we ever achieve AI?

Some successes

What are some human-oriented tasks that computers can do better than people?

- Play chess, checkers and other games
- Inspect parts on assembly lines
- Check the spelling of text
- Steer cars and other vehicles (helicopters, planes, etc.)
- Diagnose diseases
- Do hundreds of other tasks as well as or better than humans
  - Computers have made small but significant discoveries in astronomy, math, chemistry, mineralogy, biology, computer science, and other fields
Can machines really think?

What does it mean to think?

Do we have to have a brain to have a mind? to think?

“brain in a vat” experiment

Is physicality crucial for intelligence?

Matrix scenario: a brain is supported, bodiless, in a vat, and signals simulating a virtual world are fed in/out of the brain

Is being hungry the same as some rule:

HungryFor (Me, Pizza)

Could you tell the difference?

“brain in a vat” experiment

Moravec (robotics researcher/functionalist) is convinced that his consciousness would remain unaffected

Searle (philosopher and biological naturalist) is equally convinced his consciousness would vanish
“brain prosthesis” experiment

Technology advances where we can create an artificial neuron:

Exact same electrical/physiological responses as a real neuron.

We can copy an existing neuron.

If I exchange one real neuron for one artificial will you notice?

If I exchange two real neuron for two artificial will you notice?

If I continue this process, when will you notice?
Creative

Having the ability or power to create: Human beings are creative animals.

Productive; creating.

Characterized by originality and expressiveness; imaginative: creative writing.

How do people write stories?

Can Computers Be Creative?

Two paintings produced by Harold Cohen’s Aaron software:

http://www.kurzweilcyberart.com/
http://www.kurzweilcyberart.com/aaron/aim_clip_cohen.html

Neural style transfer
Neural style transfer

Original photo  Reference photo  Result

Can Computers Understand and Express Emotion?

http://people.ict.usc.edu/~gordon/publications/ICIDS09.PDF
Emotion
Can we build systems to
- Detect it?
- Express it?

Detection
- Gestures
- Facial Expressions
- Speech/Text
  - Physiological Cues
    - Blood volume pressure
    - Skin Conductivity
      - Glove (other WEARABLE DEVICES!)

Detecting emotion via wearable devices
2001 - 81% accuracy in (forced decision)
- detection of 8 emotions:
  - Neutral, anger, hate, grief, platonic love, romantic love, joy, reverence
- Person dependent - trained for at least 4 weeks
- GROUND BREAKING!

Since then, lots more work has been done
- http://www.youtube.com/watch?v=cfP-vcbFxk0

What we covered
Python!
- variables
- functions
- loops
- conditionals
- recursion
- higher order functions
- classes
- file I/O
- many other, sub-topics
  - lists, tuples, dictionaries, …
  - exceptions
  - turtle graphics

Applications?
What we covered

Machine learning
  Naïve Bayes model

Neural Networks

Search
  algorithms
  problem solving
  adversarial search and game playing

Web basics

Artificial Intelligence

Where we started

```python
# This program figures out the number of hot dogs
# needed for a BBQ

teran = 1
jacie1 = 3
jacie2 = 2 + jacie1
brenda = jacie1 - 1
grace = (brenda + 1) // 2 + 1  # add 1 to brenda using truncated division to round up

total_hotdogs = teran + jacie2 + jacie1 + brenda + grace
print(total_hotdogs)
```

Where we ended

```python
class TicToc:
    # Tracks to keep track of a two player game.
    def __init__(self, starting_piles):
        # Initialize a fun game with the list starting_piles
        self.starting_piles = starting_piles

    def get_current(self):  # A property to get the current piles.
        piles = [0] * len(self.starting_piles)
        self.current_piles = piles
        return self.current_piles

    def get_next(self, pile_number, num_to_remove):
        new_pile = self.starting_piles[pile_number] - num_to_remove
        self.starting_piles[pile_number] = new_pile
        return new_pile

    def is_winner(self, who Wins on current piles.

    if who == 'me':
        self.who = 'me'
        self.state = 'win'
        self.state = 'tie'
        self.state = 'lose'

    def print_game_state(self):
        print('Player 1: ', self.piles)
        print('Player 2: ', self.piles)

def play_game(player1, player2, game_state):
    # This is the game.
    player1_turn = True
    while not game_state.is_over():
        if player1_turn:
            move = player1(move)
            if move is None:
                print('Player 1: No Move')
                player1_turn = False
            elif move < 0 or move > len(game_state.piles):
                print('Player 1: Invalid Move')
                player1_turn = False
            else:
                move = game_state.piles[move]
                print('Player 1: ', move)
                game_state.piles[move] -= 1
                player1_turn = False
        else:
            move = player2(move)
            if move is None:
                print('Player 2: No Move')
                player1_turn = True
            elif move < 0 or move > len(game_state.piles):
                print('Player 2: Invalid Move')
                player1_turn = True
            else:
                move = game_state.piles[move]
                print('Player 2: ', move)
                game_state.piles[move] -= 1
                player1_turn = True

    if game_state.get_winner() == 'Tie':
        print('Tie')
    else:
        print(game_state.get_winner())
```

Where we ended

```python
def play_game(player1, player2, game_state):
    # This is the game.
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        else:
            move = player2(move)
            if move is None:
                print('Player 2: No Move')
                player1_turn = True
            elif move < 0 or move > len(game_state.piles):
                print('Player 2: Invalid Move')
                player1_turn = True
            else:
                move = game_state.piles[move]
                print('Player 2: ', move)
                game_state.piles[move] -= 1
                player1_turn = True

    if game_state.get_winner() == 'Tie':
        print('Tie')
    else:
        print(game_state.get_winner())
```