Constructive Interaction for Talking about Interesting Topics

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Outline

- Previous Work
  - Emergent verbal behaviour
- Current Work
  - Open-domain conversations
- Future Work
  - Speech, gaze and gesture
Previous Work

- Emergent Verbal Behaviour in Human-Robot Interaction
  - CogInfoCom 2011, Budapest
- Adding Speech to a Robotics Simulator (demo)
  - IWSDS 2011, Granada
Pyro: Python Robotics

- Open source Python robotics toolkit
  - http://pyrobotics.org
- For teaching and research
  - Simulators and real robots
- Artificial intelligence and robotics
  - Reinforcement learning, fuzzy decisions, neural networks, genetic algorithms, ...
Pyspeech: Python Speech

- Open source Python speech interface
  - http://code.google.com/p/pyspeech
- Speech input and output
  - Speech recognition functions
  - Text-to-speech functions
- For Windows computers
  - Uses Microsoft Speech Engine
Non-verbal behaviour

- Autonomous behaviour
  - Wander randomly
  - Avoid obstacles
  - Follow a wall
  - etc.
- Robot acts silently
Verbal behaviour

- Robot explains its own actions
  - “object on right”
  - (therefore) “turn left”
- Monologue
  - One-way info
- Can be irritating
  - “clear, clear, clear…”
Cooperative Verbal Behaviour

- Autonomous verbal behaviour
  - Robot explains its actions
- Interactive verbal behaviour
  - Human requests "go back", "left"
- Cooperative verbal behaviour
  - Human requests "talk less!"
  - Robot changes its verbosity level
  - No repeating, only says new things
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Fixed-domain Dialogues

- Example: Flight reservations
  - Using finite state transitions
  - Easy to implement in Pyro simulator
- Fixed-domain database
  - Flights, cities, days
  - Easy to add new flights, new cities
- Difficult to switch domains
Open-domain Dialogues

- Example: Talking about Shakespeare
  - Using information from the web
  - Wikipedia articles on any topic
- If robot has identified the topic:
  - Get Wikipedia article about Shakespeare
  - Start reading out the first paragraph
- How to continue the conversation?
William Shakespeare

From Wikipedia, the free encyclopedia
(Redirected from Shakespeare)

This article is about the poet and playwright. For other persons of the same name, see William Shakespeare (disambiguation). For other uses of "Shakespeare", see Shakespeare (disambiguation).

William Shakespeare (baptised 26 April 1564; died 23 April 1616) was an English poet and playwright, widely regarded as the greatest writer in the English language and the world's pre-eminent dramatist. He is often called England's national poet and the "Bard of Avon".

His surviving works, including some collaborations, consist of about 39 plays, 154 sonnets, two long narrative poems, and several other poems. His plays have been translated into every major living language and are performed more often than those of any other playwright.

Shakespeare was born and raised in Stratford-upon-Avon. At the age of 18, he married Anne Hathaway, with whom he had three children: Susanna, and twins Hamnet and Judith. Between 1585 and 1592, he began a successful career in London as an actor, writer, and part owner of a playing company called the Lord Chamberlain's Men, later known as the King's Men. He appears to have retired to Stratford around 1613, where he died three years later. Few records of Shakespeare's private life survive, and there has been considerable speculation about such matters as his physical appearance, sexuality, religious beliefs, and whether the works attributed to him were written by others.

Shakespeare produced most of his known work between 1589 and 1613. His early plays were mainly comedies and histories, genres he raised to the peak of sophistication and artistry by the end of the 16th century. He then wrote mainly tragedies until about 1608, including Hamlet, King Lear, Othello, and Macbeth, considered some of the finest works in the English language. In his last phase, he wrote tragicomedies, also known as romances, and collaborated with other playwrights.
William Shakespeare (baptised 26 April 1564; died 23 April 1616) was an English poet and playwright, widely regarded as the greatest writer in the English language and the world’s pre-eminent dramatist. He is often called England’s national poet and the “Bard of Avon”. His surviving works, including some collaborations, consist of about 38 plays, 154 sonnets, two long narrative poems, and several other poems. His plays have been translated into every major living language and are performed more often than those of any other playwright.
How to Continue?

- Split text into chunks
  - Speak a chunk, pause for feedback
  - Is the human interested or not?
- Feedback may be non-verbal
  - Gaze, facial expression, body language
- If human seems interested:
  - Continue same topic, next chunk
Shakespeare was born and brought up in Stratford-upon-Avon. At the age of 18, he married Anne Hathaway, with whom he had three children: Susanna, and twins Hamnet and Judith. Between 1585 and 1592, he began a successful career in London as an actor, writer, and part owner of a playing company called the Lord Chamberlain’s Men, later known as the King’s Men. He appears to have retired to Stratford around 1613 at age 49, where he died three years later. Few records of Shakespeare’s private life survive, and there has been considerable speculation about such matters as his physical appearance, sexuality, religious beliefs, and whether the works attributed to him were written by others.
How to Switch Topics?

- Dialogue, not monologue
  - Don’t read out entire article
  - Would be irritating (need ”talk less!”)

- Hypertext links
  - Links identify possible topic shifts
  - Topic navigation by clicking on links
  - Clicking shows human’s positive interest
Topic and New Info

Topic and NewInfo

- Topic
  - Need to know the current topic
  - Need to keep track of topic shifts

- NewInfo
  - Gives some new information about Topic
  - Dialogue response is based on NewInfo
Topic Chains

- Hyperlinks -> NewInfos -> topic shifts
  - Robot: "Shakespeare was born and raised in Stratford-upon-Avon" (NewInfo)
  - Human: "Stratford-upon-Avon?" (topic shift)
  - Robot: "Stratford-upon-Avon is a market town and civil parish in Warwickshire, England"
  - Human: "Warwickshire?" (topic shift)
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When to Switch Topic

- Echoing a New Info
  - Echoing shows human’s interest
  - "Shakespeare’s sexuality?"

- Immediate topic shift
  - Download new article
  - "The sexuality of William Shakespeare"
  - Start speaking first chunk
The sexuality of William Shakespeare has been the subject of recurring debate. It is known from public records that he married Anne Hathaway and they had three children; scholars have analyzed their relationship through these documents, in particular through the bequests to her in Shakespeare's will. There has been speculation that he had affairs with other women, based on contemporary writings of others anecdotally recounting such affairs and possibly on the "Dark Lady" figure in his sonnets. Scholars have also speculated that he was bisexual, based on an analysis of the sonnets, many of which, including Sonnet 18 "Shall I compare thee to a summer's day", are love poems addressed to a man, the "Fair Lord", and which contain plays on words relating to sexual desire between men.
When to Continue

- Feedback may be non-verbal
  - Eye gaze (looking at robot)
  - Facial expression
  - Body language (coming closer)

- If human seems interested:
  - Continue same topic, next chunk
At the age of 18, Shakespeare married the 26-year-old Anne Hathaway. The consistory court of the Diocese of Worcester issued a marriage licence on 27 November 1582. Two of Hathaway’s neighbours posted bonds the next day as surety that there were no impediments to the marriage. The couple may have arranged the ceremony in some haste, since the Worcester chancellor allowed the marriage banns to be read once instead of the usual three times. Hathaway’s pregnancy could have been the reason for this. Six months after the marriage, she gave birth to a daughter, Susanna. Twins, son Hamnet and daughter Judith, followed almost two years later.
Switching Topics

- Echoing
  - May show human didn’t hear clearly
  - ”Hamnet?” (... or was it ”Hamlet”?)

- Topic shift anyway
  - Download new article
  - ”Hamnet Shakespeare”
  - Start speaking first chunk
Hamnet Shakespeare (baptised 2 February 1585 – buried 11 August 1596) was the only son of William Shakespeare and Anne Hathaway, and the fraternal twin of Judith Shakespeare. He died at age 11 of unknown causes. There are several theories on the relationship, if any, between Hamnet and his father’s later play Hamlet. Other theories postulate connections between Hamnet’s death and the writing of King John, Romeo and Juliet, Julius Caesar, and Twelfth Night, among others. Such biographical theories connecting Hamnet to his father’s work began to be popular as early as the 18th century and continued into the 1930s before being dismissed on the arrival of prominent, anti-biographical literary movements such as modernism and New Criticism. More recently, as New Criticism has lost favour among academics, theories surrounding Hamnet and his father’s work have resurfaced.
The Tragedy of Hamlet, Prince of Denmark is a tragedy by William Shakespeare. Set in the Kingdom of Denmark, the play dramatizes the revenge Prince Hamlet exacts on his uncle Claudius for murdering King Hamlet, Claudius’s brother and Prince Hamlet’s father, and then succeeding to the throne and taking as his wife Gertrude, the old king’s widow and Prince Hamlet’s mother. The play vividly portrays both true and feigned madness – from overwhelming grief to seething rage – and explores themes of treachery, revenge, incest, and moral corruption.
How to Find Initial Topic?

- Quite Difficult!
  - Open vocabulary speech recognition?
  - Basically, this doesn’t work

- Spelling the Topic?
  - "S", "H", "A", "K", ...
  - "Sierra", "Hotel", "Alpha", "Kilo", ...
  - Wikipedia helps if first few letters known
Please select from: Shakespeare, Shakira, Shakedown (testing), Shakyamuni, Shakti, Shakhtar Donetsk, Shakers, Shakespeare's sonnets, Shakespeare in Love, Shakti Kapoor
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Future Work

- eNTERFACE 2012
  - *Speech, Gaze and Gesturing – Multimodal Conversational Interaction with Nao Robot*
  - International Summer Workshop on Multimodal Interaction, Metz, July 2012
Thank you!

- Questions?
- Nao says: Ask the dumb human today, but in future you’ll get better answers from clever me.