Computational Modeling of Narrative Texts, Films and Games

Course 2 - Characters and agents

Rémi Ronfard, March 2015
Characters and agents

- Story understanding
- NarrativeML
- Scripts, plans and goals
- Characters in The Wizard of Oz
- Characters in Friends

- Mindreading
- Beliefs, desires and intentions
- Story generation
- Tale Spin, Versu
Can a computer understand stories?

- Mani: NarrativeML
- Eric Muller: Discrete Event Calculus and Common Sense (lesson 3)
- Graesser: QUEST (lesson 4)
- Mark Finlayson (MIT): Sheherazade
- David Elson (Columbia University): Sheherazade
Elements of story

• A written story is made of propositions (PropBank)
• Can be annotated with NarrativeML
• Can be translated to Discourse representation theory (DRT) or Discrete Event Calculus (DEC)
• Can be used to answer questions
FrameNet vs. PropBank

FRAMENET ANNOTATION:

[Buyer Chuck] bought [Goods a car] [Seller from Jerry] [Payment for $1000].

[Seller Jerry] sold [Goods a car] [Buyer to Chuck] [Payment for $1000].

PROPBANK ANNOTATION:

[Arg0 Chuck] bought [Arg1 a car] [Arg2 from Jerry] [Arg3 for $1000].

[Arg0 Jerry] sold [Arg1 a car] [Arg2 to Chuck] [Arg3 for $1000].
FrameNet vs. PropBank

<table>
<thead>
<tr>
<th>PropBank</th>
<th>FrameNet</th>
</tr>
</thead>
<tbody>
<tr>
<td>buy</td>
<td>COMMERCE</td>
</tr>
<tr>
<td>Arg0: buyer</td>
<td>Buyer</td>
</tr>
<tr>
<td>Arg1: thing bought</td>
<td>Seller</td>
</tr>
<tr>
<td>Arg2: seller</td>
<td>Payment</td>
</tr>
<tr>
<td>Arg3: price paid</td>
<td>Goods</td>
</tr>
<tr>
<td>Arg4: benefactive</td>
<td>Rate/Unit</td>
</tr>
<tr>
<td>sell</td>
<td></td>
</tr>
<tr>
<td>Arg0: seller</td>
<td></td>
</tr>
<tr>
<td>Arg1: thing sold</td>
<td></td>
</tr>
<tr>
<td>Arg2: buyer</td>
<td></td>
</tr>
<tr>
<td>Arg3: price paid</td>
<td></td>
</tr>
<tr>
<td>Arg4: benefactive</td>
<td></td>
</tr>
</tbody>
</table>
FrameNet vs. PropBank

Frameset edge.01 "move slightly"

Arg0: causer of motion  Arg3: start point
Arg1: thing in motion   Arg4: end point
Arg2: distance moved   Arg5: direction

Ex: [Arg0 Revenue] edged [Arg5 up] [Arg2-EXT 3.4%] [Arg4 to $904 million] [Arg3 from $874 million] [ArgM-TMP in last year's third quarter]. (wsj_1210)

LOC: location
EXT: extent
DIS: discourse connectives
ADV: general-purpose
NEG: negation marker
MOD: modal verb
CAU: cause
TMP: time
PNC: purpose
MNR: manner
DIR: direction
Question-answering in the context of stories

<table>
<thead>
<tr>
<th>Arc Category/Constraint</th>
<th>Definition and Temporal</th>
<th>Composition Rule</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isa</td>
<td>A is a kind</td>
<td>type</td>
<td>instance of B</td>
</tr>
<tr>
<td>Has As Part (HAP)</td>
<td>A has as a part B</td>
<td>(concept)-HAP→(concept)</td>
<td>(Concept: robin)-HAP→( Concept: beak)</td>
</tr>
<tr>
<td>Property(P)</td>
<td>A has a property B</td>
<td>(concept)-P→</td>
<td>(Concept: bird)-P→(State: bird has wings)</td>
</tr>
<tr>
<td>Referential Pointer(ref)</td>
<td>An argument of A refers to a concept B</td>
<td>(state</td>
<td>event</td>
</tr>
<tr>
<td>Spatial Relationship</td>
<td>A has a spatial relationship with B</td>
<td>(concept)-east-of→ (concept)</td>
<td>(Concept: Nevada)-east-of→ (Concept: California)</td>
</tr>
</tbody>
</table>
Question-answering in the context of stories
Characters in NarrativeML (1)

- NARRATOR
  - name, form, exist, accessible to, order (ACHRONY, ANALEPSIS, CHRONICLE, PROLEPSIS, RETROGRADE, SYLLEPSIS, ZIGZAG), distance (NARRATED, INDIRECT, FREE_INDIRECT, REPORTED, IRECT, IMMEDIATE), perspective (NON-FOCALIZED, INTERNALLY_FOCALIZED, EXTERNALLY_FOCALIZED)

- PLACE
  - name, form, exist, accessible to

- CHARACTER
  - name, form, attributes, exist, accessible to
Characters in NarrativeML (1)

- **EVENT**
  - type, exist, goal, duration
- **GOAL**
  - id, parent, leaf, type
- **EVALUATION**
  - event, character, audience, polarity (POSITIVE, NEGATIVE, NEUTRAL)
Characters in *The fox and the crow*

- **The fox**
  - plan
  - attributes
  - actions
  - goals
  - evaluations

- **The crow**
  - plan
  - attributes
  - actions
  - goals
  - evaluations
A crow has found a piece of cheese and retired to a branch to eat it.

A fox, wanting it for himself, flatters the crow, calling it beautiful and wondering whether its voice is as sweet to match.

When it lets out a caw, the cheese falls and is devoured by the fox.
A crow has found a piece of cheese and retired to a branch to eat it.

A fox, wanting it for himself, flatters the crow, calling it beautiful and wondering whether its voice is as sweet to match.

When it lets out a caw, the cheese falls and is devoured by the fox.
Events and actions

A crow has found a piece of cheese and retired to a branch to eat it.

A fox, wanting it for himself, flatters the crow, calling it beautiful and wondering whether its voice is as sweet to match.

When it lets out a caw, the cheese falls and is devoured by the fox.

1. FIND
2. RETIRE
3. FLATTER
4. ASK
5. CAW
6. FALL
7. DEVOUR
A crow has found a piece of cheese and retired to a branch to eat it.

A fox, wanting it for himself, flatters the crow, calling it beautiful and wondering whether its voice is as sweet to match.

When it lets out a caw, the cheese falls and is devoured by the fox.

1. EAT CHEESE
2. GET CHEESE
3. RELEASE CHEESE
4. OPEN BEAK
5. GIVE LESSON
The fox and the crow

A Crow was sitting on a branch of a tree with a piece of cheese in her beak when a Fox observed her and set his wits to work to discover some way of getting the cheese.

Coming and standing under the tree he looked up and said, "What a noble bird I see above me! Her beauty is without equal, the hue of her plumage exquisite. If only her voice is as sweet as her looks are fair, she ought without doubt to be Queen of the Birds. »

The Crow was hugely flattered by this, and just to show the Fox that she could sing she gave a loud caw. Down came the cheese, of course, and the Fox, snatching it up, said, "You have a voice, madam, I see: what you want is wits."
Characters in Little Red Riding Hood

- Red Riding Hood
  - plan
  - attributes
  - actions
  - goals
  - evaluations

- The wolf
  - plan
  - attributes
  - actions
  - goals
  - evaluations
Once upon a time there lived in a certain village a little country girl, the prettiest creature who was ever seen. Her mother was excessively fond of her; and her grandmother doted on her still more. This good woman had a little red riding hood made for her. It suited the girl so extremely well that everybody called her Little Red Riding Hood.
As she was going through the wood, she met with a wolf, who had a very great mind to eat her up, but he dared not, because of some woodcutters working nearby in the forest. He asked her where she was going. The poor child, who did not know that it was dangerous to stay and talk to a wolf, said to him, "I am going to see my grandmother and carry her a cake and a little pot of butter from my mother."

"Does she live far off?" said the wolf

"Oh I say," answered Little Red Riding Hood; "it is beyond that mill you see there, at the first house in the village."

"Well," said the wolf, "and I'll go and see her too. I'll go this way and go you that, and we shall see who will be there first."
The wolf ran as fast as he could, taking the shortest path, and the little girl took a roundabout way, entertaining herself by gathering nuts, running after butterflies, and gathering bouquets of little flowers. It was not long before the wolf arrived at the old woman's house. He knocked at the door: tap, tap.

"Who's there?"

"Your grandchild, Little Red Riding Hood," replied the wolf, counterfeiting her voice; "who has brought you a cake and a little pot of butter sent you by mother."

The good grandmother, who was in bed, because she was somewhat ill, cried out, "Pull the bobbin, and the latch will go up."
Little Red Riding Hood

- The wolf pulled the bobbin, and the door opened, and then he immediately fell upon the good woman and ate her up in a moment, for it been more than three days since he had eaten. He then shut the door and got into the grandmother's bed, expecting Little Red Riding Hood, who came some time afterwards and knocked at the door: tap, tap.

- "Who's there?"

- Little Red Riding Hood, hearing the big voice of the wolf, was at first afraid; but believing her grandmother had a cold and was hoarse, answered, "It is your grandchild Little Red Riding Hood, who has brought you a cake and a little pot of butter mother sends you."
Little Red Riding Hood

• The wolf cried out to her, softening his voice as much as he could, "Pull the bobbin, and the latch will go up."

• Little Red Riding Hood pulled the bobbin, and the door opened.

• The wolf, seeing her come in, said to her, hiding himself under the bedclothes, "Put the cake and the little pot of butter upon the stool, and come get into bed with me."
Little Red Riding Hood

- Little Red Riding Hood took off her clothes and got into bed. She was greatly amazed to see how her grandmother looked in her nightclothes, and said to her, "Grandmother, what big arms you have! » "All the better to hug you with, my dear."

- "Grandmother, what big legs you have! » "All the better to run with, my child."

- "Grandmother, what big ears you have! » "All the better to hear with, my child."

- "Grandmother, what big eyes you have! » "All the better to see with, my child."

- "Grandmother, what big teeth you have got! » "All the better to eat you up with."

- And, saying these words, this wicked wolf fell upon Little Red Riding Hood, and ate her all up.
Little Red Riding Hood

• Moral: Children, especially attractive, well bred young ladies, should never talk to strangers, for if they should do so, they may well provide dinner for a wolf.

• I say "wolf," but there are various kinds of wolves. There are also those who are charming, quiet, polite, unassuming, complacent, and sweet, who pursue young women at home and in the streets. And unfortunately, it is these gentle wolves who are the most dangerous ones of all.
The Snowman is the tale of a boy who builds a snowman one winter's day. That night, at the stroke of twelve, the snowman comes to life. The first part of the story deals with the snowman's attempts to understand the appliances, toys and other bric-a-brac in the boy's house, all while keeping quiet enough not to wake the boy's parents. The two then venture back outside and go for a ride on a motorbike, disturbing many animals: pheasants, rabbits, a barn owl, a fox and a brown horse.

In the second part of the story, the boy and the snowman take flight — the song "Walking in the Air" appears at this point. They fly over the boy's town, over houses and large public buildings before flying past the Royal Pavilion in Brighton and Palace Pier and then out into the ocean. They continue through an arctic landscape and fly past many sights and animals such as penguins. Flying into the aurora they reach their destination.

The two wander hand-in-hand into a snow-covered forest and attend a snowmen's party, at which the boy is the only human. They meet Father Christmas and his reindeer, and the boy is given a scarf with a snowman pattern.

The morning after the return journey the sun has come out and the boy wakes up to find the snowman has melted. The boy reaches into his pocket and finds the snowman scarf given to him by Father Christmas. As the credits play, the boy mourns the loss of his new friend.
The snowman movie
Characters in The Wizard of Oz

• Dorothy
  • plan
  • attributes
  • actions
  • goals
  • evaluations

• Scarecrow
  • plan
  • attributes
  • actions
  • goals
  • evaluations
Characters in The wizard of Oz

• Tinman
  • plan
  • attributes
  • actions
  • goals
  • evaluations

• Lion
  • plan
  • attributes
  • actions
  • goals
  • evaluations
Characters in The wizard of Oz

- Wicked Witch
  - plan
  - attributes
  - actions
  - goals
  - evaluations

- Glinda
  - plan
  - attributes
  - actions
  - goals
  - evaluations
Characters in Friends
Rachel

The baby of the gang, spoiled, naive
Rachel enters the series in the first
episode in her wedding dress,
running away from her own big day.
She moves in with Monica, gets a
menial job serving coffee, soon
learns a little bit more about
grownup life and ends up dating
Ross off and on (and off and on and
off and on and...).
Monica

The much-needed Team Mom of the gang, Monica can be somewhat neurotic and obsessive, but puts it all to good use in her job as a chef and keeping the gang fed. She was fat in high school, which is still a source of shame for her and struggles with her parents Parental Favoritism of Ross. She eventually falls in love with Chandler and the two build the stable relationship of the show.
Phoebe

- Phoebe is the group's Cloudcuckoolander who has a bit of a dark past: her father walked out on her mother, her mother died, she was adopted, her adopted mother died, and she spent some time on the street before finding a stable job (as a masseuse) and roommate (Monica), before eventually moving in with her grandmother. She plays the guitar (badly) and sings (badly) at Central Perk, and exhibits traits of The Pollyanna.
Joey

The Casanova of the gang, a laid-back Italian womanizer, Joey is Chandler's best friend and roommate, and often the group's comic relief. He tries to make a living as an actor. Later seasons turned him into a ditz.
Chandler

• The group's Deadpan Snarker. Not much is known about his work, most likely because it only seems to involve data entry and accounting. His dad runs an all-male burlesque called "Viva Las Gaygas". His mom is a world-famous erotic romance novelist. Neither fact sits well with him; both fuel his neuroses. He eventually falls in love with Monica, and they build a rare stable relationship within the gang.
Ross

- The nerd of the group, Ross is a Hollywood Dateless paleontologist whose wife left him when she realized she was gay. She also turned out to be pregnant, and Ross tries his best to be a good dad to his son Ben. He loves Rachel, but you knew that already, right?
Friends tropes
(tvtropes.com)

- Cloudcuckoolander: A character with their head in the clouds. They are strangely oblivious to things that everyone else takes for granted.

- Team Mom: In an ensemble show, especially of the fighting kind, there needs to be someone to hold this Ragtag Bunch of Misfits together before they kill each other or wander off into the woods like so many Player Characters. Almost always a female, Team Mom basically acts as the mother figure for everyone else in the group, regardless of age or family relations.

- Hollywood dateless: This trope is a reference to those Sitcom characters who are constantly referred to as being totally inept with their preferred sex and never scoring, when we’ve seen them with more beautiful people on their arm than most people have ever met, and are sometimes quite attractive themselves.

- Deadpan snarker: A character given to gnomic, sarcastic, sometimes bitter, occasionally whimsical asides. They can vary wildly from rare, funny one-liners to complete obnoxiousness.
Characters in Schnitzler’s Reigen (La Ronde)

- THE WHORE
- THE SOLDIER
- THE PARLOR MAID
- THE YOUNG GENTLEMAN
- THE YOUNG WIFE
- THE HUSBAND
- THE LITTLE MISS
- THE POET
- THE ACTRESS
- THE COUNT
Scenes in Schnitzler’s Reigen (La Ronde)

1. The Whore and the Soldier
2. The Soldier and the Parlor Maid
3. The Parlor Maid and the Young Gentleman
4. The Young Gentleman and the Young Wife
5. The Young Wife and the Husband
6. The Husband and the Little Miss
7. The Little Miss and the Poet
8. The Poet and the Actress
9. The Actress and the Count
10. The Count and the Whore
The Actress and the Count

• ACTRESS: It's you, Count!
• COUNT: Your good mother gave me permission, or of course I wouldn't
• ACTRESS: Please come right in.
• COUNT: I kiss your hand. A thousand pardons—coming straight in from the street—you know, I can't see a thing. Yes . . . here we are. (near the bed) I kiss your hand.
• ACTRESS: Sit down, my dear Count.
• COUNT: Your mother said you weren't very well, Fräulein. Nothing too serious, I hope?
• ACTRESS: Nothing serious? I was dying!
• COUNT: Oh dear me! Not really?
• ACTRESS: In any case it's very kind of you to . . . trouble to call.
• COUNT: Not at all, Fräulein.
• ACTRESS (turning her eyes toward a Large basket of flowers, which stands on a small table by the window): There they are!

• COUNT: Last night you were positively strewn with flowers and garlands!

• ACTRESS: I left them all in my dressing room. Your basket was the only thing I brought home.

• COUNT (kisses her hand): You're very kind.

• (The Actress suddenly takes his hand and kisses it.)

• COUNT: Fräulein!

• ACTRESS: Don't be afraid, Count. It commits you to nothing!

• COUNT: You're a strange creature . . . a puzzle, one might almost say.
The Actress and the Count (3)

• ACTRESS: Fräulein Birken is . . . easier to solve?
• COUNT: Oh, little Birken is no puzzle. Though . . . I know her only superficially.
• ACTRESS: Indeed?
• COUNT: Oh, believe me. But you are a problem. And I've always longed for one. As a matter of fact, last night I realized what a great pleasure I'd been missing. You see, it was the first time I've seen you act.
• ACTRESS: Is that true?
• COUNT: Oh, yes. You see, Fräulein, it's a big problem with the theater. I'm used to dining late. By the time I get there, the best part of the play is over, isn't it?
• ACTRESS: You'll have to dine earlier from now on.
• COUNT: I'd thought of that. Or of not dining at all. There's not much pleasure in it, is there-dining?
• ACTRESS: What do you still find pleasure in, young fogey?
• COUNT: I sometimes ask myself. But I'm no fogey. There must be another reason.
• ACTRESS: You think so?
• COUNT: Yes. For instance, Lulu always says I'm a philosopher. What he means is: I think too much.
• ACTRESS: Lulu?
• COUNT: Friend of mine.
• ACTRESS: He's right . . . it is a misfortune, all that thinking.
• COUNT: I've time on my hands, that's why I think. You see, Fräulein, when they transferred me to Vienna, I thought it would be

  better. It'd be amusing, stimulating, the city. But it's really much the same here as up there.
• ACTRESS: And where is "up there"?
• COUNT: Well, down there, Fräulein, in Hungary. The small towns I used to be stationed in.
The Actress and the Count (5)

- ACTRESS: What were you doing in Hungary?
- COUNT: I'm telling you, dear lady—the army.
- ACTRESS: But why did you stay so long in Hungary?
- COUNT: It happened, that’s all.
- ACTRESS: Enough to drive anyone mad, I should think!
- COUNT: Oh, I don’t know. In a way you have more to do there than here. You know, Fräulein, training recruits, exercising horses . . . and the surroundings aren’t as bad as people say. It’s really rather lovely, the big plain there. Such a sunset! It’s a pity I’m not a painter. I often thought I’d paint one, if I were a painter. We had a man in our regiment, young Splany, and he could do it. Why I tell you this boring stuff I don’t know, Fräulein.
- ACTRESS: Please, Count! I’m highly amused.
- COUNT: You know, Fräulein, it’s so easy to talk to you. Lulu told me it would be. It’s a thing one doesn’t often meet.
- ACTRESS: In Hungary!
- COUNT: Or in Vienna! People are the same everywhere. Where there are more, it gets overcrowded but that’s the only difference. Tell me, Fräulein, do you like people, really?
- ACTRESS: Like them? I hate them! I don’t want to see them. I never do see them. I’m always alone. This house is deserted!
The Actress and the Count (6)

• COUNT: Just as I imagined: you're a misanthropist. It's bound to happen with artists. Moving in that more exalted sphere

• Well, it's all right for you, at least you know why you're alive.

• ACTRESS: Who told you that? I haven't the remotest idea why I'm alive!

• COUNT: Not really, Fräulein . . . famous . . . celebrated

• ACTRESS: Is that-happiness?

• COUNT: Happiness? Happiness doesn't exist. None of the things people chatter about really exist. . . Love, for instance. It's the same with love.

• ACTRESS: You may be right there.

• COUNT: Enjoyment . . . intoxication . . . there's nothing wrong with them, they're real. I enjoy something, all right, and I know I enjoy it. Or I'm intoxicated, all right. That's real too. And when it's over, it's over, that's all.

• ACTRESS (grandly): It's over!
Mindreading

• Understand character’s goals and actions in terms of beliefs, desires and intentions

• Using different cues
  • words in written stories
  • images in comics
  • motion and sound in film
  • interaction in games
Beliefs, desires and intentions

- Beliefs: Beliefs represent the informational state of the agent, in other words its beliefs about the world (including itself and other agents). Beliefs can also include inference rules, allowing forward chaining to lead to new beliefs. Using the term belief rather than knowledge recognizes that what an agent believes may not necessarily be true (and in fact may change in the future).
Beliefs, desires and intentions

• Desires: Desires represent the motivational state of the agent. They represent objectives or situations that the agent would like to accomplish or bring about. Examples of desires might be: find the best price, go to the party or become rich.

• Goals: A goal is a desire that has been adopted for active pursuit by the agent. Usage of the term goals adds the further restriction that the set of active desires must be consistent. For example, one should not have concurrent goals to go to a party and to stay at home – even though they could both be desirable.
Beliefs, desires and intentions

- Intentions: Intentions represent the deliberative state of the agent – what the agent has chosen to do. Intentions are desires to which the agent has to some extent committed. In implemented systems, this means the agent has begun executing a plan.

- Plans: Plans are sequences of actions (recipes or knowledge areas) that an agent can perform to achieve one or more of its intentions. Plans may include other plans: my plan to go for a drive may include a plan to find my car keys. This reflects that in Bratman's model, plans are initially only partially conceived, with details being filled in as they progress.
BDI loop for autonomous agents

- options: option-generator(event-queue)
- selected-options: deliberate(options)
- update-intentions(selected-options)
- execute()
- get-new-external-events()
- drop-unsuccessful-attitudes()
- drop-impossible-attitudes()
Theory of mind

• What I believe, desire and intend

• What I believe others believe, desire and intend

• What the audience believes I believe, desire and intend

• What the audience believes I believe about others, etc.

• Season 5, episode 14: where everybody finds out
Story example: Rashomon
Characters in story generation

- Tale Spin
- Universe
- Versu
Meehan : Talespin

• The Metanovel: Writing Stories by Computer, 1976


Richard Evans : Versu
**Characters in versu**

- **Name**: Darth Vader

- "A tall man, whose rather extreme black asthma inhaler causes much comment, Darth frequently gets his long cloak caught in the office elevator doors, but his ability to strangle clients by mental power alone makes his billings department the envy of Madison Avenue."

- **Personality**: An older, modern man, conscientious, closed, unfriendly, assertive, short-tempered, touchy, violent and combative if provoked.

- **Extrait de**: Graham Nelson. « Writing for Versu. » iBooks.
Characters in versu

• Concerns: He is concerned with leadership, menace and authority, but not manners or quality as a parent.

• Reputation: By reputation he is menacing but not romantic.

• Back-story : ...

• Extrait de: Graham Nelson. « Writing for Versu. » iBooks.
Character qualities in Versu

- trustworthiness
- distinction
- friendship
- leadership
- accomplishment
- attractiveness
- style
- manners
- propriety
- intelligence
- confidence
- health
- sense of fun
- virtue
- piety
- menace
- worldliness
- sensitivity
- faithfulness
- romantic appeal
- compatibility
- authority
- presentability
- morality

Character relationships in versus

- A is a relative of B
- A is an estranged relative of B
- A is a close relative of B
- A is an acquaintance of B
- A is a friend of B
- A is a close friend of B
- A flirts with B
- A has been rejected by B
- A is a protege of B
- A is the boss of B

- A is an employee of B
- A has rejected B
- A has an understanding with B
- A is engaged to B
- A is married to B
- A is a foe of B
- A is an enemy of B
- A is a mortal enemy of B
- A is a protector of B
Characters in Facade: Trip and Grace

FACADE by Mateas and Stern

hi Trip! how are you!

hi Grace, you look great!

no, I think it looks fine!
Characters in Nothing for Dinner (2004)
Next week : time and space