Natural Language Processing

Lecture 6
Natural Language Generation

Theory of speech acts

A **speech act** in linguistics and the philosophy of language is an utterance that has performative function in language and communication.

Speech acts can be analysed on three levels:

1. **locutionary act**: the performance of an utterance;
2. **illocutionary act**: the aim of speech;
3. **perlocutionary act**: its actual effect, such as persuading, convincing, scaring, enlightening, inspiring, or otherwise getting someone to do or realize something, whether intended or not.

J. L. Austin 1962

Theory of speech acts: Searle's Classification

Act	Description	Kind	Example
Assertives	They commit the speaker to something being the case.	suggesting, putting forward, swearing, boasting, concluding	"*No one makes a better cake than me.*"
Directives	They try to make the addressee perform an action.	asking, ordering, requesting, inviting, advising, begging	"*Could you close the window?*"
Commisives	They commit the speaker to doing something in the future.	promising, planning, vowing, betting, opposing	"*I'm going to Paris tomorrow.*"
Expressives	They express how the speaker feels about the situation.	thanking, apologising, welcoming, deploring	"*I am sorry that I lied to you.*"
Declarations	They change the state of the world in an immediate way.		"*You are fired, I swear, I beg you.*"

Theory of speech acts: examples

(1) “Will John leave the room?” - question;
(2) “John will leave the room.” - statement/prediction;
(3) “John, leave the room!” - asking;
(4) “I would like John to leave the room.” - wish
(5) “If John leave the room, I’ll come in.” - hypothetical intention

- “Can you lend me a pen?” - asking, but in form of question

Theory of speech acts

Features of illocutionary function:

- context;
- mood;
- some verbs (ask/beg/promise etc.);
- words order;
- punctuation;
- intonation

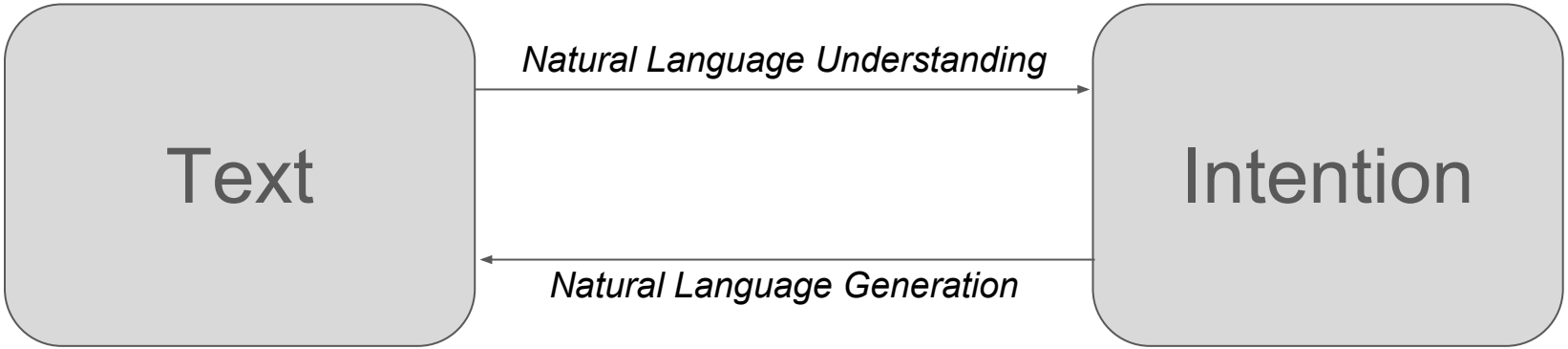
Название иллокутивной функции	Количественная встречаемость твитов по категориям
Повествование	32%
Поздравление	11%
Рекомендация	8%
Вопрос	7%
Просьба	7%
Мнение	6%
Оценка	6%
Инструкция	5%
Предложение	5%
Сочувствие	4%
Пожелание	3%
Аргументация	1%
Извинение	1%
Напоминание	1%
Благодарность	1%
Приглашение	1%
Приказ	1%

Natural Language Generation

Natural language generation (NLG) is the process by which thought is rendered into language.

The process of generation is usually divided into three parts, often implemented as three separate programs:

1. identifying the goals of the utterance,
2. planning how the goals may be achieved by evaluating the situation and available communicative resources
3. realizing the plans as a text.


Text
Natural Language Understanding
Intention
Natural Language Generation

Examples of Generated Texts: complex

You know for some reason I just thought about the bill and payment again. (You shouldn't give me a bill.) I was thinking that I (shouldn't be given a bill) of asking you whether it wouldn't be all right for you not to give me a bill. That is, I usually by (the end of the month know the amount of the bill), well, I immediately thought of the objections to this, but my idea was that I would simply count up the number of hours and give you a check at the end of the month.

John Clippinger's program Erma (1977)

Examples of Generated Texts: simple

- The implications of separating the processing of a generator into distinct modules and levels of representation, especially in regard to which operations (lexical choice, linear ordering, and such) took place at which level;
- The use of pronouns and other forms of subsequent reference;
- The possibilities and techniques for ‘aggregating’ minimal propositions to form syntactically complex texts;
- The relationship between how lexical choice is done and the choice of representation used in the source

Examples of Generated Texts: simple

2. MISSION

10th Corps defend in assigned sector to defeat the 8th Combined Arms Army.

3. EXECUTION

a. 52d Mechanized Division

(1) Conduct covering force operations along avenues B and C to defeat the lead regiments of the first tactical echelon in the CFA in assigned sector

Marie Meteer's Spokesman system (1992)

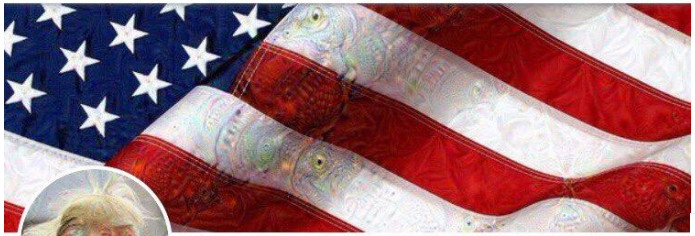
Examples of Generated Texts: today

Input: *Dallas, TX—Charles Barkley scored 42 points Sunday as the Phoenix Suns defeated the Dallas Mavericks 123–97.*

Output: *Dallas, TX—Charles Barkley tied a season high with 42 points and Danny Ainge came off the bench to add 21 Sunday as the Phoenix Suns handed the Dallas Mavericks their league worst 13th straight home defeat 123–97.*

Jacques Robin's Streak (1993, 1996)

Examples of Generated Texts: today - RNN



Follow

DeepDrumpf
@DeepDrumpf

I'm a Neural Network trained on Trump's transcripts. Priming text in [ ]s. Donate (gofundme.com/deepdrumpf) to interact! Created by @hayesbh.

deepdrumpf2016.com

7 Following **28,289** Followers

DeepDrumpf @DeepDrumpf · Apr 8

When I have to build a hotel, we're bombing the hell out of them. Lots of money. To those suffering, I say vote for Donald. #SyriaStrikes

2 60 155

DeepDrumpf @DeepDru... · Jan 20, 2017

I won and now I'm so strong, but not enough to bankrupt and destroy the US. We're going to try lies, negligence, and violence. #inauguration

166 296

DeepDrumpf @DeepDru... · Nov 9, 2016

[Thank you Georgia!] The education is a disaster. Jobs are essentially nonexistent. What do you have to lose?

1 33 64

DeepDrumpf @DeepDru... · Feb 14, 2017

Replying to @GlennThrush

Mike. Fantastic guy. Today I heard it. Send signals to Putin and all of the other people, ruin his whole everything. @GlennThrush @POTUS

28 85

DeepDrumpf @DeepDru... · Nov 9, 2016

[Thanks Alabama, South Carolina, and Tennessee!] Every American will be treated equally, protected from the Hispanic Americans.

1 63 128

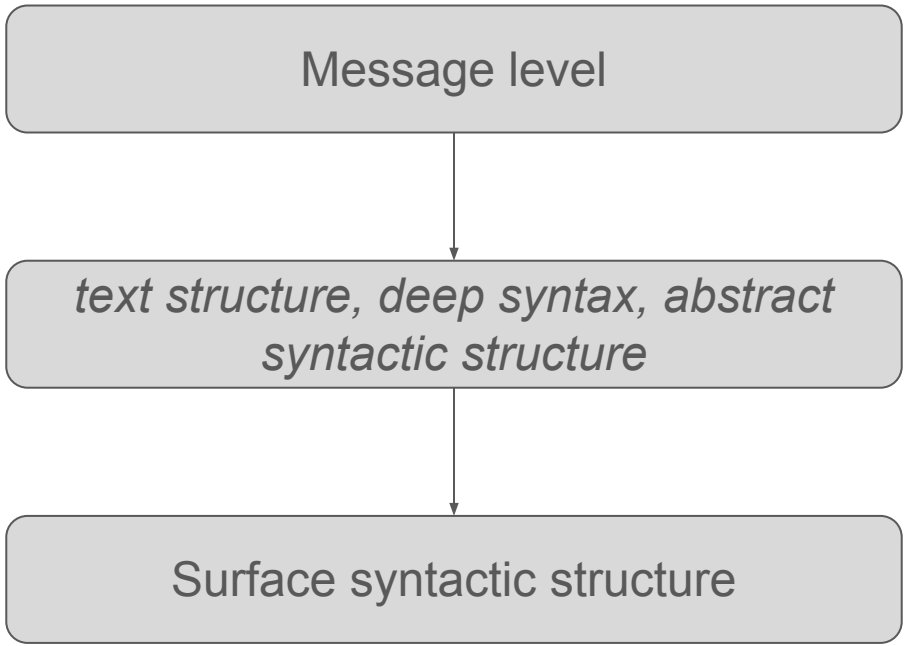
Components and Levels of Representation: tasks

1. Information must be *selected* for inclusion in the utterance.
2. The information must be given a *textual organization*.
3. *Linguistic resources* must be chosen to support the information's realization.
4. The selected and organized resources must be *realized* as an actual text and written out or spoken.

Components and Levels of Representation: Coarse Components

1. The application program or ‘speaker’: It does the thinking and maintains a model of the situation.
2. A text planner: It selects (or receives) units from the application and organizes them to create a structure for the utterance as a text by employing some knowledge of rhetoric.
3. A linguistic component: It realizes the planner’s output as an utterance.

Representational Levels



Approaches to Text Planning

- ***Macro-planning*** refers to the process(es) that choose the speech acts, establish the content, determine how the situation dictates perspectives, and so on.
- ***Micro-planning*** is a cover term for a group of phenomena: determining the detailed (sentence-internal) organization of the utterance, considering whether to use pronouns, looking at alternative ways to group information into phrases, noting the focus and information structure that must apply, and other such relatively fine-grained tasks.

Willem Levelt (1989)

The Function of the Speaker

- The speaker establishes what content is potentially relevant;
- It has a history of past transactions;
- It is the component with the model of the present state and its physical or conceptual context;
- The speaker deploys a representation of what it knows

Desiderata for Text Planning

- Construing the speaker's situation in realizable terms given the available vocabulary and syntactic resources, an especially important task when the source is raw data;
- Determining the information to include in the utterance and whether it should be stated explicitly or left for inference;
- Distributing the information into sentences and giving it an organization that reflects the intended rhetorical force, as well as the appropriate conceptual coherence and textual cohesion given the prior discourse

The Linguistic Component: Surface Realization Components

The job of a surface realization component is to take the output of the text planner, render it into a form that can be confirmed (in a theory-specific way) to a grammar, and then apply the grammar to arrive at the final text as a syntactically structured sequence of words, which are read out to become the output of the generator as a whole.

The Cutting Edge: Story Generation

Once upon a time a woodman and his wife lived in a pretty cottage on the borders of a great forest. They had one little daughter, a sweet child, who was a favorite with everyone. She was the joy of her mother's heart. To please her, the good woman made her a little scarlet cloak and hood. She looked so pretty in it that everyone called her Little Red Riding Hood.

Charles Callaway: the StoryBook system (2002)

The Cutting Edge: Personality-Sensitive Generation

5 (2.83) *Right, I mean, Le Marais is the only restaurant that is any good.*

3 (6.0) *I am sure you would like Le Marais, you know. The atmosphere is acceptable, the servers are nice and it's a french, kosher and steak house place. Actually, the food is good, even if its price is 44 dollars.*

Marilyn Walker's Personage system (2007, 2008)

Natural Language Generation at Google Research

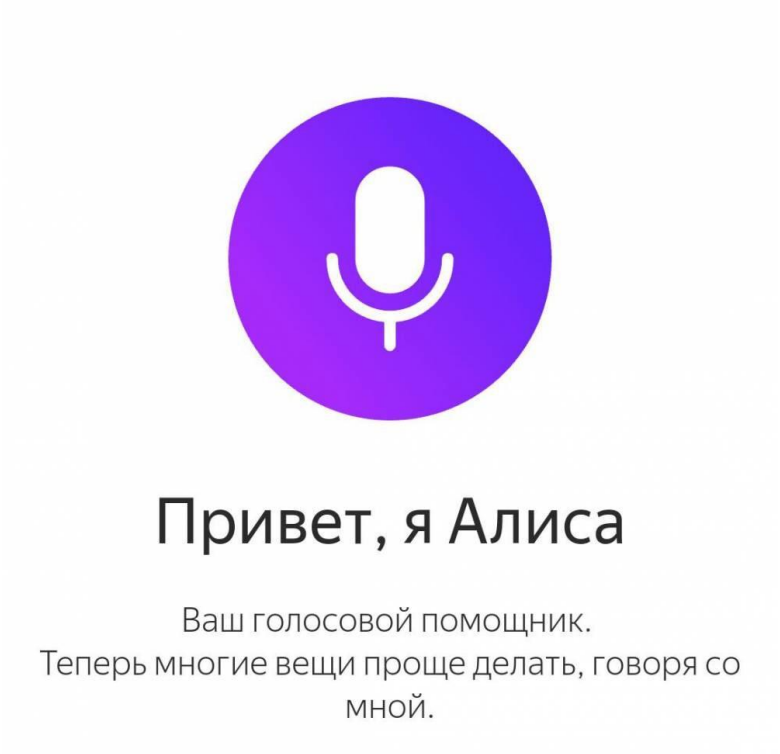
https://towardsdatascience.com/natural-language-generation-at-google-research-bbf2c3756d80

YouTube:
https://www.youtube.com/watch?list=PLIivdWyY5sqJxnwJhe3etaK7utrBiPBQ2&time_continue=5&v=MNvT5JekDpg


Google Cloud
AI Adventures
Big Data for Training
Models in the Cloud

Alice by Yandex

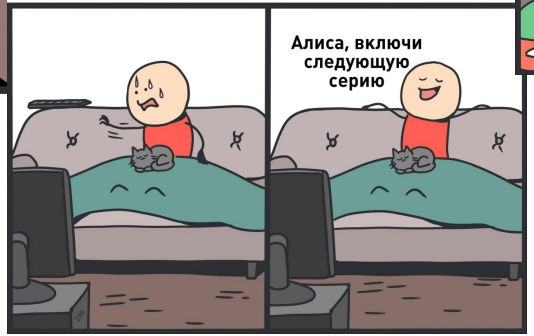
https://events.yandex.ru/lib/talks/5444/



Алиса умеет читать детям сказки

...или заказать пиццу

ПНН (пульты не нужны)!



С Алисой можно поговорить по душам

Алиса может легко вызвать такси...

Алиса может назвать цену любой вещи

Алиса может включить любую песню

Академия Яндекса

Алиса, вид сверху