Virtual World e-Parliament Conference 2021
Wednesday, 16 June 2021 - Friday, 18 June 2021

- Session Title: What is AI and how does it affect parliaments?

- Track: AI and parliaments
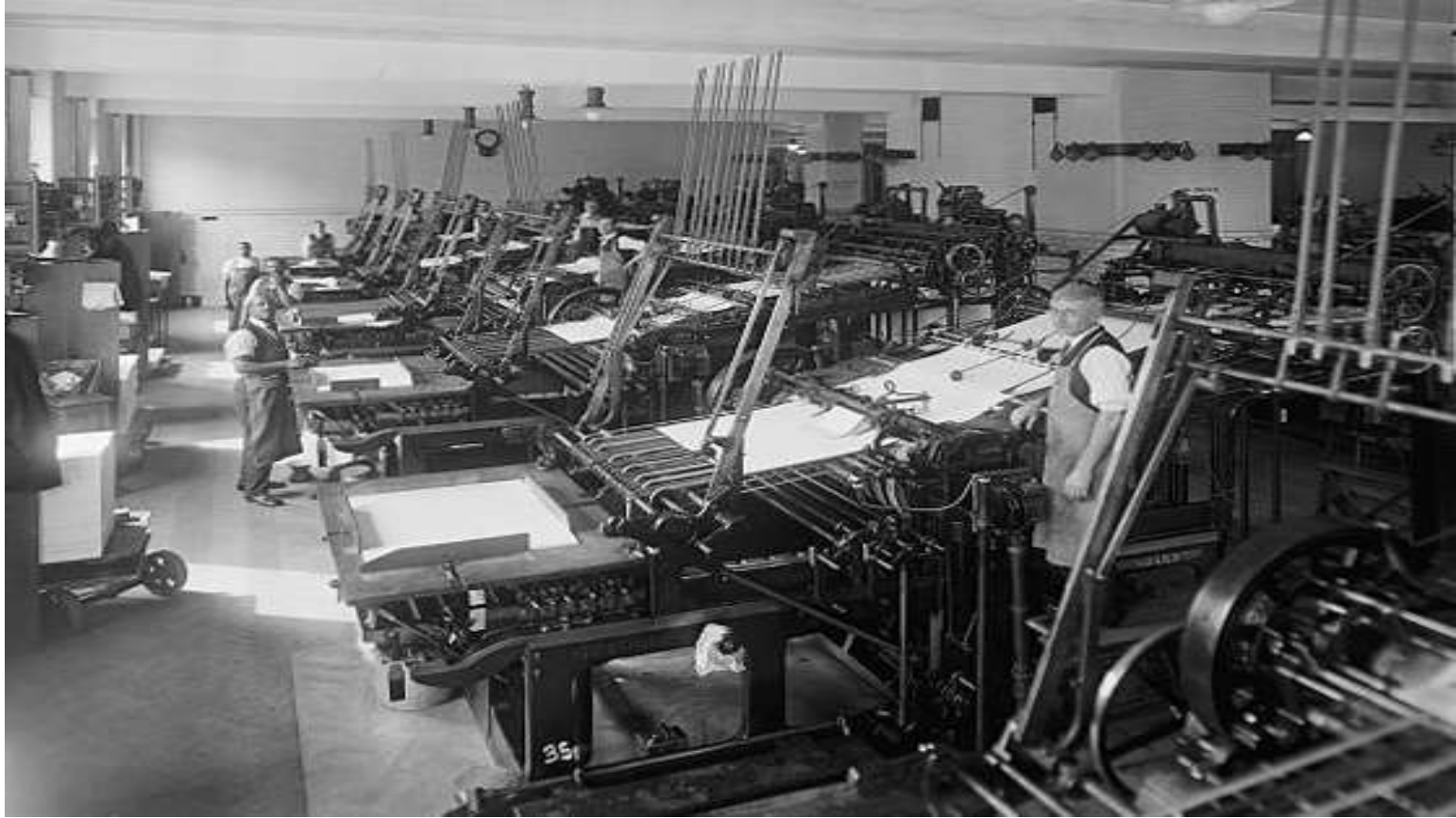
- Date: Thursday June 17th, 11:10 - 11:55 AM EDT

https://www.ipu.org/event/virtual-world-e-parliament-conference

https://www.ipu.org/our-impact/strong-parliaments/setting-standards/centre-innovation-in-parliament

Comparative Print Project
United States House of Representatives

World e-Parliament Conference

June 2021

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Welcome

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Three types of comparisons

Document to document

Amendments contained in a legislative proposal to current law — Changes in existing law (Ramseyer/Cordon)

Amendments to legislative proposal — Committee amendments

Floor amendments

Changes to existing law

Challenges: Finding provisions in Federal Law

No single unified code

Draft to several sources

- U.S. Code
- Statutes at Large
- Statute Compilations
- Other law (Revised Statutes of the United States, Uniform Code of Federal Evidence, Tariff Tables,…)

No single effective date; conditional effective dates

Notable Information

Data Standards

United States Legislative Markup (USLM)

- https://github.com/usgpo/uslm

Oasis LegalDocML or Akoma Ntoso

- http://www.akomantoso.org/

Innovation Hub

- https://usgpo.github.io/innovation/

Project Reports

- https://cha.house.gov/modernization-reports

What do the Natural Language Processors need to do?

- Recognize
- Interpret
- Retrieve
- Execute

Section 704 of the Homeland Security Act of 2002 (6 U.S.C. 344) is amended—

(1) in subsection (b)—

(A) in paragraph (1)—

(i) by inserting ", including with respect to leader development and employee engagement," after "policies";

(ii) by striking "and in line" and inserting ", in line"; and

(iii) by inserting "and informed by best practices within the Federal government and the private sector," after "priorities,";

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Challenges: Interpreting Amendatory Instructions

strike "Chief" and insert "director".

At the end of Title 15, add this new section…

Strike subsection (e) and insert a new (e) and (f), redesignate (f), (g), (h) as (g), (h), and (i).

Amended to read as follows:

in paragraph (9), as so redesignated, by striking "325(b)(7)" and inserting "325"; and

in subsection (j), as so redesignated—
- in paragraph (3), as so redesignated, by striking "122(j)" and inserting "122(g)";

The user notification system

If the changes to the existing law cannot be executed

- due to a drafting error,
- an error in the current law dataset, or
- an error in the solution itself (*unsupported instruction, something else*).

- It also alerts the user to when an amendment proposed in the bill has already been executed into current law.

The User Notification System

	AUTOMATED NOTIFICATIONS	WHAT IT MEANS
1	The act being amended could not be found.	The system does not have the act or there is a user error in the citation of the act.
2	This amendment could not be executed programmatically.	The system has located the act, but could not find the text to apply changes to. This could be a user or system error.
3	The amendment is missing a location.	No position specified for insert, and no preceding strike.
4	The provision of the act could not be found.	Citation Notice: Could not find provisions to amend: [human readable identifiers]
5	This amendment could not be executed.	Most likely a user error
7	The range of provisions could not be found.	System can't find the range of sections/subsections listed.
8	The citation language could not be processed programmatically.	Error parsing text to CIMPL.
9	The instruction language could not be processed programmatically.	Error parsing text AMPL.
10	The amendment could not be executed.	Error with content submitted.

Demonstration

Happy path

Changes to existing law

Problem: understanding English text

Bills are written in English, which is a natural language (as opposed to computer language).
- Understanding natural language is usually a hard problem for computers.
- Multiple ways express the same idea, harder to parse(analyze it's structure), possible ambiguity, no fully defined semantics.

Can we just handle all phrases, one by one?
- We've identified 4910 unique phrases in our dataset (skipping quoted text and designations).
- Handling each case individually would be very hard to code and impossible to maintain.
- There could be other phrases in the future.

What about patterns?
- A single pattern can handle multiple phrases by skipping some words, but those words we skip might be important. Handling those by defining exceptions can be sloppy.

What is AI?

Douglas Hofstadter, prof. Of cognitive sciences: "AI is whatever hasn't been done yet"

Problems that can be solved by humans, and used to be hard for a machine

A set of techniques to solve such problems

Machine learning

Powerful statistical techniques for identifying patterns out of sufficiently large data
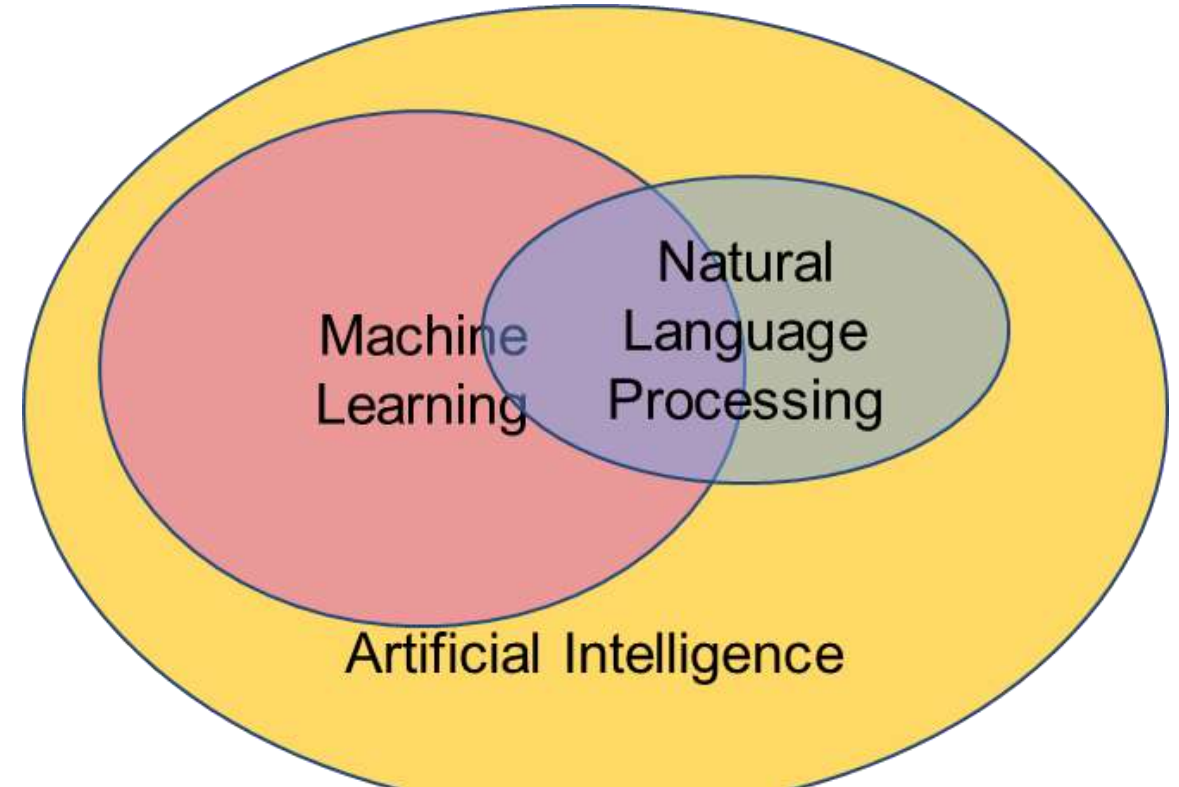
Natural Language Processing

Natural Language Processing (NLP) is the problem domain of **interpreting human languages by computers**.

Examples:

- Machine translation,
- sentiment analysis (customer service),
- information retrieval (Watson playing Jeopardy),
- conversation (chatbot)

There are various techniques used to solve this problem. Machine learning is the most common one.

Processing amendments is different than "typical" NLP

Typical NLP

Amendments

Expansive, unconstrained vocabulary

Limited vocabulary (130 keywords cover 97% of phrases)

Unrestricted, uncontrolled language

(Semi-)Controlled language

Ambiguity is very common

Ambiguity is highly discouraged

HARD

Imprecision is tolerated

When successful, should be precise

HARD

Shallow semantics

Deep semantics

Analysis of Amendatory phrases

Before starting to develop our solution, we analyzed the lexicon used in amendatory phrases.
Analyzed all bills from 2005 to early 2018.

- 28014 bills
- 284,094 phrases
- 606 keywords that occur 10 times or more
- 4910 unique phrases

Going over the most frequently occurring keywords

- Sorting those keywords into different groups: Action verbs, locations, other nouns, prepositions etc.
- Looking at the context for each of these keywords to understand their semantics
- Identified a lexicon of 130 keywords covering 97% of the phrases

From Natural Language to Machine Executable Language

We defined new machine-executable language for amendments

   CIMPL: CItation Modeling and Processing Language

   AMPL: AMendment Processing Language

Define the semantics of English phrases using CIMPL/AMPL

Use Categorial Grammar lexicon to specify the semantics in English

Execute CIMPL+AMPL to show changes to current law

NLP: CIMPL & AMPL

CIMPL:

select (law(\"Homeland Security\"+\"Act\"+\"of\"+\"2002\"):section(\"704\"))

AMPL:

select subsection(\"(b)\"); select paragraph(\"(1)\");

insert after(search(\"policies\")) \", including with respect to leader development and employee engagement,\";

strike search(\"and in line\"); insert \", in line\";

insert after(search(\"priorities,\")) \"and informed by best practices within the Federal government and the private sector,\";

Section 704 of the Homeland Security Act of 2002 (6 U.S.C. 344) is amended—

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(A) in paragraph (1)—

(i) by inserting ", including with respect to leader development and employee engagement," after "policies";

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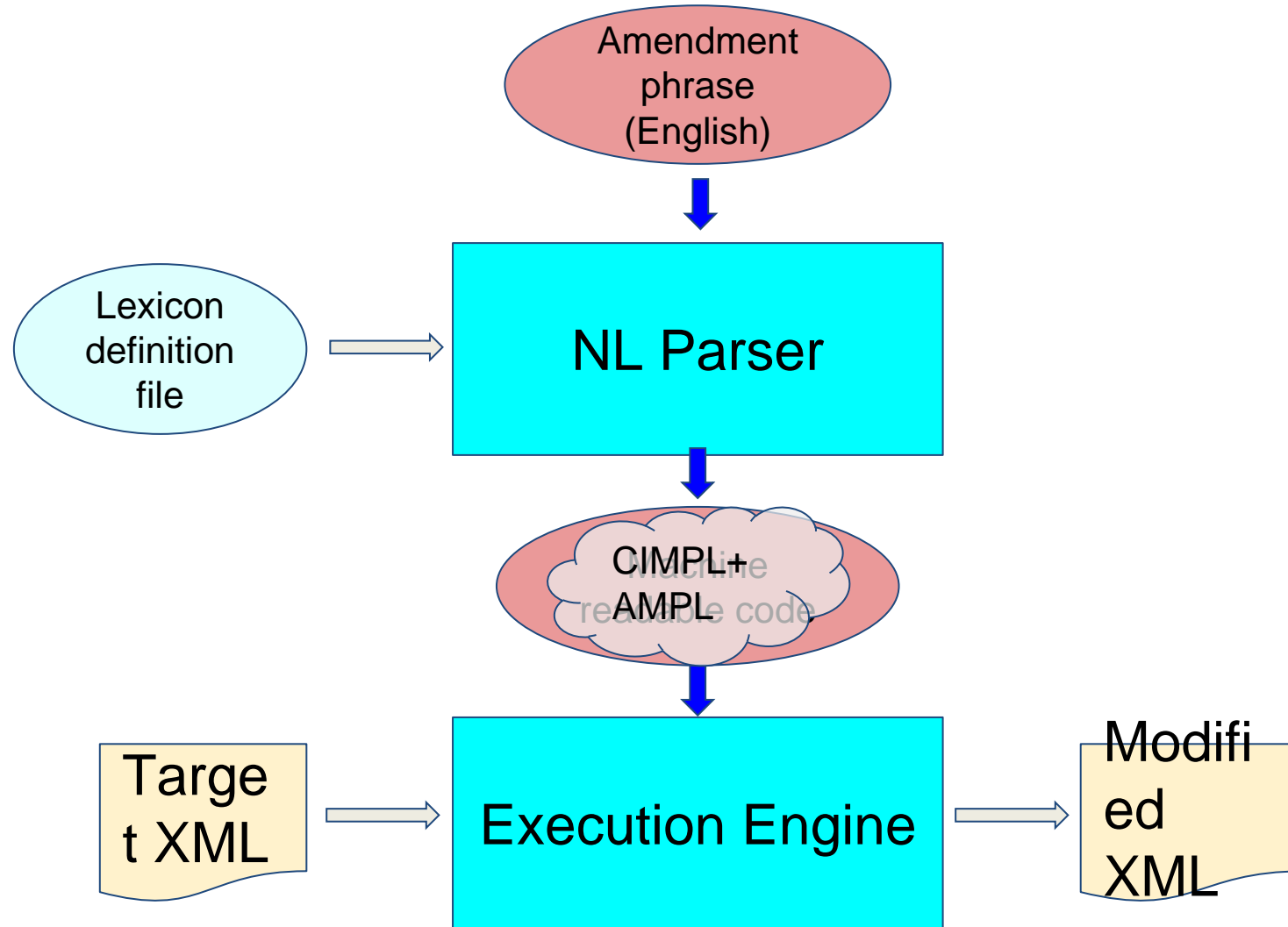CLERK | UNITED STATES HOUSE of REPRESENTATIVES

More complex example

Amendment phrase:
- In the second section 221, by striking the section heading and all that follows through "wow!"

AMPL code:
- select nth(2, section("221"));
  strike rangeof(this:heading) through
  end_of(search("wow!"));

Solution

Questions and Answers

Bill to bill differences

"(b) Chair; Membership.—The Administrator shall designate a representative to serve as the Chair of the advisory board. In addition to the Chair, the membership of the advisory board shall include ~~the Director of the Office of Personnel Management;~~
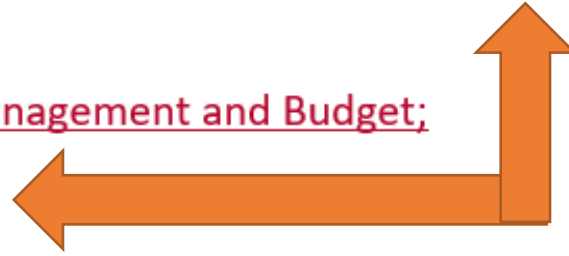
"(1) the Deputy Director for Management of the Office of Management and Budget;

"(2) the Director of the Office of Personnel Management;

"(3) the Administrator of the Office of Electronic Government of the Office of Management and Budget;

"(4) the Assistant to the President and Chief Technology Officer; and

"(5) other individuals as may be designated by the Administrator.

Changes and Differences

Comparison variation one

"(b) Chair; Membership.—The Administrator shall designate a representative to serve as the Chair of the advisory board. In addition to the Chair, the membership of the advisory board shall include—

"(1) the Deputy Director for Management of the Office of Management and Budget;

"(2) the Director of the Office of Personnel Management;

"(3) the Administrator of the Office of Electronic Government of the Office of Management and Budget;

"(4) the Assistant to the President and Chief Technology Officer; and

"(5) other individuals as may be designated by the Administrator.

Changes and Differences

Comparison variation two

Demonstration

Happy path

Bill to bill differences

Goals of the Pilot Group

Feedback will be gathered in terms of:

- Usability:
  - The application's usefulness and ease of use
- Desirability:
  - Refers to the application's ability to drive the user towards an action.
- Learnability:
  - Refers to the user's ability to learn to use the application easily
- Accuracy:
  - Refers to the accuracy of the application

Thank you

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