Statistical NL generation

(a brief overview)

MOTIVATIONS

Drawback of symbolic NLG

Very labor intensive

Use of statistics

Specific content modules, also in the context of dialog systems

Best-studied - surface generation

Advantages

Easily portable and coverage is increasable

provided there is sufficient data/training examples

Methods

Overgeneration and rank by language model ("generate and select")

Based on data to text (rare, low availability), treebank regeneration

NITROGEN (Langkilde 1998)

Components (originally)

Non-deterministic symbolic generator

Ranker based on bi- or tri- gram language models

(elicited in an initial interview, converted into function components)

Application/Motivation

Missing input specification (inderspecification)

Japanese-English machine translation (e.g., number)

Method

Approx. 250 hand-written rules

Map input representation into packed set of possible output expressions

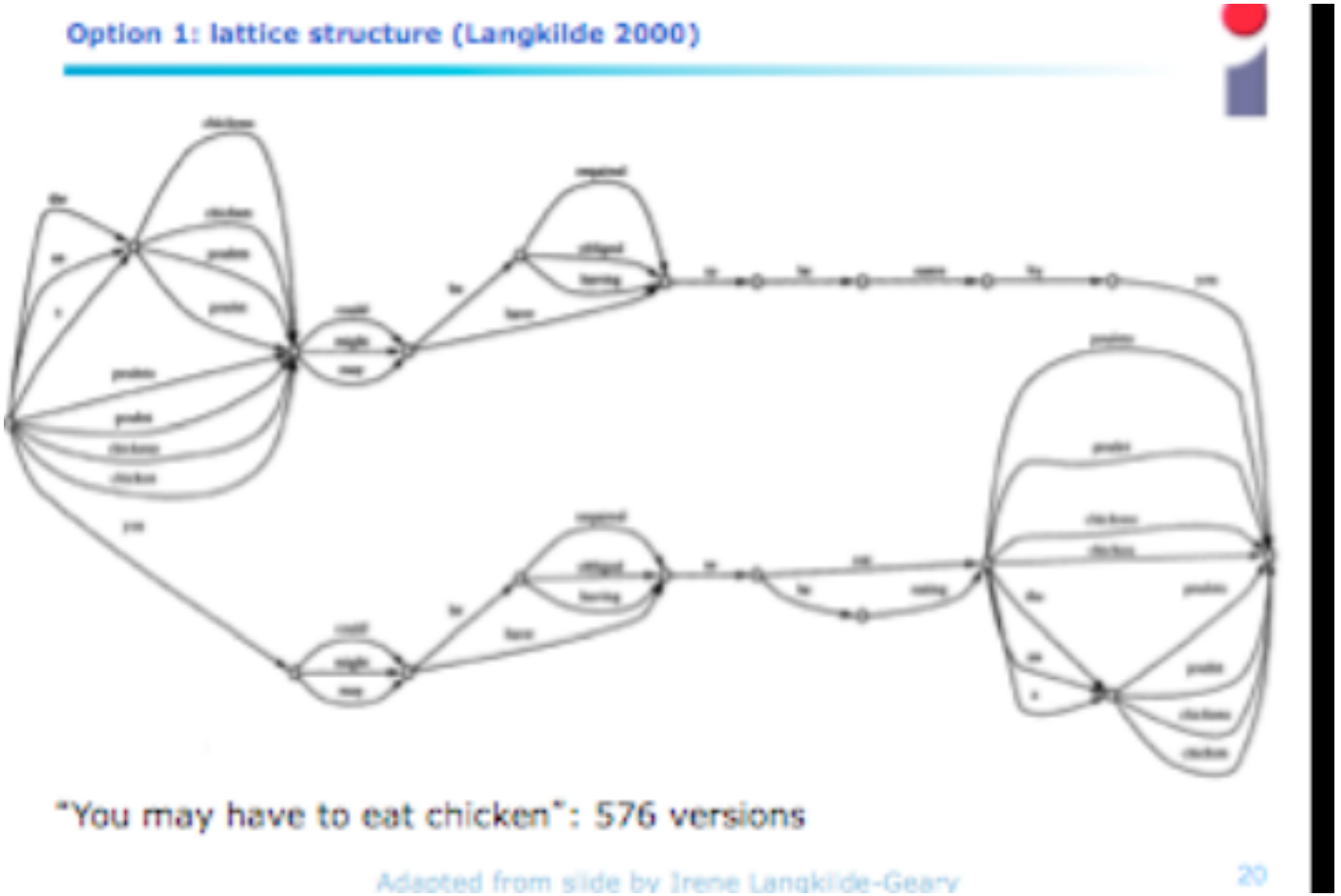
(word lattice, forest of trees)

Very efficient representations (pointers instead of duplication) and

associated evaluation procedures (which determine preferences

A major limitation is the inability to handle (long-distance) dependencies

AN EXAMPLE OF A WORD LATTICE



A COMPARABLE VIEW ON OPENCCG

A point for improvement

N-grams are a reasonably good model, but

computation to compare all combinations of alternatives is highly inefficient

Some effective measures

A principled, mildly overgenerating grammar

Small set of hand-crafted rules to chunk input logical forms

into subproblems to be solved independently before combination

Prune edges in chart based on n-gram score

N-gram scores used to sort edges in a chart

Results

Best-first searching dominates breadth- and depth-first searching

Makes it possible to get near perfect results

STATISTICS GUIDES SENTENCE PLANNING

MATCH - Multimodal dialog system (AT&T, Johnston et. al)

User-adapted restaurant comparisons and recommendations

Communicates values of restaurant attributes considered relevant (for a user)

Multiple sentence plans that express a content plan

Order of assertions (e.g., main claim first or last), obeying centering theory

Use of sentential connectives

Alternatives in referring expressions (name or pronoun, based on recency)

Method for selection and assessment

Ranking based on rules learned from labeled set of sentence plan examples

Better than templates for Compare-2, but worse for Compare-3, Recommend

Template have large standard deviation

Individuation important, better than leveraging over members of a group