Amazon at MRP 2019: Parsing Meaning Representations with Lexical and Phrasal Anchoring

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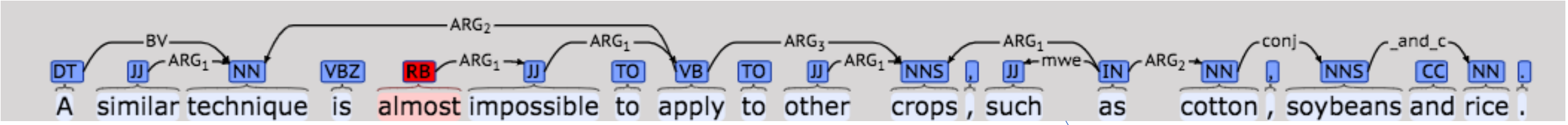
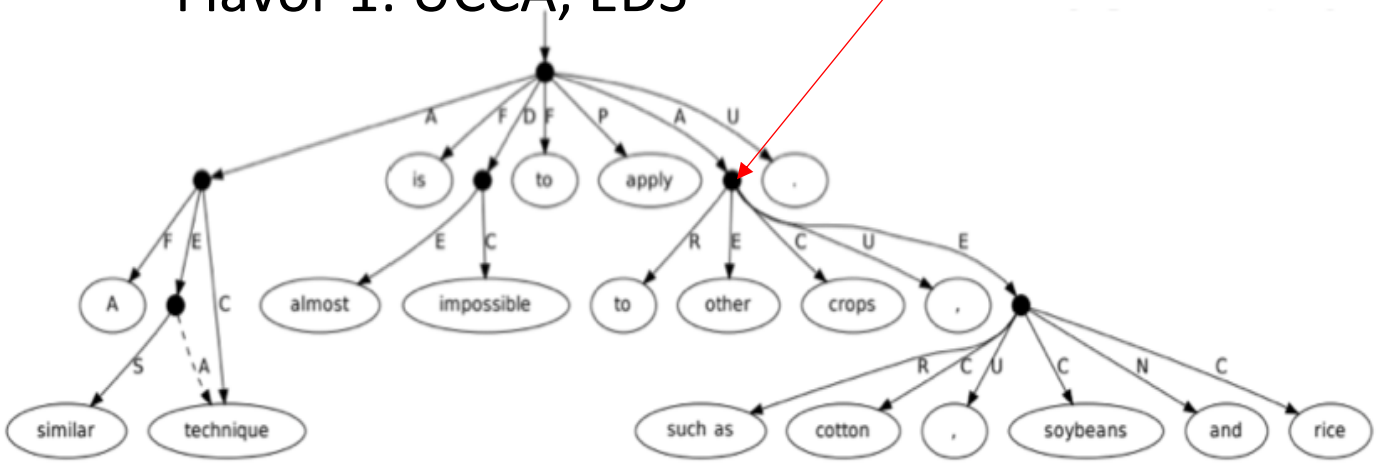
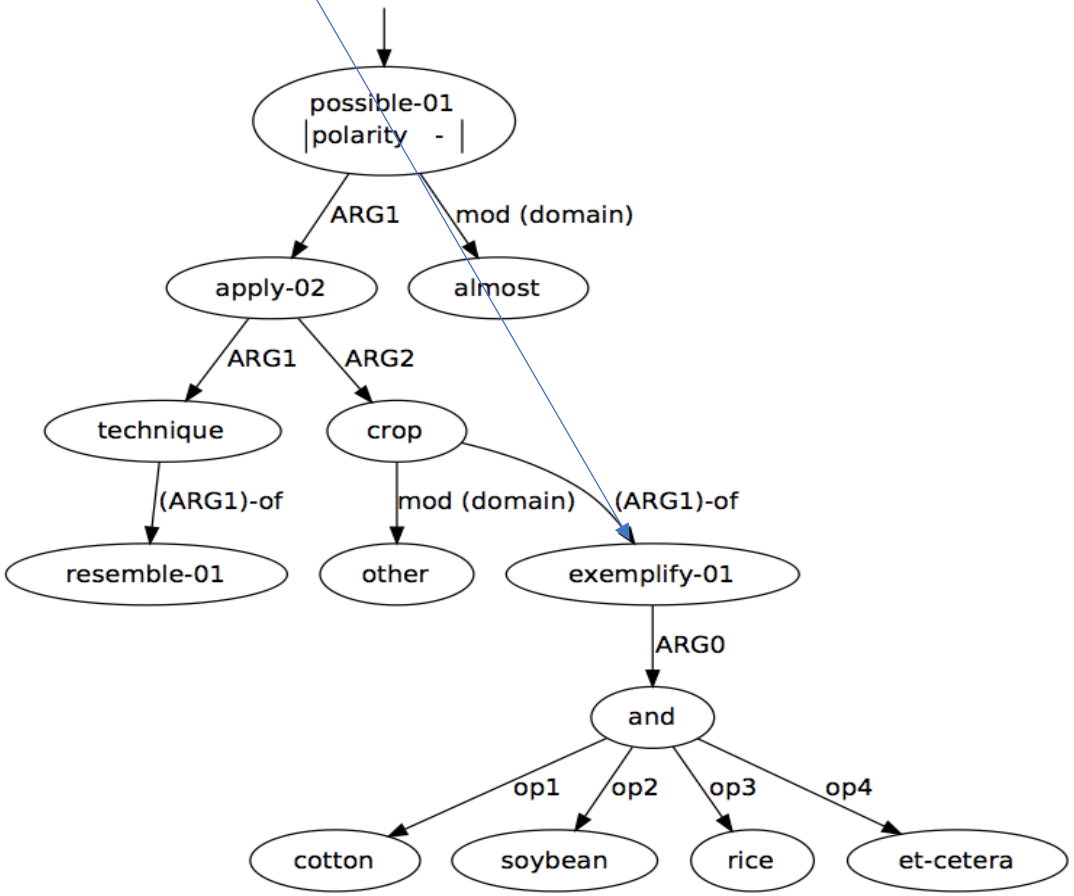
https://www.youtube.com/watch?v=5ZMZSfl_Ng0

Anchoring in Meaning Representation



- **Lexical Anchoring (token/MWEs/NEs)**
  - Flavor 0: DM, PSD
    - Explicit bi-lexical semantic dependency
  - Flavor 2: AMR
    - Implicit lexical anchoring
- **Phrasal Anchoring(lexical token + phrase)**
  - Flavor 1: UCCA, EDS



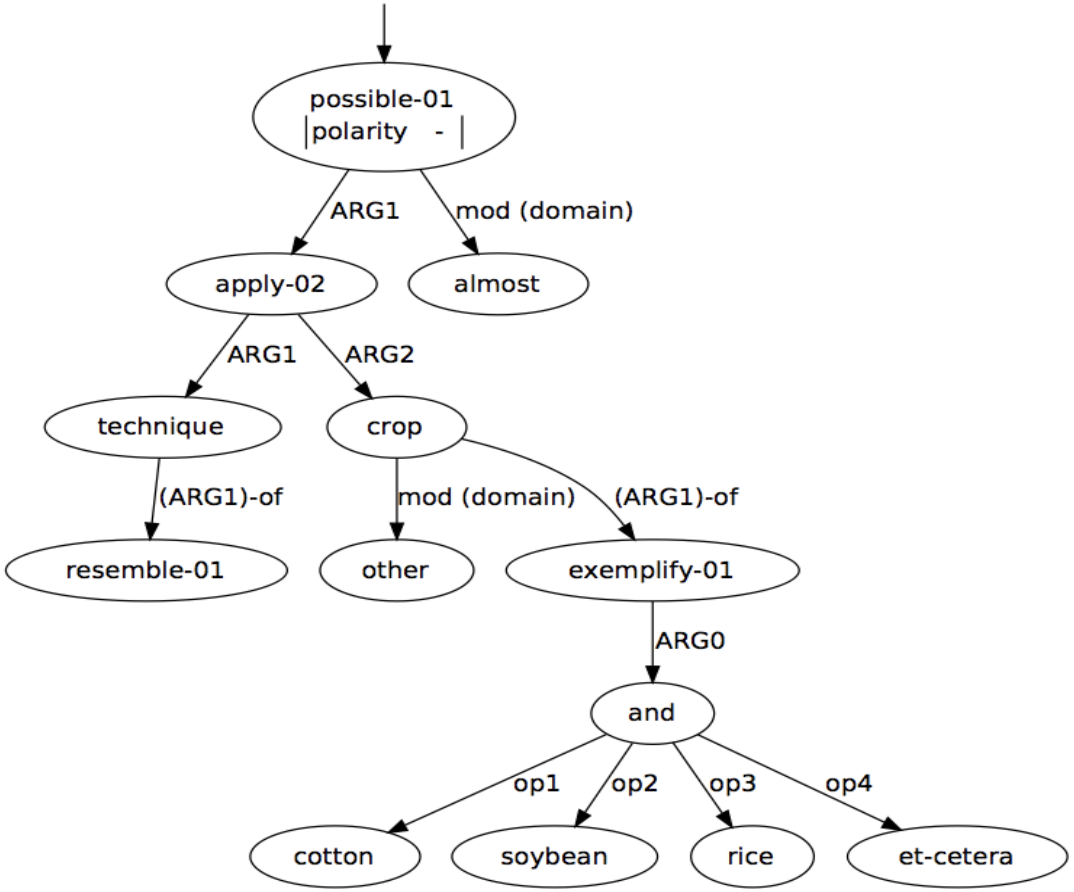


Lexical-Anchoring: Graph-based Parsing with Latent Alignment

For **m** words w, to predict concepts **C**, relations **R**,
marginalize in the latent alignment **discrete** variable $a \in \mathbb{Z}^m$

$$
\begin{aligned}
P(C, R|w) &= \sum_a P(a)P(C, R|w, a) \\
&= \sum_a P(a)P(R|w, a, c)P(c|w, a) \\
&= \sum_a P(a) \prod_i^m P(c_i|h_{a_i}) \prod_{i,j=1}^m P(r_{ij}|h_{a_i}, c_i, h_{a_j}, c_j)
\end{aligned}
$$

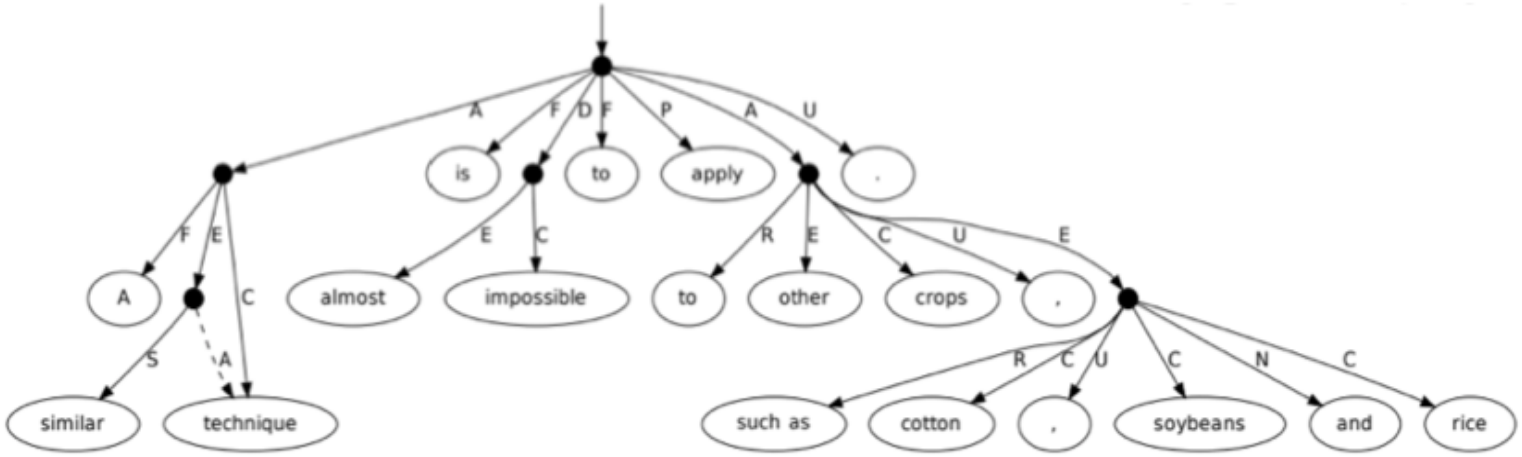
For DM, PSD, explicit alignment,
P(a*) = 1.0 and P(a!=a*) = 0.0



For AMR, latent alignment

- estimating posterior alignments model
- Variational Inference into ELBO
- Perturb-and-Max(MAP)
- Gumbel-Softmax

Phrasal-Anchoring: CKY Parsing with Self-Attentive Encoder



- Assign edge label to dep non-terminal node label
- Remove ‘remote’ edge
- Ignoring discontinuous span
- 8 layers with 8 heads transformer encoder with positional encoding
- Span encoding with CKY

```
(TOP
    (HEAD
        (:A
            (:F   (TOK A))
            (:E   (:S (TOK similar)))
            (:C   (TOK technique)))
        (:F   (TOK is))
        (:D   (:E almost) (:C impossible))
        (:F   (TOK to))
        (:P   (TOK apply))
        (:A   (:R (TOK to))
              (:E (TOK other))
              (:C (TOK crops))
              (:U (TOK ,))
              (:C (TOK soybeans))
              (:N (TOK and))
              (:C (TOK rice))
        (:U   (TOK .))
    )
)
```

Conclusion(https://www.youtube.com/watch?v=5ZMZSfl_Ng0)

Please see more details on poster session. Thanks!

- Implicit anchoring in AMR is almost lexical-anchoring.
- Our graph-based framework with latent-alignment mechanism can support both explicit and implicit lexical anchoring. It ranks 1st place in AMR subtask, and 6th in PSD, 7th in DM
- Our span-based constituent tree parsing model can handles the phrasal anchoring in UCCA. Equipped with self-attentive encoder and ELMo, our model can rank 5^{th} in post-evaluation phase.