Semantic Role Labeling

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Semantic Role Labeling

- **Semantic role labeling:** Automatically assigning semantic roles to predicate arguments
- Often solved using supervised machine learning methods

Feature-Based Semantic Role Labeling

```
parse ← get_parse(input)
for each predicate in parse do:
        for each node in parse do:
                feature_vector ← extract_feature_vector(node, predicate, parse)
                classify_node(node, feature_vector, parse)
```

Feature-Based Semantic Role Labeling

- Node-level classification can optionally be broken down into multiple subtasks:
  - **Pruning:** Using simple heuristics, assess whether the node is likely to serve as a semantic role
  - **Identification:** Perform binary classification to predict whether or not the node serves as a semantic role
  - **Classification:** Perform 1-of-N classification to predict the specific semantic role for the node

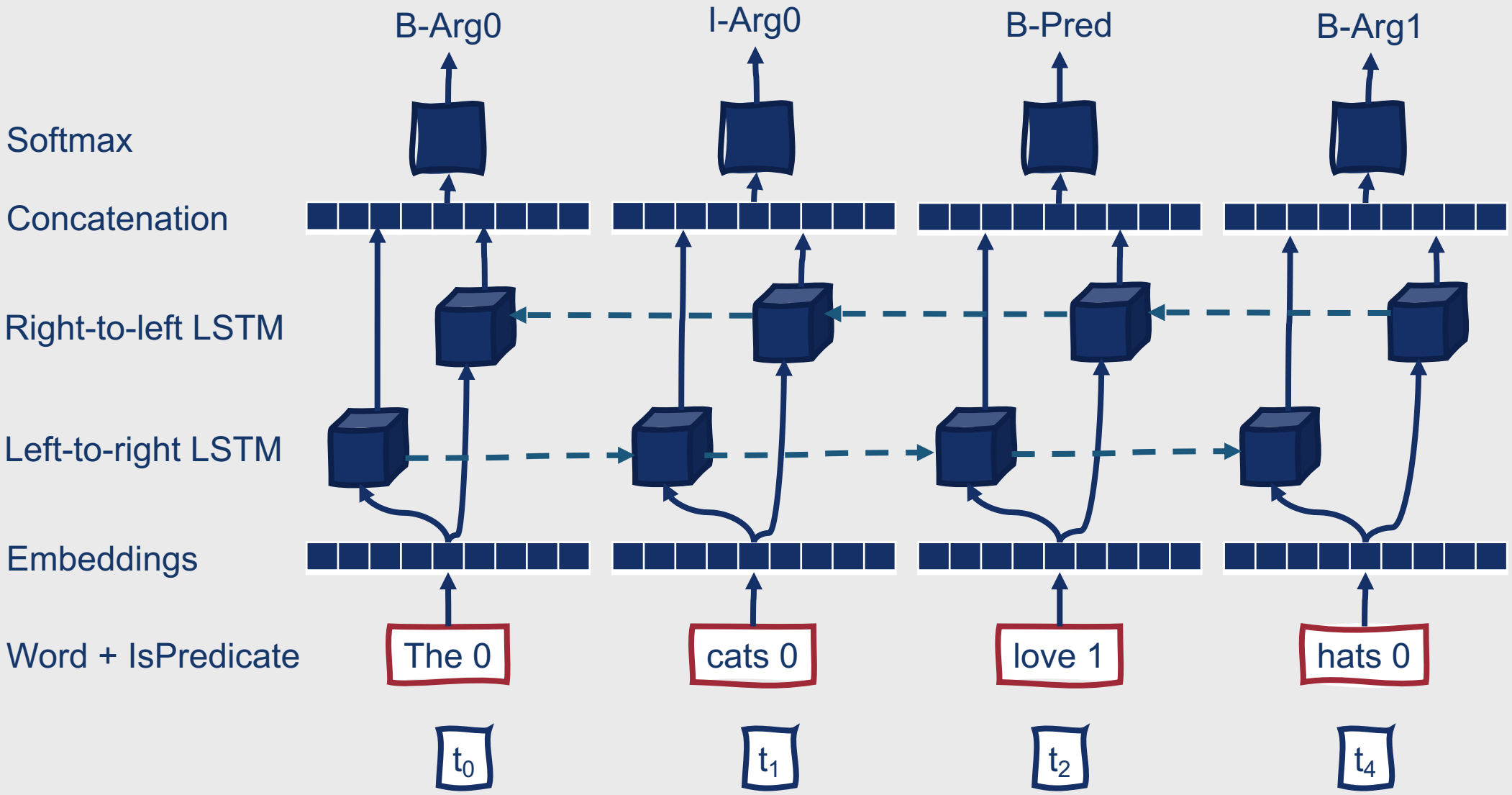
Global Optimization

- Semantic roles are not independent of one another!
- Many approaches perform a second pass to address **global consistency**
  - Viterbi decoding
  - Reranking
  - Integer linear programming

Features for Semantic Role Labeling

- Common features:
  - Governing predicate
  - Constituent type
  - Head word of the constituent
  - Part of speech of the head word
  - Path in the parse tree from the constituent to the predicate
  - Whether the voice of the surrounding clause is active or passive
  - Whether the constituent appears before or after the predicate
  - Set of expected arguments for the verb phrase
  - Named entity type of the constituent
  - First and last word(s) of the constituent

Neural Semantic Role Labeling



Neural Semantic Role Labeling

- Global optimization is still important!
- Can be addressed by applying Viterbi decoding either directly to the softmax output, or to the output of a CRF layer that replaces the softmax layer

Evaluation of Semantic Role Labeling

- **True positives:** Argument labels assigned to the correct word sequence or parse constituents
- Then, we can compute our standard NLP metrics:
  - Precision
  - Recall
  - F-measure