BSCS5002: Introduction to Natural Language Processing

Week 2 Lecture-2: Text Analysis: Stemming and Lemmatization

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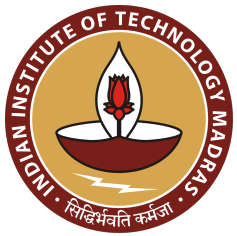

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Text Analysis: Linguistic Representation

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Example :

- arguing $>$ argu, flies $>$ fli
- playing $>$ play, caring $>$ car
- news $>$ new

Examples of Stemming

- **Original Word → Stemmed Form**
  - “Caring” → “car”
  - “Studied” → “studi”
  - “Running” → “runn”
  - “Happiness” → “happi”

Advantages and Disadvantages of Stemming

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  - May result in words that lose their meaning.
  - Example: “caring” $\rightarrow$ “car”

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Lemmatization and stemming are mutually exclusive, and the former is much more resource-intensive than the latter.

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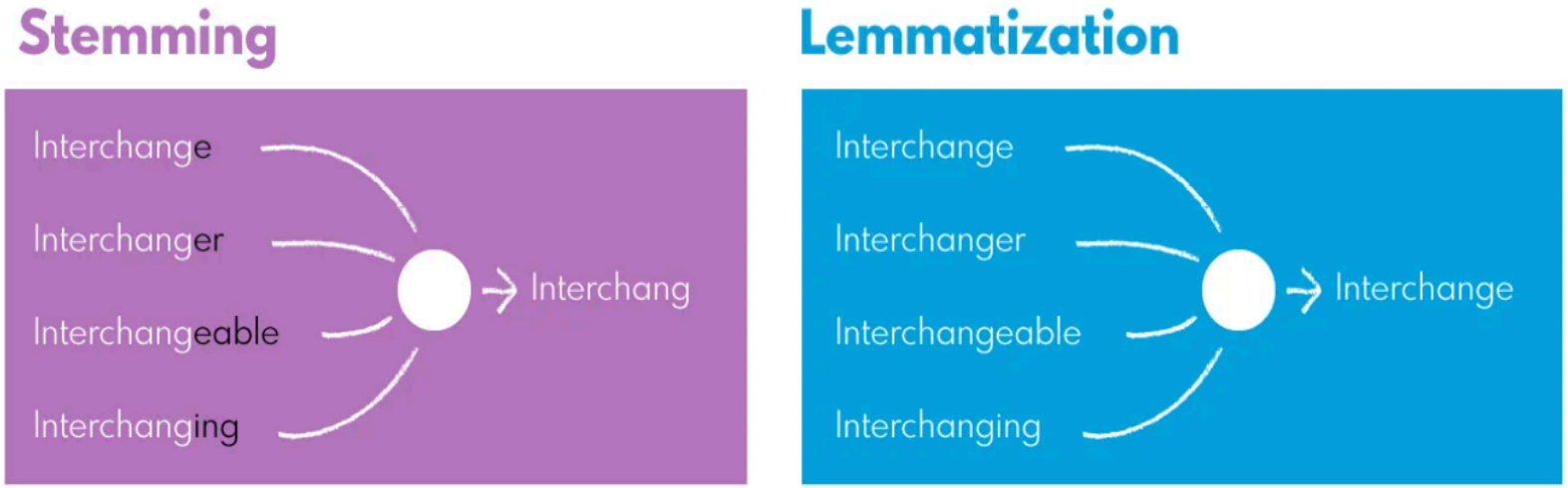
- Disadvantages of Lemmatization:
  - Slower and more complex to implement.
  - Requires additional resources like a dictionary or POS tagger.

Stemming Vs. Lemmatization



Stemming vs Lemmatization

Comparison of Stemming and Lemmatization

Feature	**Stemming**	**Lemmatization**
Approach	Rule-based, chops off suffixes	Dictionary-based, considers POS
Result	Stem (may not be a real word)	Lemma (always a real word)
Speed	Faster, less computationally intensive	Slower, more computationally intensive
Accuracy	Less accurate, may distort meaning	More accurate, preserves meaning
Use Case	Simple text processing	Advanced text analysis and NLP tasks
"Running"	Stem: "runn"	Lemma: "run"
"Studies"	Stem: "studi"	Lemma: "study"

Practical Applications of Stemming

- **Search Engines:**
  - Reduces variations of words to their base form to improve search results.
  - For example, searching for "run" might also return "running" and "ran".
- **Text Mining:**
  - Simplifies words in a large dataset, making it easier to analyze patterns.

Practical Applications of Lemmatization

- **Machine Translation:**
  - Ensures that words are translated accurately by maintaining their base form.
- **Sentiment Analysis:**
  - Improves the accuracy of text sentiment analysis by understanding the correct form of words.
- **Speech Recognition:**
  - Helps in identifying the correct form of spoken words to improve transcription accuracy.