

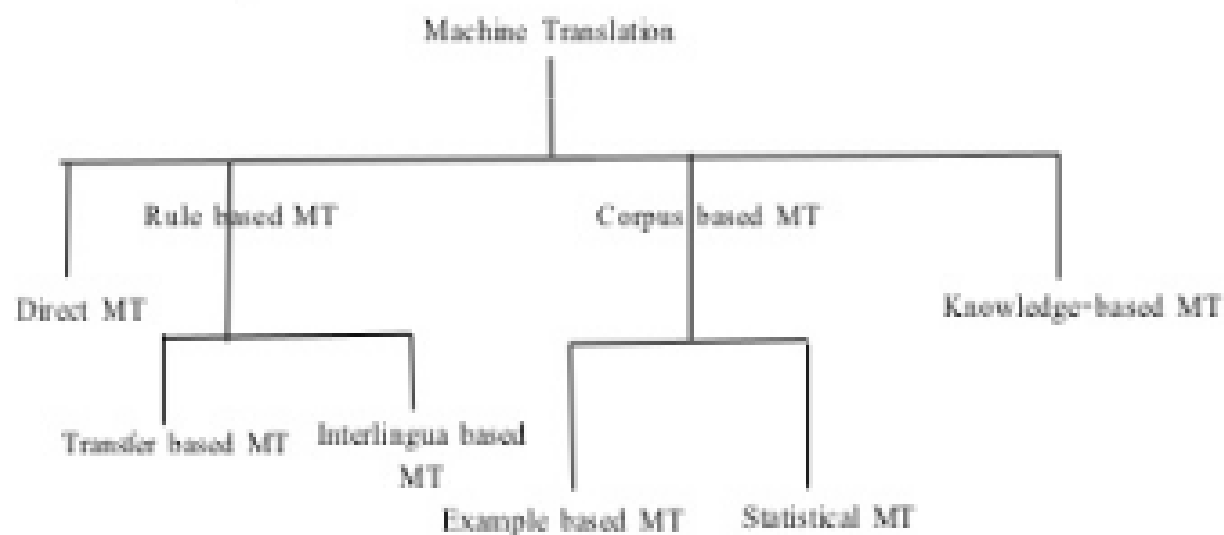
# Machine Translation

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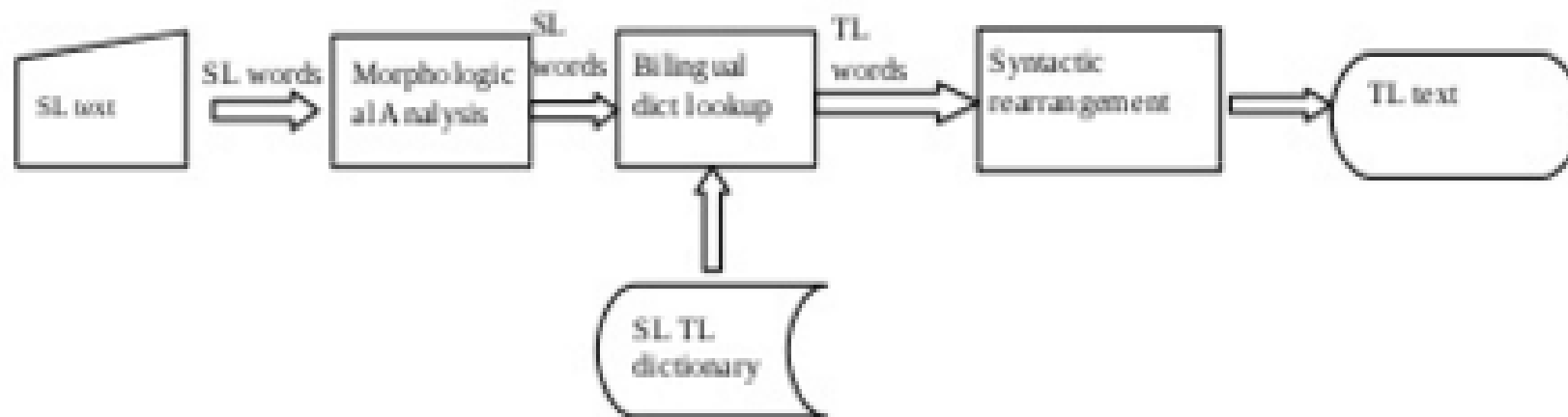
# MT Approaches

Approaches in MT can be classified into four categories:

- 1) Direct MT
- 2) Rule-based MT
- 3) Corpus-based MT
- 4) Knowledge-based MT



# Direct translation



**Figure 2. Direct machine Translation System**

# Example

Input (English Sentence)	-	Sita slept in the garden.
Words translation	-	सीता सोयि में बग
Syntactic rearrangement	-	सीता बग में सोयि ।

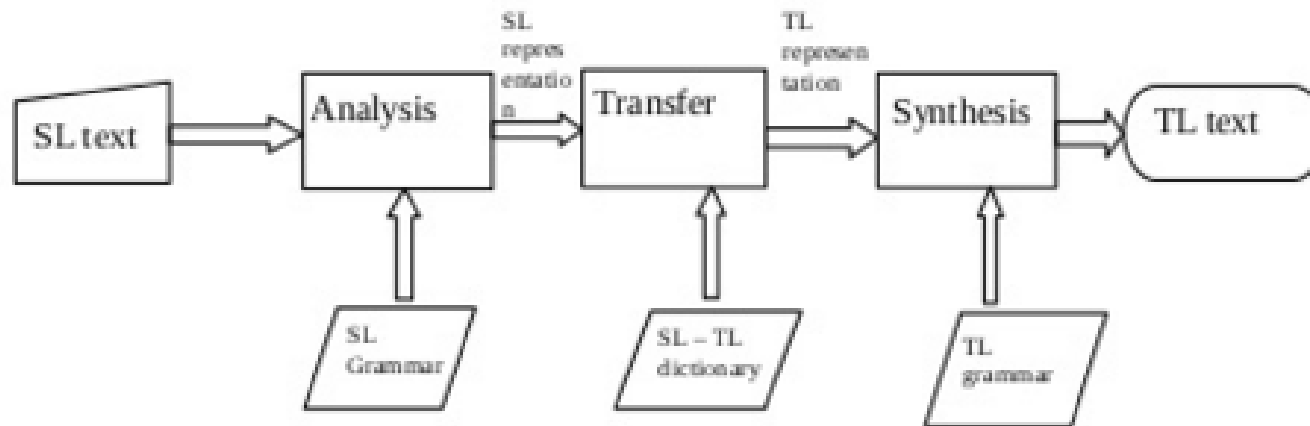
English Sentence	-	The boy gave the girl a flower.
Word Translation	-	लइका दी लटकी एक फूल
Syntactic rearrangement	-	लइका लइकी एक किताब दी
Idiomatization	-	लइके ने लइकी को एक फूल दी ।

(Suffix handling and preposition handling)

(modification of verb and adjective according to gender)

English Sentence	-	She saw stars in the sky.
Word Translation	-	वो देखा तारे में आसमान
Syntactic rearrangement	-	वो आसमान में तारे देखी
Idiomatization	-	उसने आसमान में तारे देखि ।

# Transfer based



We can work out the system with our previous example 'Sita slept in the garden'.

- |                            |   |
|----------------------------|---|
| Input                      | - Sita slept in the garden  |
| Analysis output            | - (S (NP (NNP Sita)) (VP (VBD slept) (PP (IN in) (NP (DT the) (NN garden))))))  |
| After Syntactical transfer | - (S (NP (NNP Sita)) (VP (PP (NP (DT the) (NN garden)) (IN in) ) (VBD slept) )) |
| Hindi lexicalization       | - (S (NP (NNP सीता)) (VP (PP (NP (NN बग)) (IN में) ) (VBD सोयि) ))              |
| Hindi Sentence             | - सीता बग में सोयि ।  |

# Interlingua

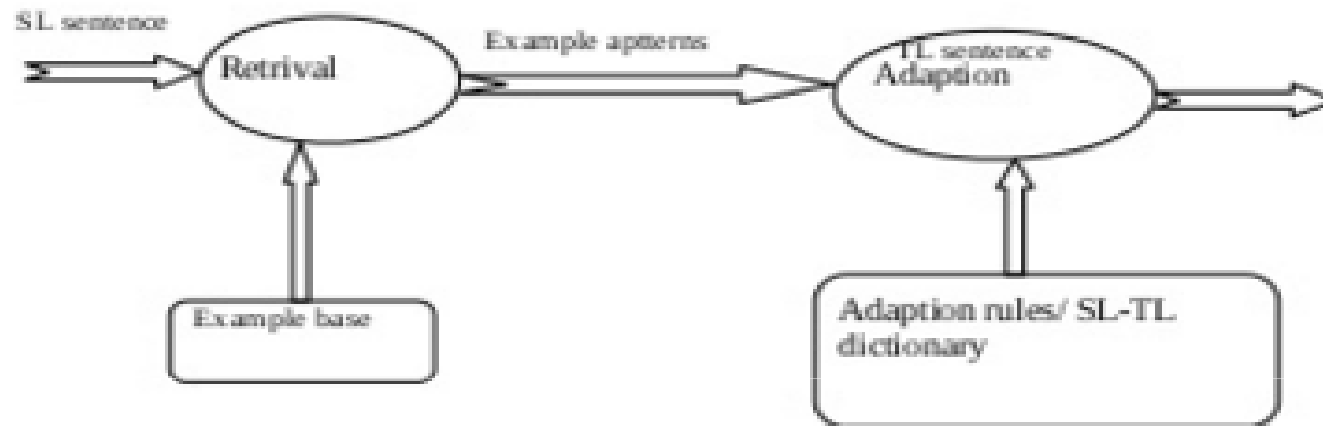


( \*sleep  
(tense past)  
(mood declarative)  
(punctuation period)  
(subject ( \*Sita  
                 (number singular)  
(Location ( \*garden  
                 (reference definite)  
                 (number singular)))

**Sample interlingua for the sentence 'Sita slept in the garden'**

# Example based

To carry out the necessary modifications



Input - Santhosh is writing a letter.

Example base -

Vikram wrote a poem.	(1)
Anand is writing.	(2)
Ravi is writing an essay.	(3)
Mukesh writes a Malayalam poem.	(4)

Selection by the retriever

Ravi is writing an essay  
रवि एक उपन्यास लिख रहा है ।

replace Ravi with Santhosh and उपन्यास with पत्र

# Knowledge based

```
person ::= ( 'person'  
            ( 'isa' creature)  
            ( 'agent-of' (Eat, Drink, Move, Attck, Love ....))  
            ( 'consists-of'(Hand Foot, ....)))
```

```
computer-user ::= ( 'computer-user'  
                   ( 'isa' person)  
                   ( 'agent-of' (+ (Operate)))  
                   ( 'subworld' computer-world))
```

**Example of an ontology for KBMT system**



