MR2918608 (Review)   68Q45 68T50
Maletti, Andreas (D-STGT-NLP)
Survey: Weighted extended top-down tree transducers. Part II—Application in machine translation. (English summary)
Fund. Inform. **112** (2011), *no. 2-3,* 239–261.

From the introduction: "Machine translation is the subfield of natural language processing that investigates the automatic translation of natural languages. Since natural languages are highly ambiguous, the field of machine translation is essentially different from compiler construction or database (XML) processing. In machine translation, the ambiguity is typically handled with the help of probabilities, which express the likelihood of the translations.

"Here, we will focus on statistical machine translation [...], where the translation and language model are automatically obtained from linguistic resources using statistical methods [...].

"Finite-state automata and transducers have been investigated since the 50s [...]. In the 60s, costs were added to the transitions and the theory of weighted automata was established [...]. Such automata are widely used nowadays (e.g., in image processing [...], in speech processing [...], and in machine translation [...]). All the already mentioned toolkits are based on weighted finite-state automata and transducers, which made those automata and transducers the de-facto standard in many application areas such as finite-state morphology. However, it was recently realized that string-based systems cannot easily compute certain important translations [...]. Since modern and reliable parsers are available [...], the translation model can be supplied with syntactical information about the input or output sentence.

"In this [...] survey, we demonstrate the application of weighted extended top-down tree transducers in machine translation. To this end, we first collect a few formal properties that are desirable in a formal machine translation model. Using the results of the first part [A. Maletti, Acta Cybernet. **20** (2011), no. 2, 223–250; MR2907804] we show that most properties are fulfilled for linear and nondeleting weighted extended top-down tree transducers." *Saeed Salehi*

© *Copyright American Mathematical Society 2014*