Text Simplification is a task to generate a sentence which is easier to understand than original. Text Simplification helps beginners such as children and foreigners learn languages. Recently, seq2seq models based on large scaled datasets have achieved state-of-the-art results in many areas including Machine Translation, Summarization, and Question Answering, to name a few. Although these model can be applied in text simplification as well, it requires a large number of parallel sentence pairs. Since available sentential corpora for text simplification are inadequate, building new corpus is so critical. In this paper, we suggest the application of neural textual entailment method to detection of simplified sentence pairs so that we are able to automatically construct text simplification dataset. In experiment, we evaluated the performance of identification of simplified sentences by using manually annotated dataset, and our proposed framework outperformed a baseline method.