Morphological segmentation is segmentation of words into morphemes - smallest units carrying meaning. It is a low level Natural Language Processing task. Since morphological segmentation is sometimes used as method of preprocessing, achieving better results on this task may help NLP algorithms to better solve various problems, especially in scenarios involving small amount of data, and it may also also help the linguistic research. We propose a novel ensemble algorithm for morphological segmentation of Czech lemmas which makes use of the DeriNet derivation tree dataset. As a sideproduct we also created suggestions for improvements of the DeriNet dataset.