Word-initial vowel glottalization is used in Czech as a boundary signal. While its contextual occurrence is predictable, it is not always realized. In addition, it is not always realized as a canonical glottal stop. Acoustic parameters which would quantify and identify the various types of glottalizations are selected based on literature research and exploratory data analysis. These acoustic parameters are then used in a machine learning categorization model. Results show that with a small number of parameters, satisfactory results can be obtained, and thus these parameters are deemed suitable in characterizing these glottalizations.