

DUG-Seis Documentation

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1 Structure and Approach

In the figure below the overall structure of the processing software is shown. The blocks equal a script of the processing software. In the next chapters each of these blocks is described. 2 times in the software a block sends an output to a block (dug_trigger and get_waveforms), retrieves the output and sends this to the next block. The two blocks/scripts dug_trigger and get_waveforms will be treated as a sub chapter while the other blocks will be treated as main chapters.

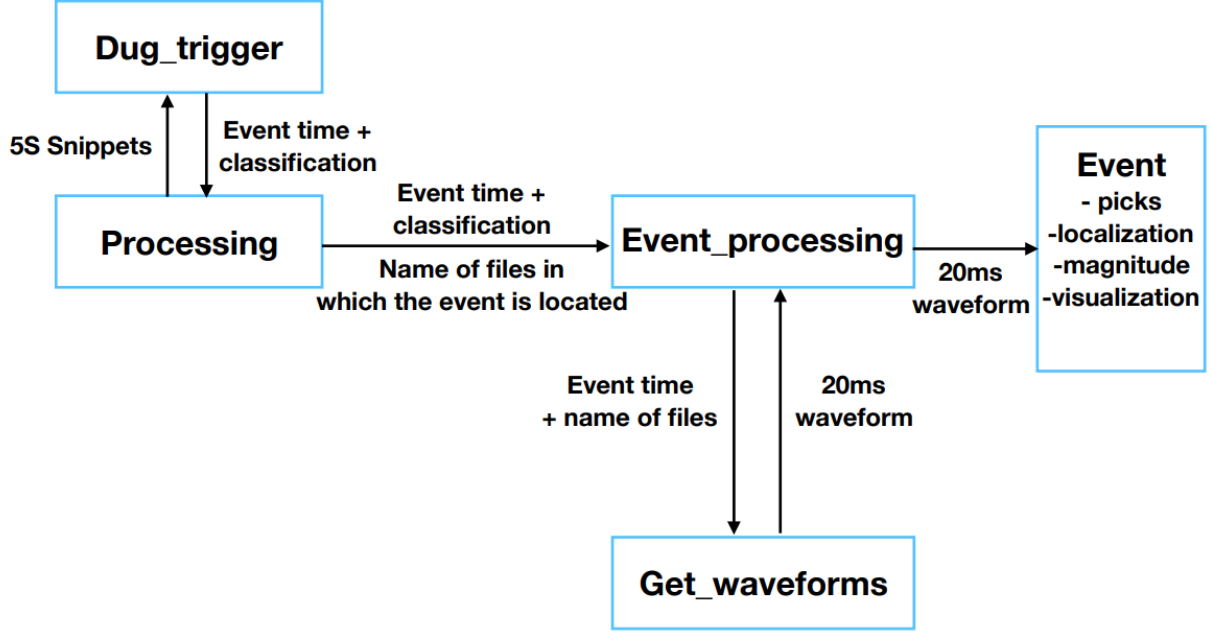


Figure 1: DUG-Seis Software Structure

1.1 processing

In this script the 5 second data snippets are read in using an overlap at the boundary between snippets as not to miss any events. These snippets+overlaps are then sent to the dug_trigger script and the event time and classification of an event is received back. Then the name of the original 5s snippet in which the event lies is found out and when the event is close to a boundary the name of the next 5s snippet is also found out and stored. The event time, classification and the name(s) of the original 5s snippet is sent to the event_processing script.

1.1.1 dug_trigger

In this script a trigger is run on the data and whenever an event is triggered a classification for this event is done.

1.2 event_processing

In this script, first the event time and the name of the original 5s snippet(s) in which the event lies is sent to the get_waveforms script and new 20ms waveforms around the event are received back. Then this script acts as a control to what processing steps are applied on the 20ms waveforms. These steps are: picking, localization, magnitude estimation event plotting. The 20ms waveform is sent to the event class and the before mentioned steps are applied.

1.2.1 get_waveforms

In this script 20 ms waveforms around an event are created using the event time and the names of the original file(s) in which this event lies. There are 3 different ways of getting these 20ms waveforms that depend on if an event is in the middle of the original 5s data snippet (20ms waveform can be generated from only one file) or if an event is close to the border of the original 5s snippet (20ms waveform has to be generated from 2 files).

1.3 event

This is a class type script. It receives the 20ms waveforms from event_processing and applies the modules shown below on it depending on if this is specified in the event_processing script.

1.3.1 pick

In the picker module in the event class the picker is run over all traces in the 20ms snippet and the pick times are put out.

1.3.2 locate

In the locate module in the event class the pick times from the picker module are used for localization of hypocenters. The x,y and z coordinates as well as the pick times corresponding with these locations are put out.

1.3.3 magnitude

In the magnitude module in the event class, the amplitude of the arrival around the pick times is used to determine a relative magnitude.

1.3.4 event_plot

In the event_plot module in the event class, the 20ms waveforms for all 32 stations are plotted and the picks are shown in the figure as well.