

Separation of Multi-mode Surface Waves by Supervised Machine Learning Methods

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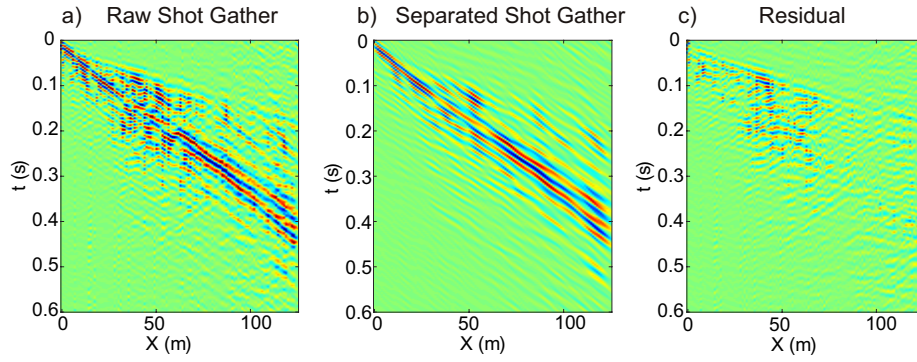


Figure 1: (a) Raw Shot Gather and (b) Separated Shot Gather with SVM, (c) Residual Shot gather.

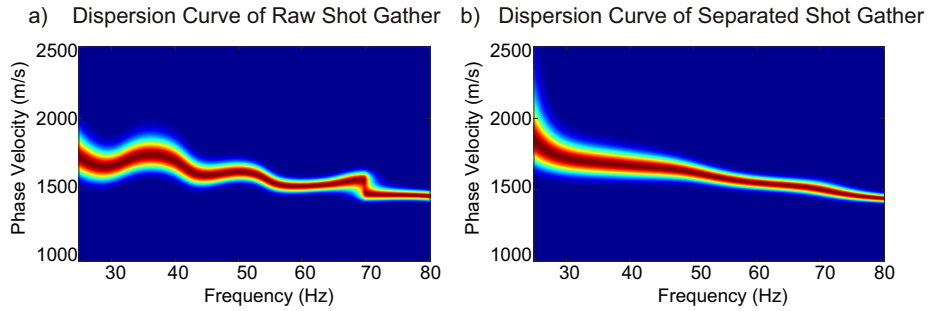


Figure 2: (a) Dispersion curve of Raw Data and (b) Dispersion curve of separated Shot Gather.

1 Objective

Learn and explore the surface wave dispersion curve automatic picking with Machine Learning method.

2 Required Software

1. Compilers: Matlab, or parallel cluster.
2. Visualization: Matlab.

3 Procedure

- Download “Lab_ML_SW.tar.gz”, extract the compressed package by
- `tar -xvf Lab_ML_SW.tar.gz`; and you will find file directory and matlab script.
- `”pre_core”`: contain all the subroutines;
- `”data”`: one field data will stored in the corresponding subdirectory;
- `”result”`: The training model and feature data and final processed shot gather will stored in the corresponding subdirectory;
- `”main_extract_feature.m”`: is the main function to extract the feature of surface wave in shot gather.
- `”main_SVM_training.m”`: is the main function to build the training model as the input data. You should select the surface wave event and non-surface wave events by manual operation
- `”Lab_ML_SW.m”`: is the main function to run the machine learning method to automatic separate the surface wave from shot gather.
- Modify the basic parameter in `”main_extract_feature.m”`, such as the number is the process shot gather number. In our code, we only need to extract the feature of the first and the last shot gather. So, the is is equal to 1 or ng; N is the size of the feature.
- Modify the basic parameter in `”main_SVM_training.m”`, the is the shot number. Similar to the follow step, we only need to build the training model of the first shot and the last shot.