Supporting Information for

Unsupervised Clustering of Seismic Signals Using Deep Convolutional Autoencoders

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Introduction

Supporting information Figure S1 shows the distribution of magnitudes and hypocentral distances for data used for discrimination of local from teleseismic events and polarity of first motions. Figure S2 shows the accuracy of clustering for the polarity of waveforms with different signal to noise ratio levels. Figure S3 and S4 present the confusion matrices associated with the performance of two networks. Details of the architecture of two networks are given in Table S1 and S2.

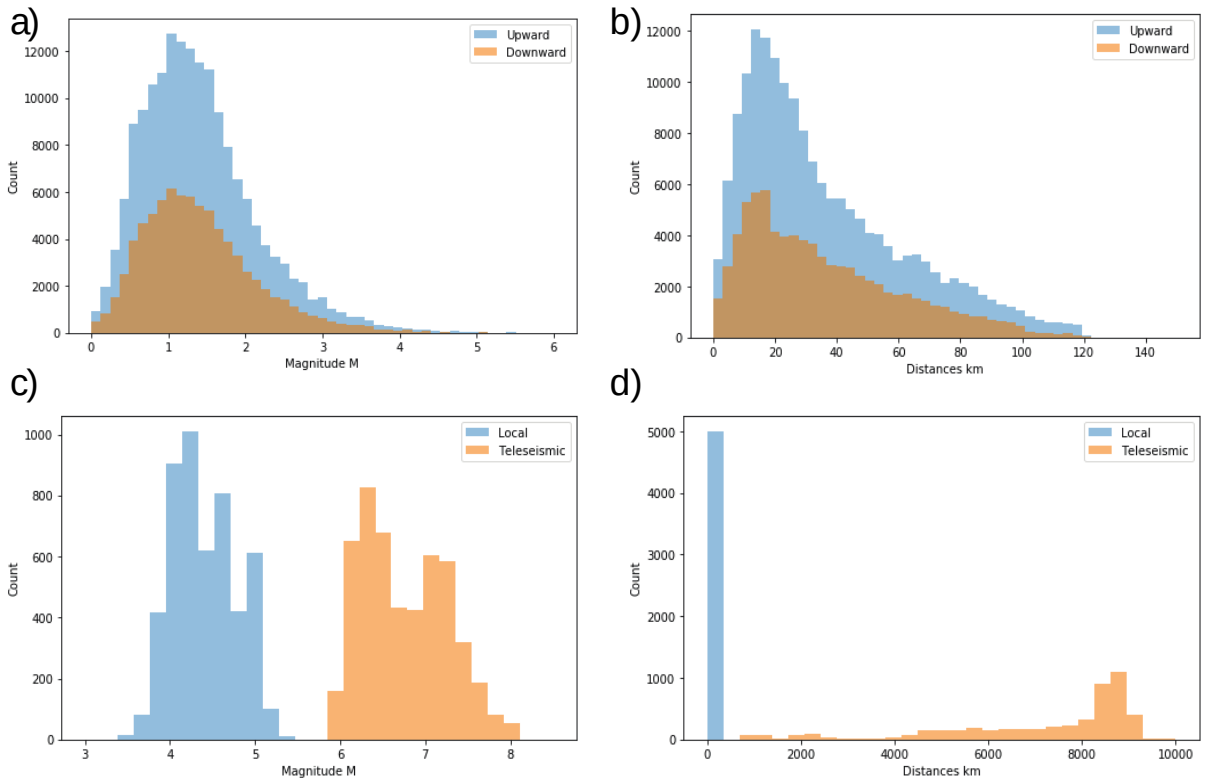

Figure S1. magnitude and distance distributions of seismic data used for first-motion polarity (a & b) and local/teleseismic discriminations (c & d).

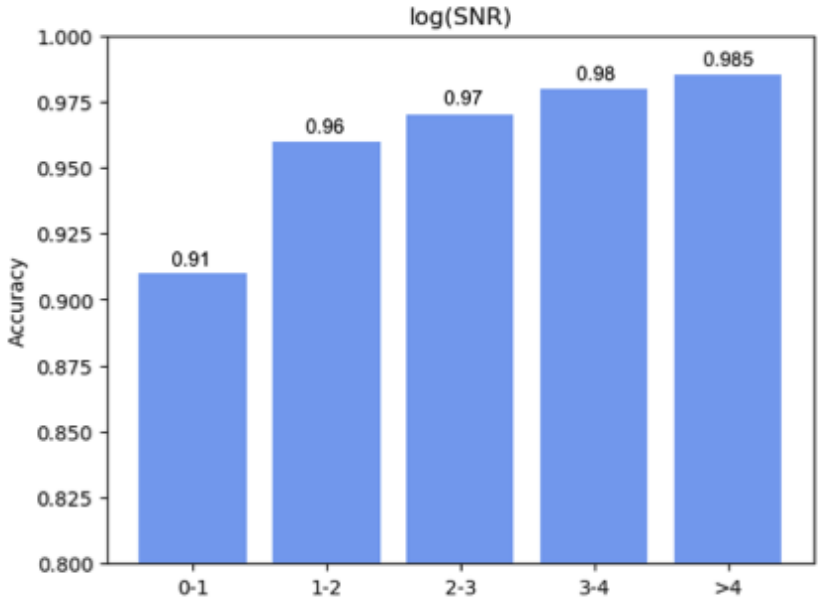

Figure S2. Sensitivity of deep-clustering to the noise level. Clustering accuracy for each SNR bin is marked on top of each bar.

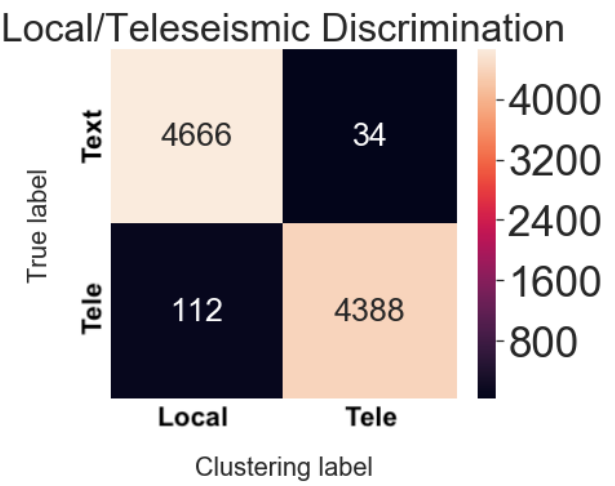

Figure S3. confusion matrix of local/teleseismic discrimination results.

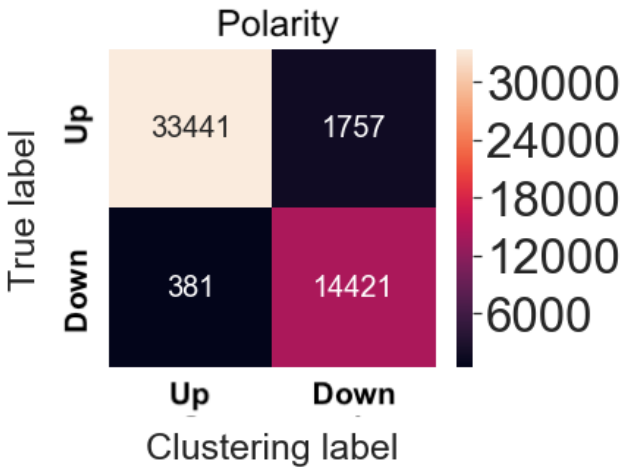

Figure S4. confusion matrix of polarity discrimination results.

Table S1. Model Architecture for Teleseismic/Local Discrimination

Layer	Type	Number of Filters	Kernel Size
Input	-	-	(16, 48)
1	Conv2D	4	(3 , 3)
2	MaxPooling2D	-	(2 , 2)
3	Conv2D	2	(3 , 3)
4	MaxPooling2D	-	(2 , 2)
5	Conv2D	1	(3 , 3)
6	MaxPooling2D	-	(2 , 2)
Bottleneck	-	-	(2 , 6)
7	Conv2D	1	(3 , 3)
8	UpSampling2D	-	(2 , 2)
9	Conv2D	2	(3 , 3)
10	UpSampling2D	-	(2 , 2)
11	Conv2D	4	(3 , 3)
12	UpSampling2D	-	(2 , 2)
13	Conv2D	1	(3 , 3)

Table S2. Model Architecture for Polarity Discrimination

Layer	Type	Number of Filters	Kernel Size
Input	-	-	32
1	Conv1D	8	11
2	MaxPooling1D	-	2
3	Conv1D	4	9
4	MaxPooling1D	-	2
5	Conv1D	2	3
6	MaxPooling1D	-	2
7	Conv1D	1	3
8	MaxPooling1D	-	2
Bottleneck	-	-	2
9	Conv1D	1	3
10	UpSampling1D	-	2
11	Conv1D	2	3
12	UpSampling1D	-	2
13	Conv1D	4	9
14	UpSampling1D	-	2
15	Conv1D	8	11
16	UpSampling1D	-	2
17	Conv1D	1	3