

LAMPIRAN



Lampiran 1. Riwayat Hidup



I Dewa Gede Mahesta Parawangsa lahir di Kabupaten Klungkung, Provinsi Bali, Indonesia pada tanggal 27 November 2002. Penulis lahir dari pasangan I Dewa Gede Parwata S.S dan Desak Nyoman Trisna Dewi serta merupakan anak pertama dari empat bersaudara. Pada tahun 2009 penulis masuk sekolah di Sekolah Dasar (SD) Negeri 2 Nyalian dan lulus pada tahun 2015. Selanjutnya masuk pada Sekolah Menengah Pertama (SMP) Negeri 3 Banjarangkan dan lulus pada tahun 2018. Setelah itu melanjutkan Sekolah Menengah Atas (SMA) Negeri 1 Semarapura dan lulus pada tahun 2021. Pada tahun 2021, penulis diterima dan melanjutkan pendidikan sebagai mahasiswa di Universitas Pendidikan Ganesha, Program Studi S1 Sistem Informasi. Berkat petunjuk dan anugerah Tuhan Yang Maha Esa, usaha dan disertai doa dari kedua orang tua dalam menjalani aktivitas akademik. Akhirnya, penulis dapat menyelesaikan tugas akhir dengan skripsi yang berjudul “Implementasi Metode Long Short-Term Memory Untuk Pengenalan Pola Imajinasi Ucapan Pengangge Suara Aksara Bali Pada Sinyal Electroencephalogram” pada Desember 2025.



Lampiran 2. Hasil Data 2D

Variables - data																		
data																		
60x64 double																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	
1	0.9549	0.6161	0.4645	0.8549	1.8013	1.2807	1.4014	0.9346	-0.1699	17.6619	2.3553	1.0976	1.9716	1.9484	1.1195	1.0076	-1.0019	-
2	1.0481	0.6731	0.6761	1.2462	-1.5009	4.6831	0.7806	1.2854	-1.0187	15.3522	0.9337	1.0137	0.6506	-0.3311	0.7558	1.4559	0.6032	-
3	1.1076	1.2762	1.5337	0.9344	1.6154	0.7291	0.9686	0.8943	3.1270	-8.7875	0.2661	0.9069	1.4940	0.0801	1.0346	0.7837	2.4600	-
4	1.1995	0.8513	0.3579	1.1844	2.4510	-0.1001	-0.2169	0.9554	1.2866	1.3592	1.7906	0.9552	2.0469	2.2040	1.2515	1.0265	1.3183	-
5	-0.1854	-0.9565	-1.2988	1.6093	-2.8393	18.4679	4.3440	1.3368	-2.9746	40.3559	3.2792	1.1849	0.9621	-0.3650	0.6860	1.3943	-1.1379	-1
6	1.2699	1.3966	1.1538	0.8487	1.2964	1.5196	1.7815	0.7254	1.2949	1.4257	1.5449	0.7249	1.2932	1.4255	1.5017	0.8804	1.2791	-
7	0.4799	0.5467	0.5826	1.5099	0.5603	0.6864	0.6966	1.2294	0.4299	0.8141	0.7545	1.5148	0.5114	0.8153	0.7706	1.1676	0.5236	-
8	0.1086	0.3428	1.1699	1.0334	-0.1988	-0.6142	-0.3461	1.2386	0.0715	-0.3892	0.3161	0.9946	-0.0104	-0.2455	0.4391	1.0163	-0.0895	-
9	0.3183	0.0567	-0.0718	2.2989	0.0440	-1.5496	-1.5563	2.1803	0.0748	-0.3169	-0.9551	1.7943	-0.0273	-0.4198	-0.7867	1.4517	0.1481	-
10	0.1972	0.0639	0.3377	1.8958	0.1939	0.3396	-0.3047	1.6326	0.3007	0.1526	-0.2374	1.9496	0.2504	0.1206	-0.3310	1.6233	0.2592	-
11	1.0578	1.0668	1.0577	-124.5706	1.0172	1.0183	0.9789	1.1375	1.0909	1.0493	1.0109	1.2407	1.0835	1.0312	0.9859	1.4454	1.0163	-
12	1.1216	1.0835	1.0634	113.6079	1.0649	1.0692	1.0600	0.7702	1.0634	1.1223	1.0436	0.6533	1.0652	1.0898	1.0610	0.6841	1.1253	-
13	0.6524	0.7981	0.8750	-90.7334	0.8290	0.8911	0.9814	1.1872	0.7196	0.7596	0.9547	1.2758	0.6997	0.8390	0.9656	1.0808	0.7450	-
14	0.3440	0.0404	0.1905	-363.7871	0.5292	0.1753	0.2598	2.2868	0.5364	0.2145	0.3281	2.0996	0.2882	0.1872	0.3174	1.9810	0.4602	-
15	0.9415	0.2938	0.5324	-279.9091	0.3390	-0.3283	-0.2557	1.7425	0.3522	-0.2574	-0.2473	1.5464	0.2429	-0.4189	-0.1099	1.1198	0.2548	-
16	0.1082	0.5203	1.3236	1.1353	-0.0125	2.6808	1.1514	1.0801	-0.1793	-0.0634	1.5961	0.9996	0.1509	1.5101	0.4836	1.0918	-0.1923	-
17	1.1187	1.4690	1.3628	0.7599	0.8661	-0.4719	-0.4326	0.6833	0.6557	0.8813	0.5847	0.7699	0.9312	1.5854	0.7911	0.6570	0.6155	-
18	1.1208	0.4983	0.0276	1.2361	1.4048	-0.4497	1.8999	1.4884	1.4392	1.7892	0.8527	1.4056	1.2768	-0.0732	1.9606	1.5262	1.5121	-

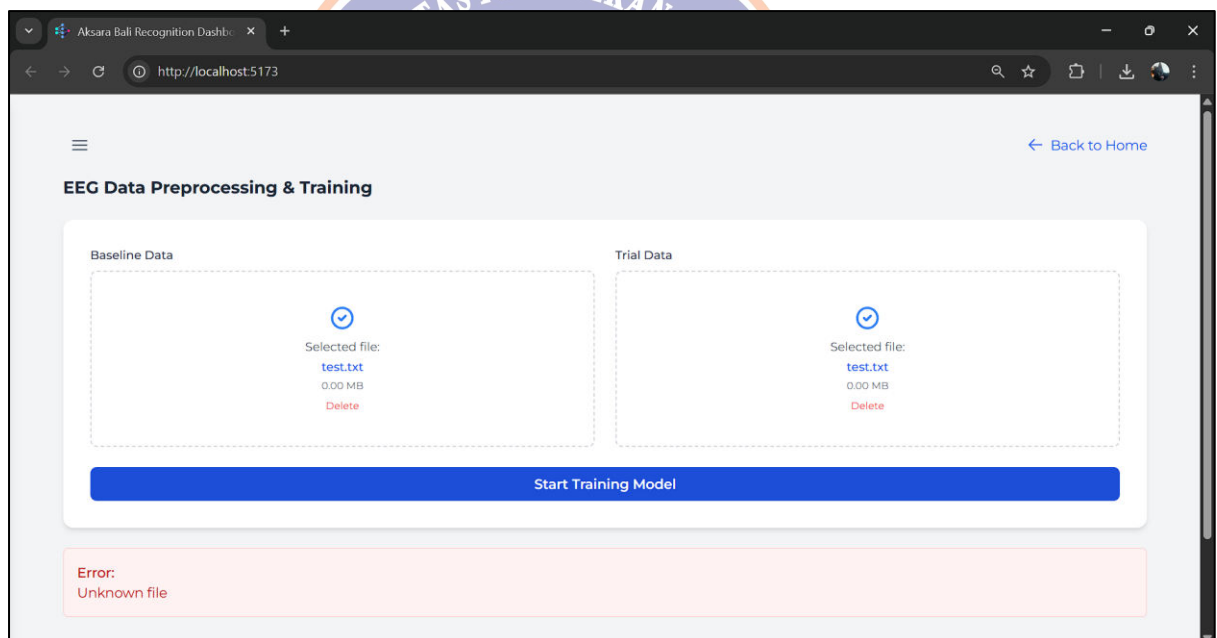
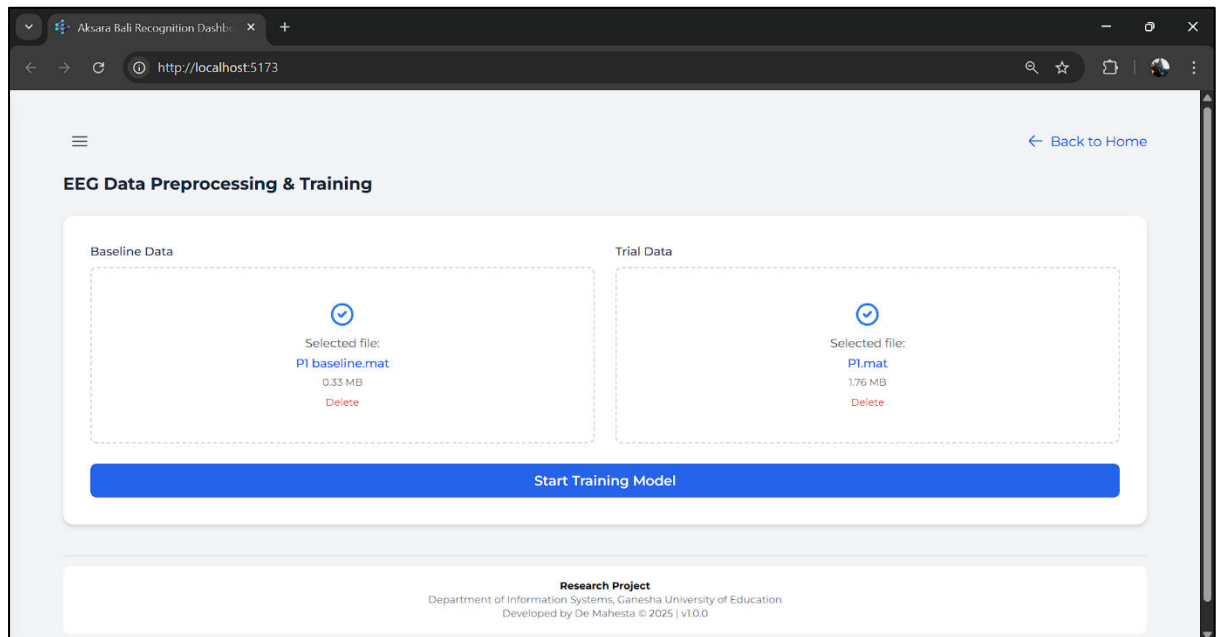
Variables - arousal_labels																		
data																		
1x60 double																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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Variables - dominance_labels																		
data																		
1x60 double																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	
1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
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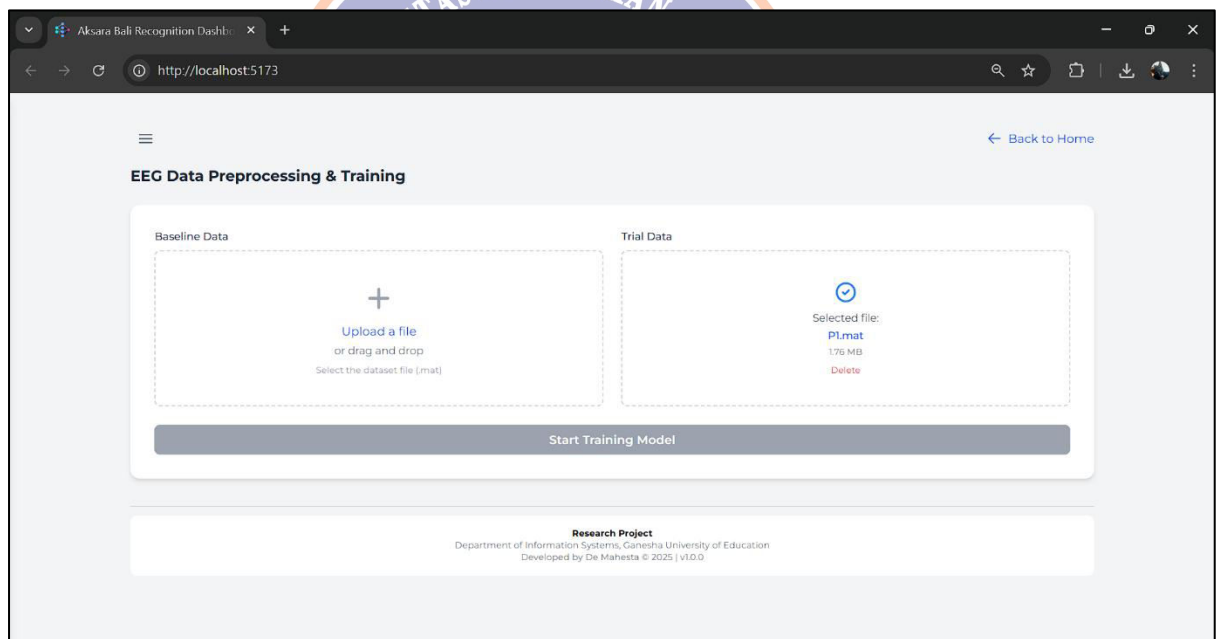
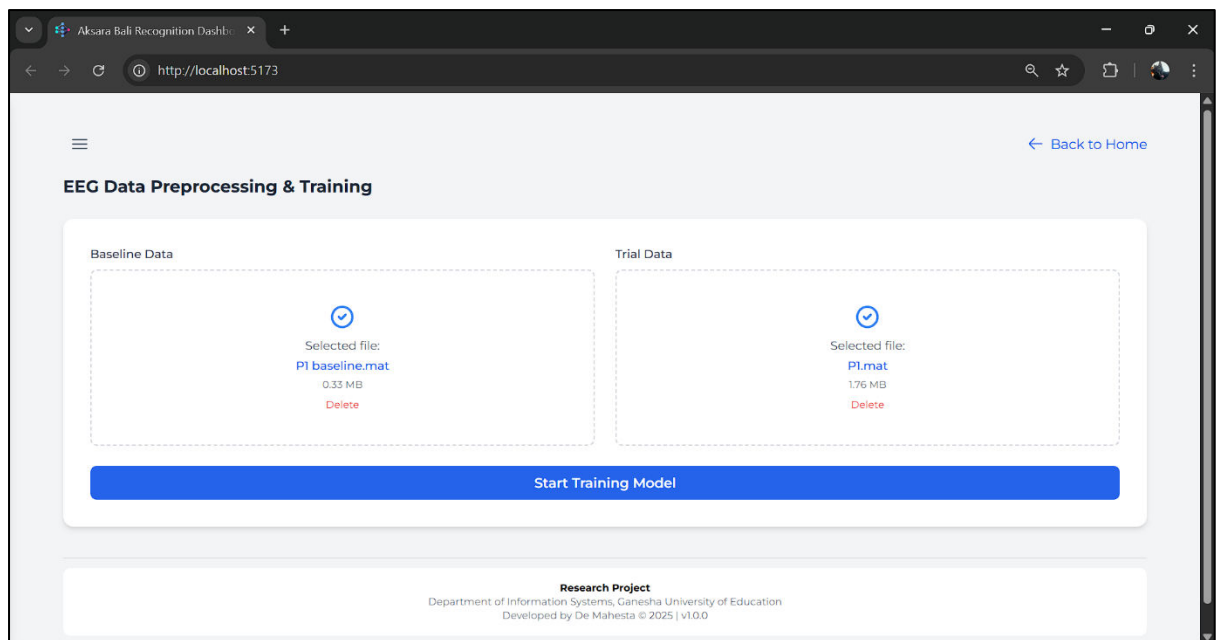
Variables - valence_labels																		
data																		
1x60 double																		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	1	
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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Lampiran 3. Hasil Blackbox Testing

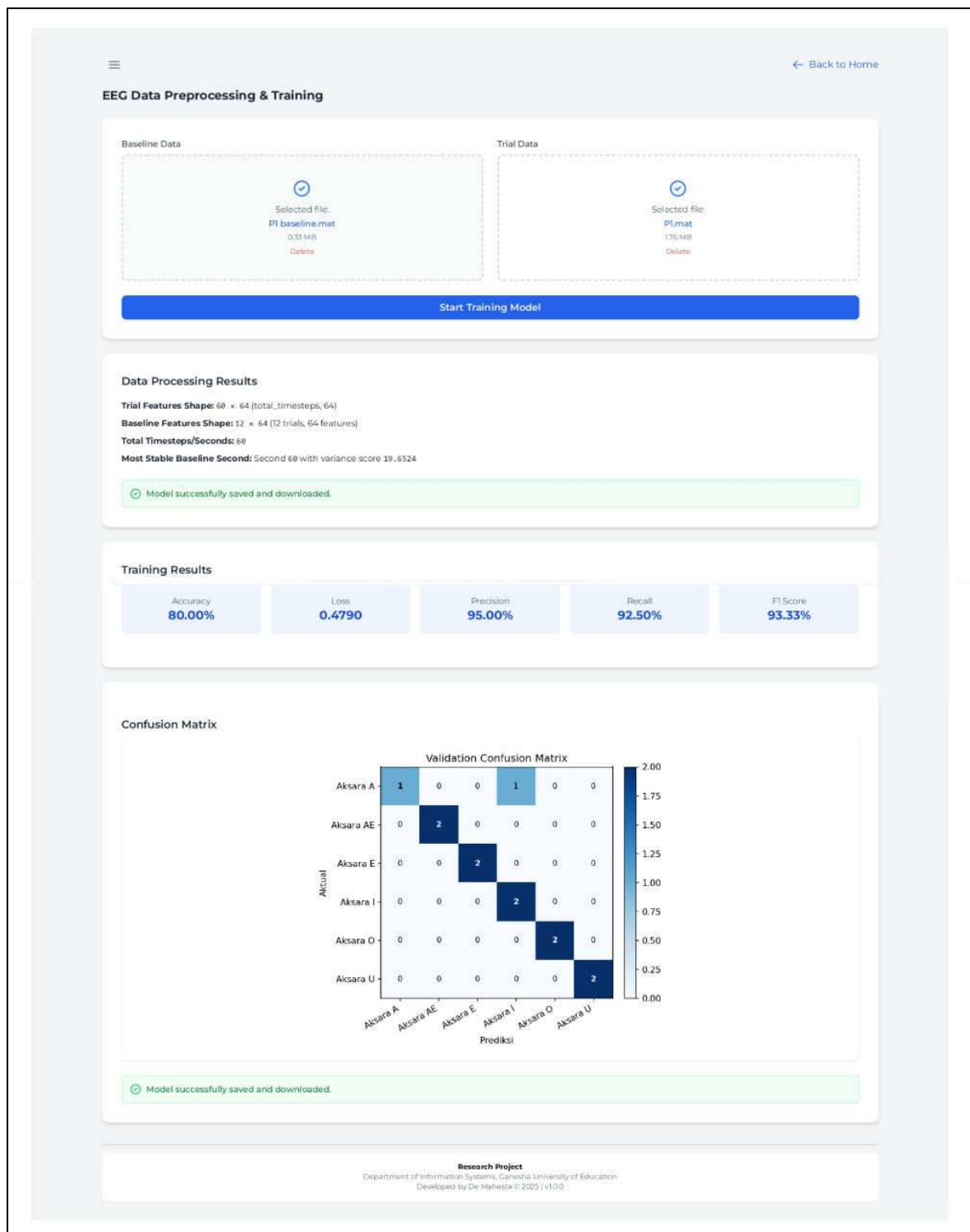
1. Test Upload File Training sesuai format

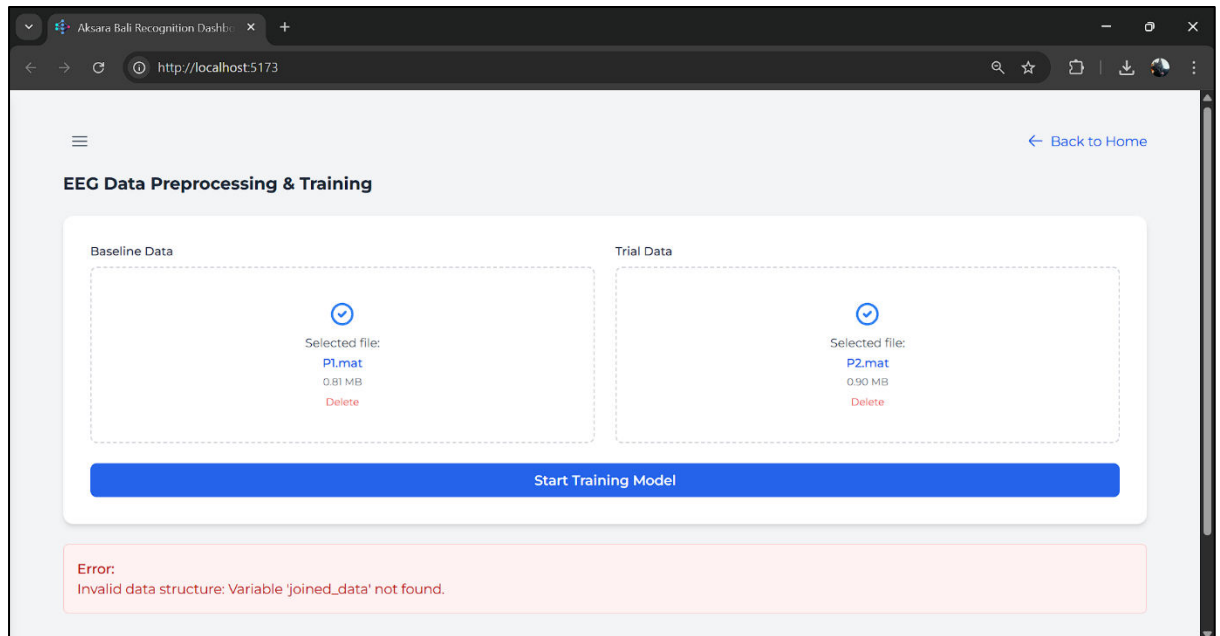


2. Validasi 2 Input

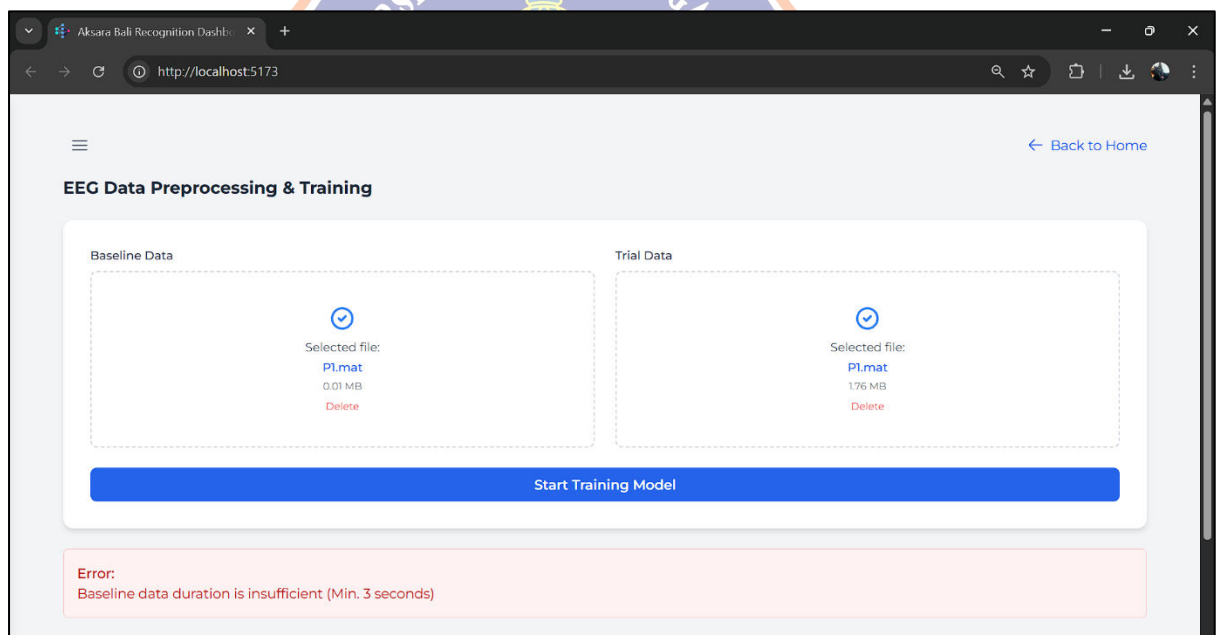
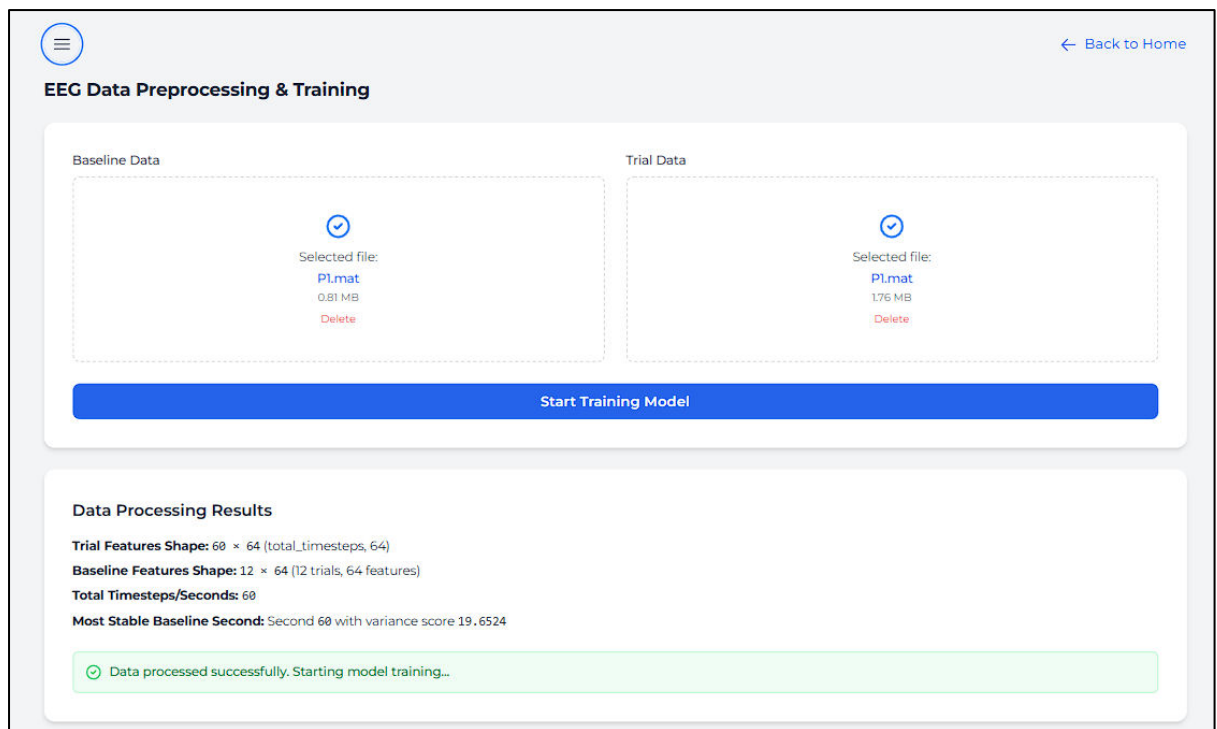


3. Test Struktur Data Training yang sesuai

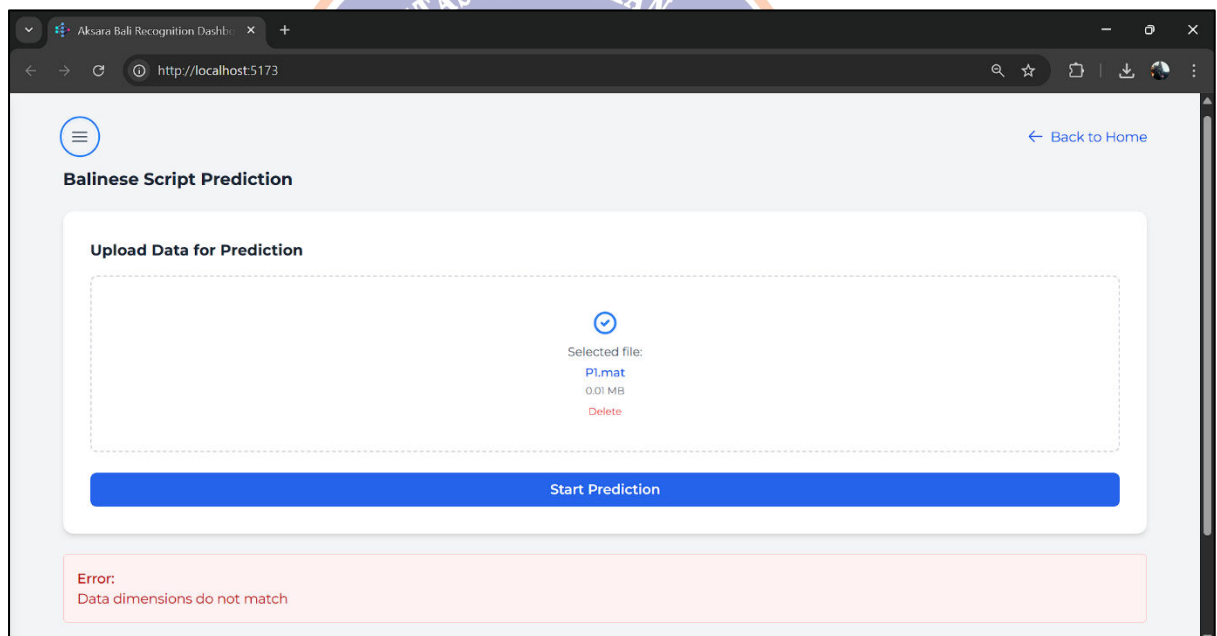
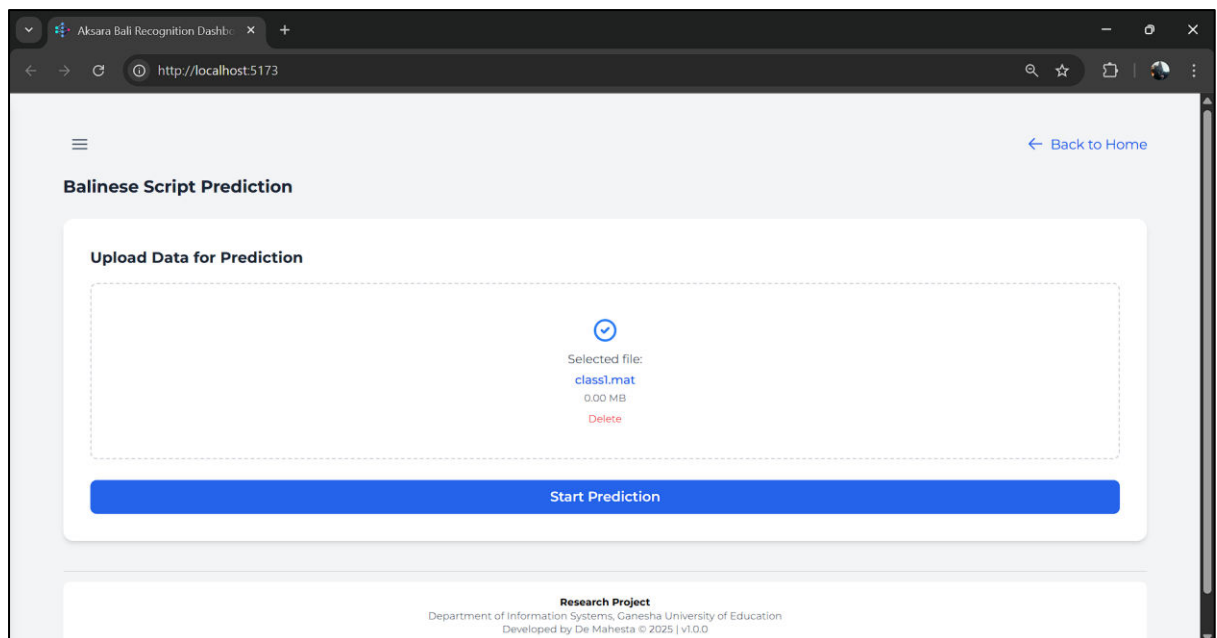




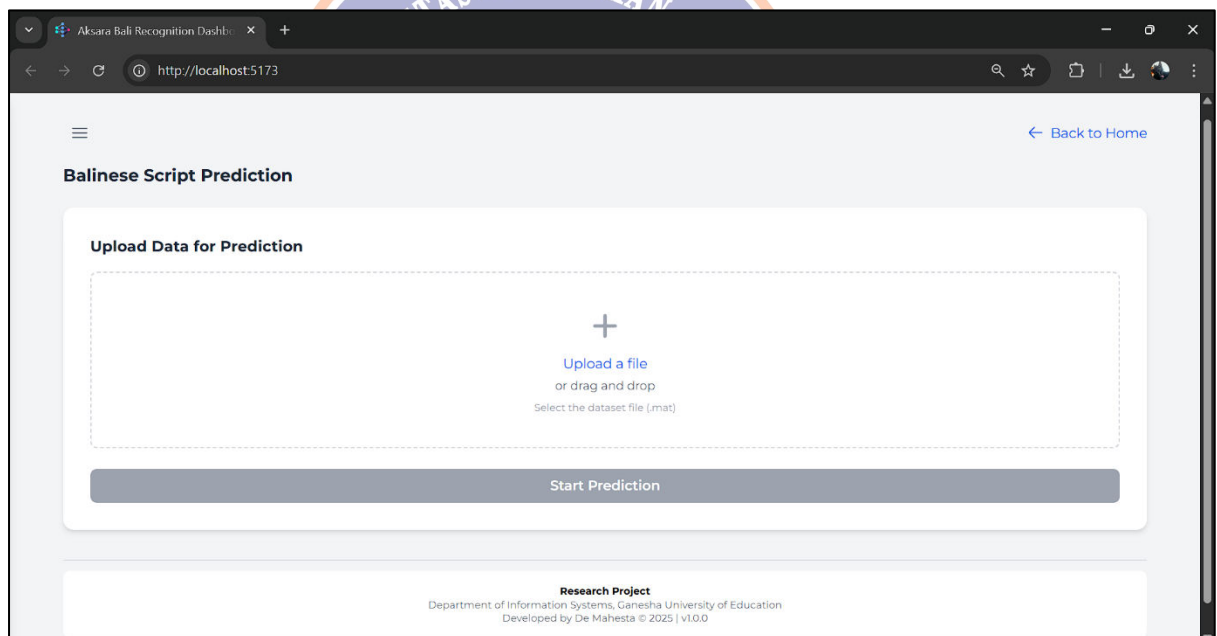
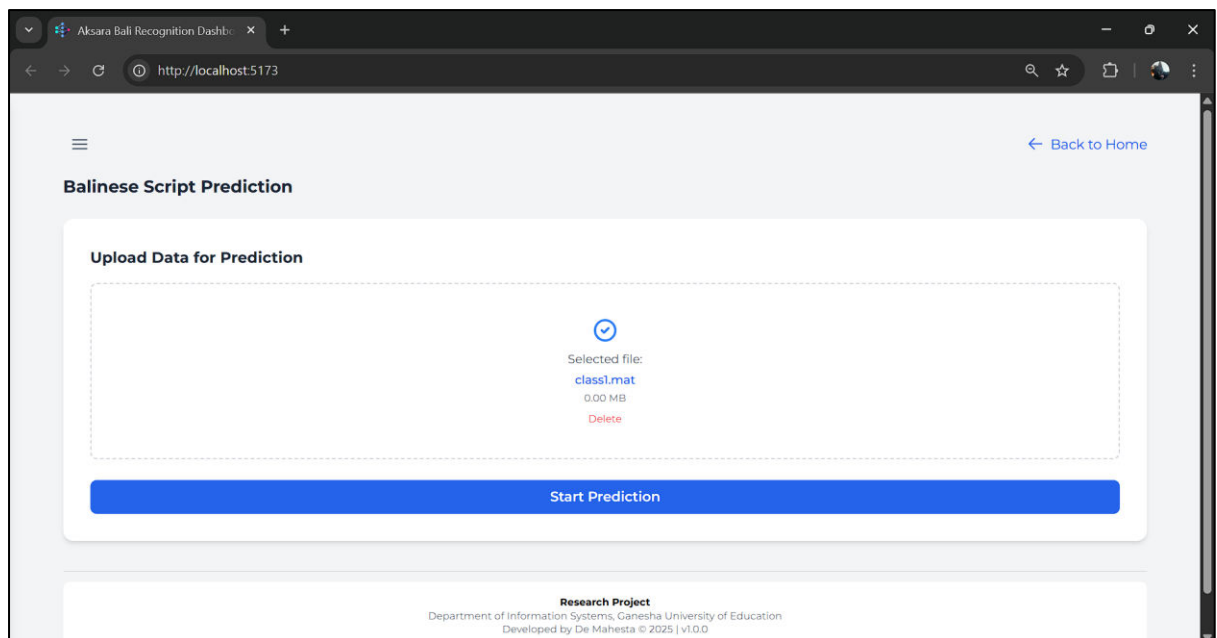
4. Validasi Durasi Sinyal EEG Training



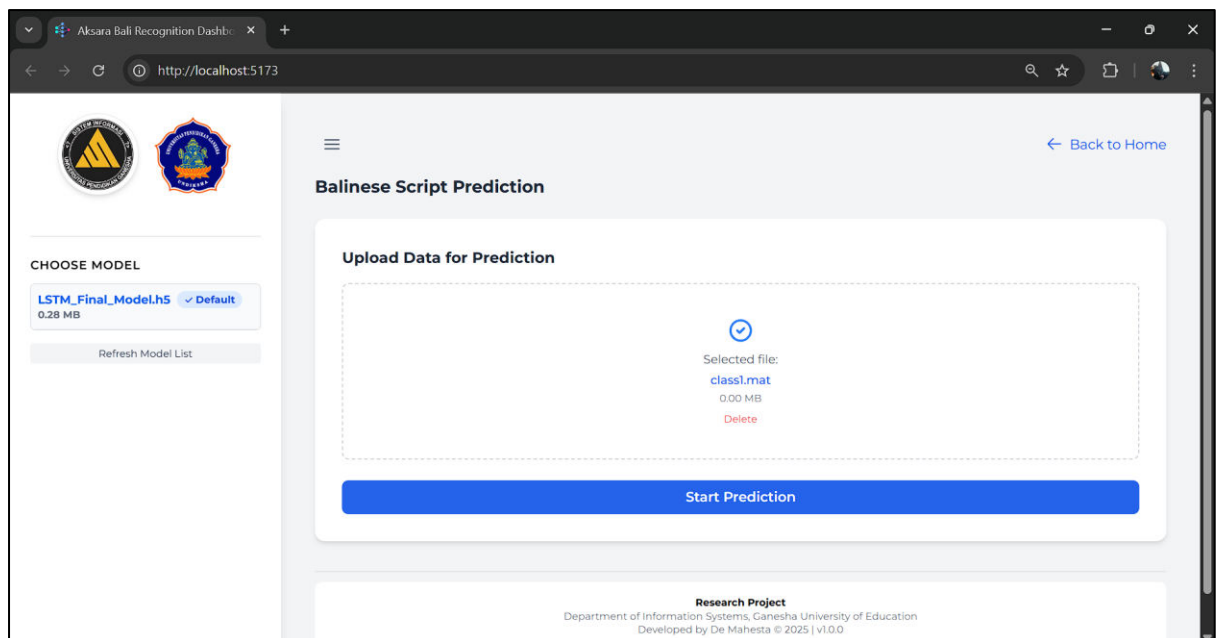
5. Test Input Data Prediksi



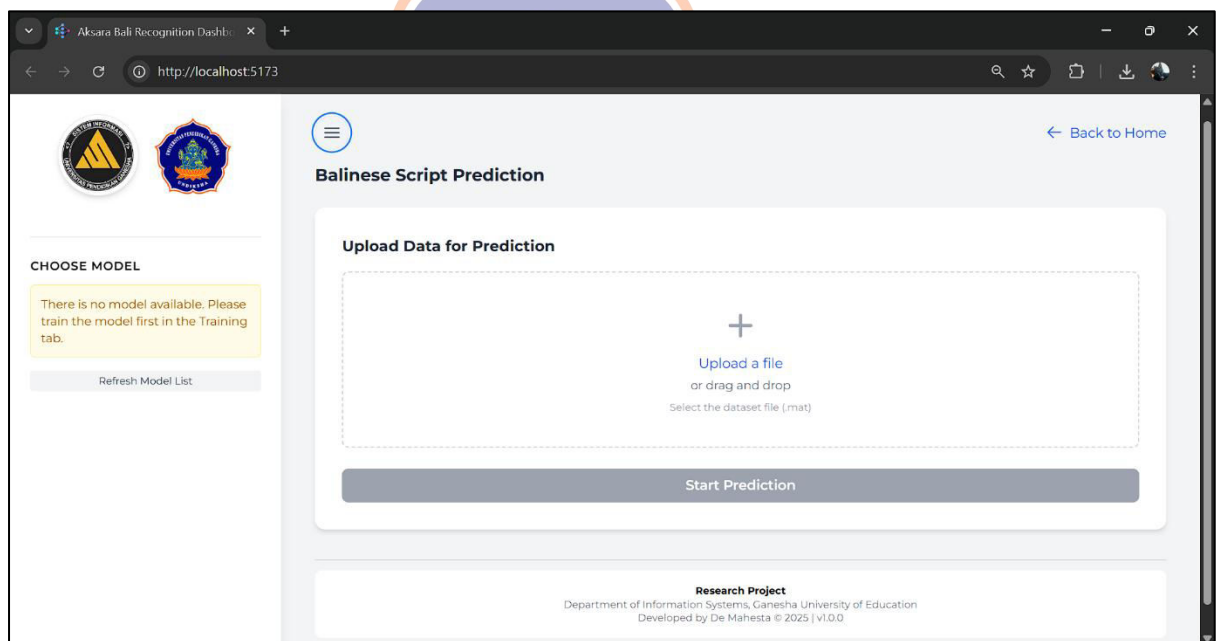
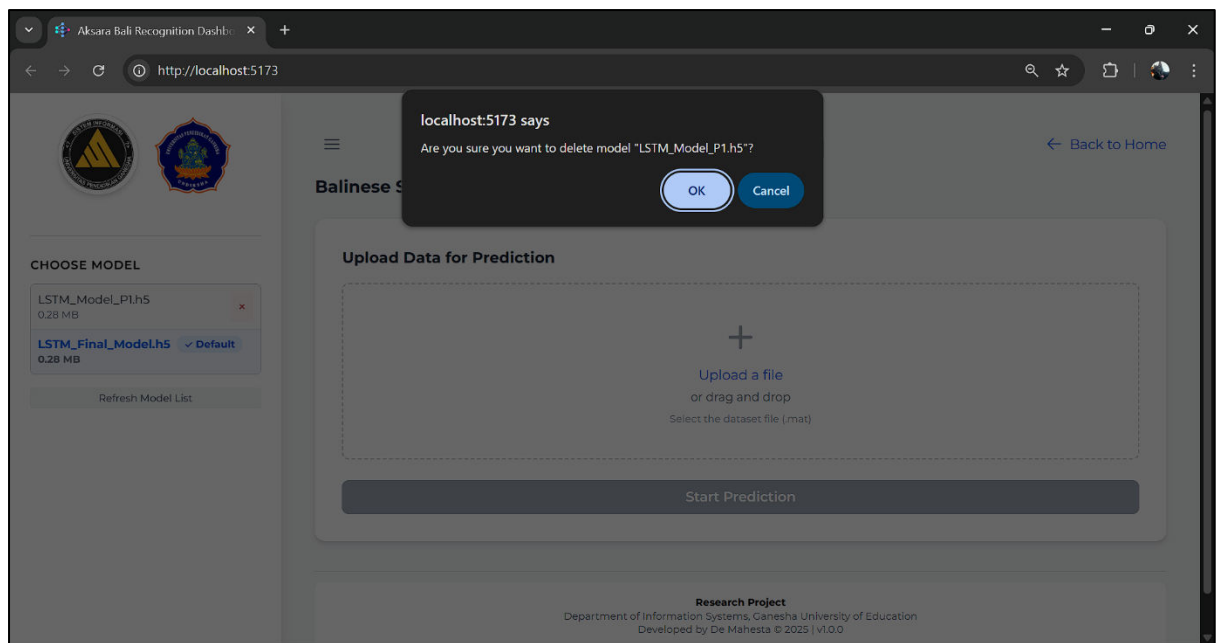
6. Test Input Ketersediaan Data Prediksi

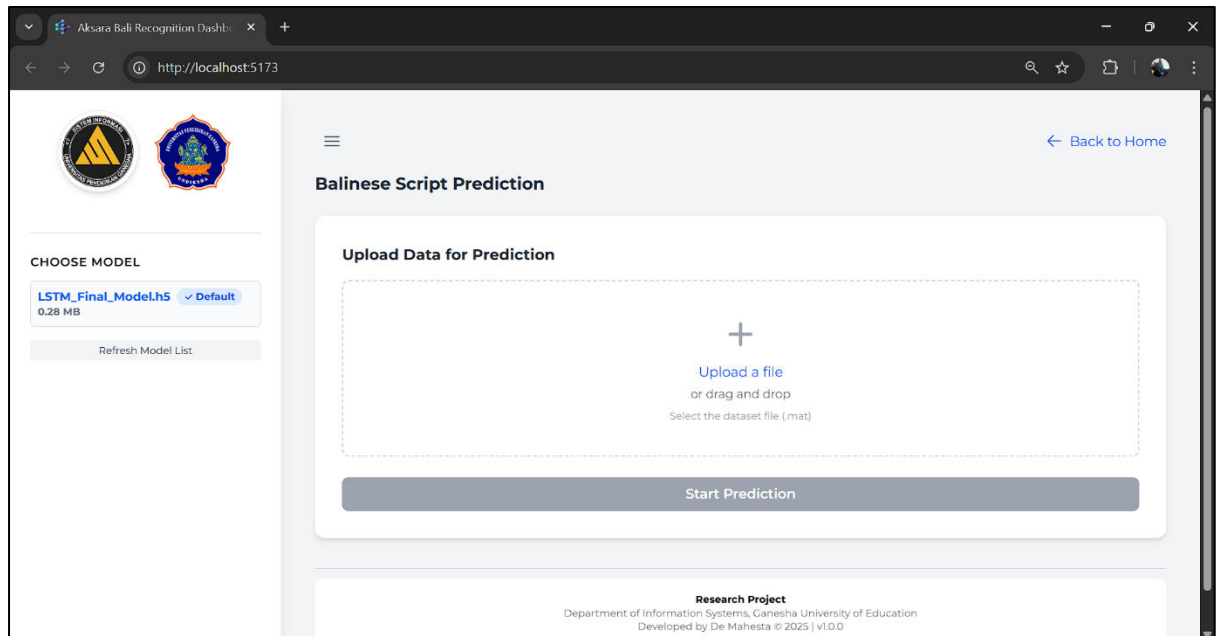


7. Test Akses Model untuk Prediksi



8. Test Hapus dan Sinkronisasi Model





Lampiran 4. Hasil Whitebox Testing

1. Test Preprocessing Unit

```
1 (env_skripsi) PS C:\Users\dewam\Dokumen\Semester 7\Skripsi\Code Main\Deployment\tests> pytest test_preprocessing.p
2 ..... [100%]
3
4 =====
5 PASSED TESTS:
6 tests/test_preprocessing.py::test_butter_bandpass_filter_keeps_length_and_no_nan
7 tests/test_preprocessing.py::test_butter_bandpass_filter_invalid_freq_raises_error
8 tests/test_preprocessing.py::test_compute_de_float_and_finite
9 tests/test_preprocessing.py::test_compute_de_per_band_with_all_zeros
10 tests/test_preprocessing.py::test_compute_de_handles_zero_variance
11 tests/test_preprocessing.py::test_decompose_band_success_on_valid_signal
12 tests/test_preprocessing.py::test_decompose_band_based_relative_with_zero_data
13 tests/test_preprocessing.py::test_get_labels_safe_length_and_dtype
14 tests/test_preprocessing.py::test_get_labels_mismatched_length_error
15 tests/test_preprocessing.py::test_baseline_reduction_actually_reduces_baseline_influence
16 tests/test_preprocessing.py::test_best_second_selection_finds_stable_section
17 tests/test_preprocessing.py::test_baseline_reduction_and_decompose_shapes
18 tests/test_preprocessing.py::test_baseline_reduction_div_zero_handling
19 tests/test_preprocessing.py::test_preprocess_then_download_ok
20 tests/test_preprocessing.py::test_preprocess_missing_baseline_returns_422_and_download_blocked
21 tests/test_preprocessing.py::test_preprocess_missing_training_returns_422_and_download_blocked
22 tests/test_preprocessing.py::test_preprocess_valid_channel_count_ok
23 tests/test_preprocessing.py::test_preprocess_baseline_too_short_returns_400
24 tests/test_preprocessing.py::test_preprocess_handles_odd_channel_count
25 tests/test_preprocessing.py::test_preprocess_response_keys_and_types
26 tests/test_preprocessing.py::test_preprocess_internal_error_structure
27 tests/test_preprocessing.py::test_preprocess_download_mat_keys_and_shapes
28 tests/test_preprocessing.py::test_download_without_preprocess_returns_400
29 tests/test_preprocessing.py::test_multiple_preprocess_calls_update_state
30 tests/test_preprocessing.py::test_preprocess_roundtrip_single_use_and_expiry
31 tests/test_preprocessing.py::test_preprocess_timeout_configurable
32 tests/test_preprocessing.py::test_preprocess_access_expired_session
33 =====
34 27 passed in 67.11s (0:01:07)
35
```

2. Test Training Unit

```
1 (env_skripsi) PS C:\Users\dewam\Dokumen\Semester 7\Skripsi\Code Main\Deployment\tests> pytest test_train.p
2 y ..... [100%]
3
4 =====
5 PASSED TESTS:
6 tests/test_train.py::test_train_full_flow_with_preprocessed_data
7 tests/test_train.py::test_train_missing_label_keys_returns_400
8 tests/test_train.py::test_train_with_empty_data
9 tests/test_train.py::test_model_architecture_and_output_units
10 tests/test_train.py::test_train_cannot_reshape_returns_400
11 tests/test_train.py::test_train_with_imbalanced_classes
12 tests/test_train.py::test_train_near_minimum_viability
13 tests/test_train.py::test_train_one_class_dataset_returns_400
14 tests/test_train.py::test_train_label_mapping_produces_6_classes
15 tests/test_train.py::test_train_unknown_label_returns_error
16 tests/test_train.py::test_load_valid_model_architecture_success
17 tests/test_train.py::test_load_model_safely_with_batch_shape_error
18 tests/test_train.py::test_train_sets_validation_cm_shape_and_classes
19 tests/test_train.py::test_train_validation_confusion_matrix_shape_and_values
20 tests/test_train.py::test_train_metrics_within_bounds
21 tests/test_train.py::test_train_metrics_handle_nan_values
22 tests/test_train.py::test_train_confusion_matrix_plot_both_sources
23 tests/test_train.py::test_train_plot_fails_on_missing_history
24 tests/test_train.py::test_train_download_by_model_name_variants
25 tests/test_train.py::test_save_without_training_returns_400
26 tests/test_train.py::test_train_download_without_model_returns_400
27 tests/test_train.py::test_training_consistent_across_multiple_runs
28 tests/test_train.py::test_train_with_different_feature_scales
29 tests/test_train.py::test_train_flow_plot_save_list_download
30 =====
31 24 passed in 65.15s (0:01:05)
32
```

3. Test Predict Unit

```
1 (env_skripsi) PS C:\Users\dewam\Dokumen\Semester 7\Skripsi\Code Main\Deployment\tests> pytest test_predict.p
2 y ..... [100%]
3
4 =====
5 PASSED TESTS:
6 tests/test_predict.py::test_predict_valid_data_structure_accepted
7 tests/test_predict.py::test_predict_missing_data_variable_returns_400
8 tests/test_predict.py::test_predict_wrong_feature_dim_returns_400
9 tests/test_predict.py::test_predict_bad_shape_returns_400
10 tests/test_predict.py::test_predict_valid_model_path_access
11 tests/test_predict.py::test_predict_with_invalid_model_name
12 tests/test_predict.py::test_predict_with_nonexistent_model
13 tests/test_predict.py::test_predict_single_sample_sets_flag_true
14 tests/test_predict.py::test_predict_2d_multiple_trials_reshape_ok
15 tests/test_predict.py::test_extract_file_id_with_various_formats
16 tests/test_predict.py::test_extract_file_id_returns_none_on_invalid
17 =====
18 11 passed in 0.58s
19
```

4. Test Model State Management Unit

```
1 (env_skripsi) PS C:\Users\dewam\Dokumen\Semester 7\Skripsi\Code Main\Deployment\tests> pytest test_model.p
2 y ..... [100%]
3
4 =====
5 PASSED TESTS:
6 tests/test_model.py::test_modelstate_validation_confusion_matrix
7 tests/test_model.py::test_modelstate_prediction_results
8 tests/test_model.py::test_modelstate_invalid_data_type_error
9 tests/test_model.py::test_delete_model_then_fail_download
10 tests/test_model.py::test_delete_default_model_blocked
11 tests/test_model.py::test_delete_nonexistent_model
12 tests/test_model.py::test_models_delete_success_path
13 tests/test_model.py::test_models_delete_error_paths
14 =====
15 8 passed in 2.39s
16
```

Lampiran 5. Formulir dan Hasil dari System Usability Scale

<https://forms.gle/RTeLfrBcvuEjzhVV9>

<https://docs.google.com/spreadsheets/d/1zOIzFDWlhNFg2iEOVq8rU7k7iJaj7werNMT0CR2GGzE/edit?usp=sharing>



Lampiran 6. Dokumentasi System Usability Scale

