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LAMPIRAN

Lampiran 1. Program model yang telah dilatih di modul Phyton dan di ekspor ke bahasa program C

```
#pragma once
#include <cstdarg>

namespace Eloquent {
  namespace ML {
    namespace Port {
      class RandomForest {
        public:
          /**
           * Predict class for features vector
           */
          int predict(float * x) {
            uint8_t votes[2] = {
              0
            };
            // tree #1
            if (x[3] <= 0.0026296295691281557) {
              if (x[3] <= -0.0019259259570389986) {
                if (x[0] <= 13.330999851226807) {
                  if (x[3] <= -0.015770114492624998) {
                    if (x[0] <= 12.578793048858643) {
                      if (x[2] <= -0.10241379588842392) {
                        votes[1] += 1;
                      } else {
                        votes[0] += 1;
                      }
                    } else {
                      votes[0] += 1;
                    }
                  } else {
                    if (x[1] <= 50001.6796875) {
                      if (x[0] <= 12.45616340637207) {
                        votes[0] += 1;
                      } else {
                        if (x[2] <= 0.033908046782016754) {
                          if (x[1] <= 3267.207763671875) {
                            if (x[2] <= 0.01666666753590107) {
                              votes[0] += 1;
                            } else {
```

```
        votes[1] += 1;
      }
     } else {
      if (x[0] <= 13.288666248321533) {
       votes[1] += 1;
      } else {
       if (x[1] <= 6940.37451171875) {
        votes[0] += 1;
       } else {
        if (x[3] <= -0.0024999999441206455) {
         if (x[0] <= 13.290833473205566) {
          if (x[0] <= 13.289666652679443) {
           votes[1] += 1;
          } else {
           votes[0] += 1;
          }
         } else {
          votes[1] += 1;
         }
        } else {
         if (x[2] <= 0.01666666753590107) {
          if (x[0] <= 13.291333198547363) {
           votes[1] += 1;
          } else {
           votes[0] += 1;
          }
         } else {
          votes[0] += 1;
         }
        }
       }
      }
     }
    } else {
     if (x[1] <= 44249.8671875) {
      votes[0] += 1;
     } else {
      votes[1] += 1;
     }
    }
   }
  } else {
   if (x[0] <= 12.901166915893555) {
    votes[1] += 1;
```

```
    } else {
      votes[0] += 1;
    }
   }
  }
 } else {
  if (x[1] <= 29611.9697265625) {
   if (x[1] <= 11629.61083984375) {
    if (x[2] <= 0.01666666753590107) {
     if (x[0] <= 14.01883316040039) {
      if (x[0] <= 13.391499996185303) {
       if (x[3] <= -0.00566666666418314) {
        if (x[0] <= 13.358223915100098) {
         votes[1] += 1;
        } else {
         if (x[3] <= -0.009666666388511658) {
          votes[0] += 1;
         } else {
          votes[1] += 1;
         }
        }
       } else {
        votes[0] += 1;
       }
      } else {
       votes[0] += 1;
      }
     } else {
      if (x[0] <= 14.1829195022583) {
       if (x[1] <= 11166.09033203125) {
        votes[0] += 1;
       } else {
        votes[1] += 1;
       }
      } else {
       votes[1] += 1;
      }
     }
    } else {
     votes[0] += 1;
    }
   } else {
    if (x[0] <= 13.383592128753662) {
     if (x[0] <= 13.356609344482422) {
```

```
            votes[0] += 1;
          } else {
            if (x[2] <= 0.017241379246115685) {
              votes[1] += 1;
            } else {
              votes[0] += 1;
            }
          }
        } else {
          if (x[0] <= 13.566488265991211) {
            if (x[0] <= 13.555963516235352) {
              if (x[0] <= 13.513586044311523) {
                if (x[3] <= -0.02866666577756405) {
                  votes[1] += 1;
                } else {
                  votes[0] += 1;
                }
              } else {
                votes[0] += 1;
              }
            } else {
              votes[1] += 1;
            }
          } else {
            votes[0] += 1;
// sampai dengan tree #10

// return argmax of votes
uint8_t classIdx = 0;
float maxVotes = votes[0];

for (uint8_t i = 1; i < 2; i++) {
  if (votes[i] > maxVotes) {
    classIdx = i;
    maxVotes = votes[i];
  }
}

return classIdx;
}
```

ected:

Lampiran 2. Sebagian Data *logger* yang telah diolah dan diberikan label pada Ms Exel

WAKTU	DAYA	TEGANGAN	INTENSITAS	KONDISI	MEAN_DAYA	MEAN_TEGANGAN	MEAN_INTENSITAS	DELTA_DAYA	DELTA_TEGANGAN
08:37:00	145	14,43	36441,66	0	144,3333333	14,295	30331,24833	0,166666667	0,095
08:42:00	145	14,43	39344,16	0	144,5	14,36833333	31994,85833	0,166666667	0,073333333
08:47:00	145	14,44	37210	0	144,6666667	14,41833333	34102,77333	0,166666667	0,05
08:52:00	146	14,44	43545,83	0	144,8333333	14,425	35942,21833	0,166666667	0,006666667
08:57:00	146	14,45	34045	0	145,1666667	14,43	39172,91167	0,333333333	0,005
09:02:00	146	14,45	42121,66	0	145,3333333	14,43666667	39078,885	0,166666667	0,006666667
09:07:00	146	14,45	43445,83	0	145,5	14,44	38784,71833	0,166666667	0,003333333
09:12:00	146	14,45	33086,66	0	145,6666667	14,44333333	39952,08	0,166666667	0,003333333
09:17:00	147	14,45	50213,33	0	145,8333333	14,44666667	38909,16333	0,166666667	0,003333333
09:22:00	147	14,45	45114,16	0	146,1666667	14,44833333	41076,385	0,333333333	0,001666667
09:27:00	147	14,45	36831,66	0	146,3333333	14,45	41337,77333	0,166666667	0,001666667
09:32:00	147	14,45	54612,5	0	146,5	14,45	41802,21667	0,166666667	0
09:37:00	147	14,46	54612,5	0	146,6666667	14,45	43884,02333	0,166666667	0
09:42:00	148	14,45	44481,66	0	146,8333333	14,45166667	45745,135	0,166666667	0,001666667
09:49:00	148	14,45	52629,16	0	147,1666667	14,45166667	47644,30167	0,333333333	0
09:50:00	148	14,45	54612,5	0	147,2857143	14,45142857	48356,42429	0,119047619	-0,000238095
09:51:00	148	14,45	54612,5	0	147,375	14,45125	49138,43375	0,089285714	-0,000178571
09:52:00	148	14,45	40889,16	0	147,5	14,45125	49688,33	0,125	0
09:53:00	148	14,46	54612,5	0	147,5555556	14,45111111	48710,64444	0,055555556	-0,000138889
09:54:00	148	14,47	54612,5	0	147,6	14,452	49300,83	0,044444444	0,000888889
09:55:00	148	14,48	54612,5	0	147,6363636	14,45363636	49783,70909	0,036363636	0,001636364
09:56:00	148	14,44	54612,5	0	147,6666667	14,45583333	50186,10833	0,03030303	0,00219697
09:57:00	148	14,45	48726,66	0	147,75	14,455	50977,63667	0,083333333	-0,000833333
09:58:00	148	14,44	31867,5	0	147,7692308	14,45461538	50804,48462	0,019230769	-0,000384615
09:59:00	148	14,44	30824,17	0	147,7857143	14,45357143	49451,84286	0,016483516	-0,001043956
10:00:00	148	14,45	54612,5	0	147,8	14,45266667	48209,998	0,014285714	-0,000904762
10:01:00	148	14,47	53990,83	0	147,8125	14,4525	48610,15438	0,0125	-0,000166667
10:02:00	148	14,48	54612,5	0	147,875	14,45375	49682,6025	0,0625	0,00125
10:03:00	148	14,44	54612,5	0	147,8823529	14,45529412	49972,59647	0,007352941	0,001544118
10:04:00	148	14,46	54612,5	0	147,8888889	14,45444444	50230,36889	0,006535948	-0,000849673
10:05:00	148	14,44	28419,17	0	147,8947368	14,45473684	50461,00737	0,005847953	0,000292398
10:06:00	148	14,43	28812,5	0	147,9	14,454	49358,9155	0,005263158	-0,000736842
10:07:00	148	14,43	27855	0	147,95	14,453	48068,9155	0,05	-0,001
10:08:00	148	14,48	54612,5	0	147,952381	14,45190476	47106,3481	0,002380952	-0,001095238
	48	14,48	54612,5	0	147,9545455	14,45318182	47447,53682	0,002164502	0,001277056
	48	14,44	54612,5	0	147,9565217	14,45434783	47759,05696	0,001976285	0,001166008
	48	14,47	54612,5	0	147,9583333	14,45375	48044,61708	0,001811594	-0,000597826
	48	14,49	54612,5	0	148	14,45416667	48044,61708	0,041666667	0,000416667

Lampiran 3. Diagram algoritme *Random Forest* 1 *decision tree* dari 10 *decision trees*

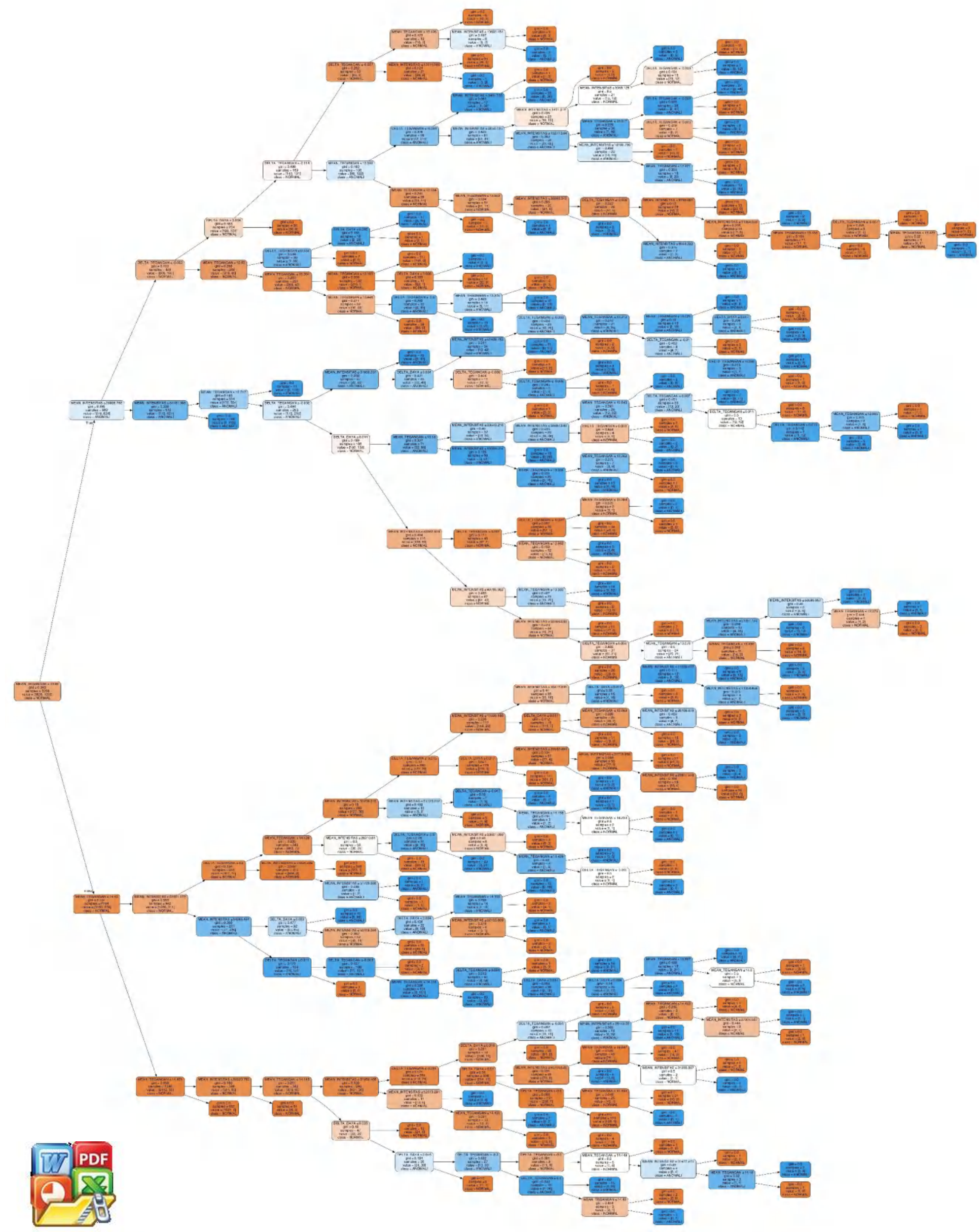


Diagram algoritme *decision trees*

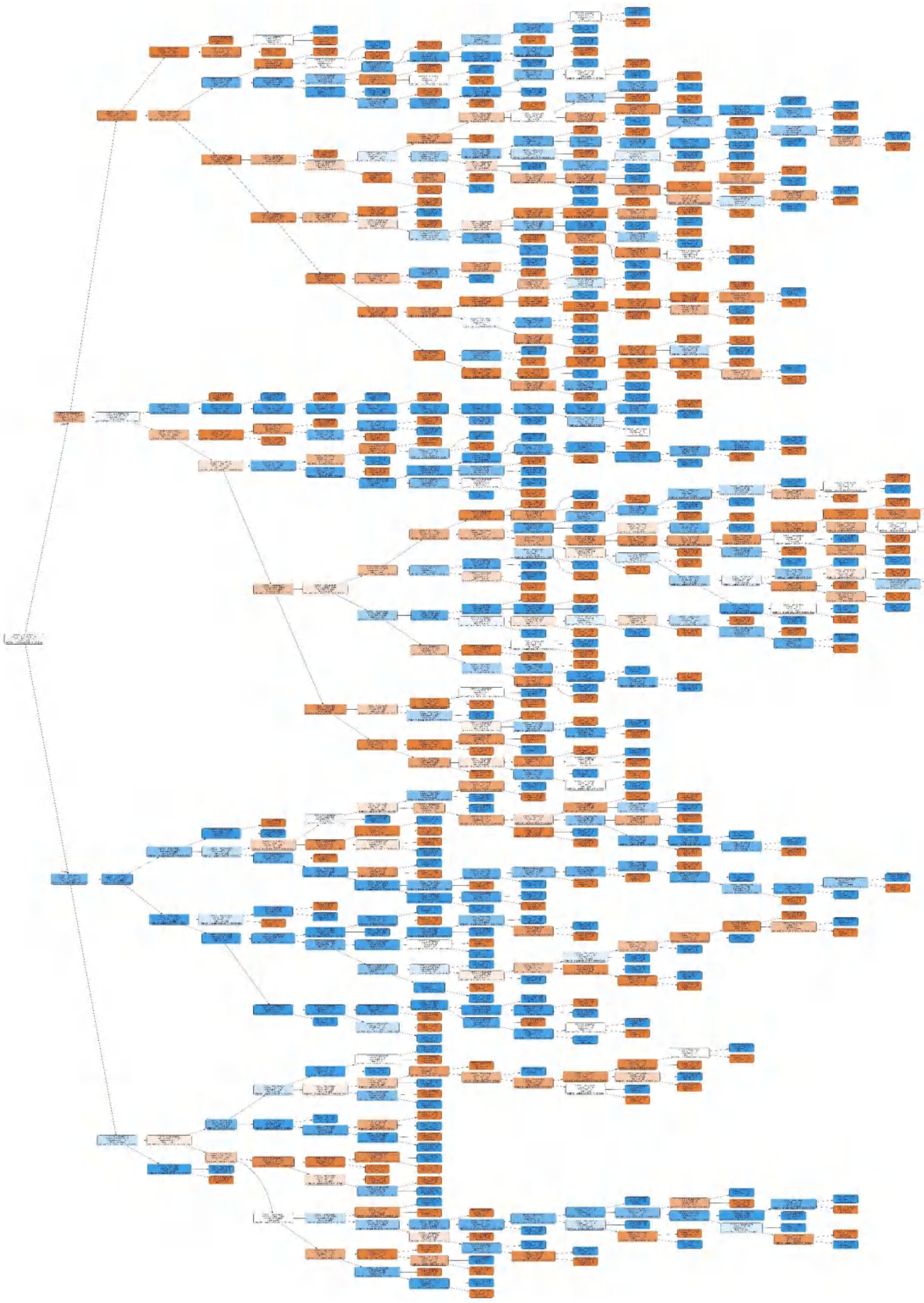
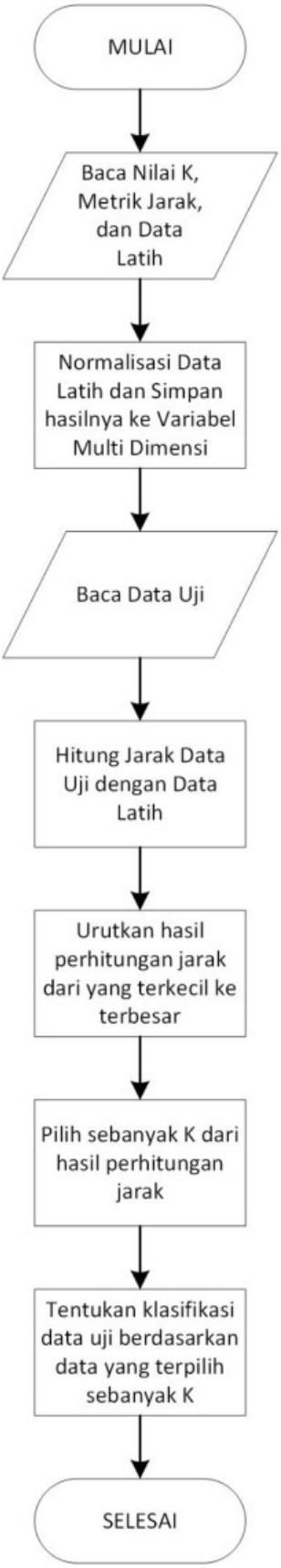


Diagram blok KNN

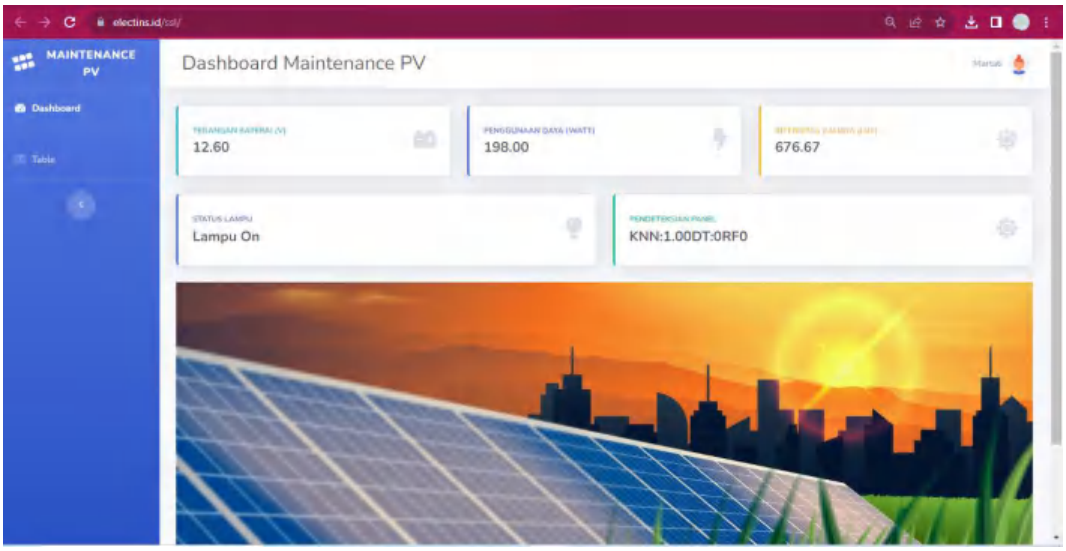


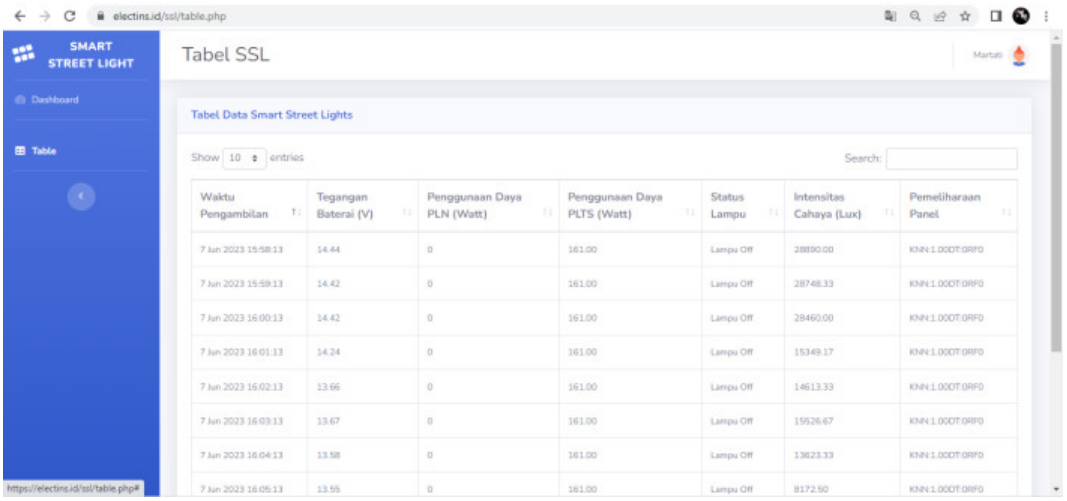
Lampiran 4. Foto-foto proses pembuatan sistem dan pengujian sistem

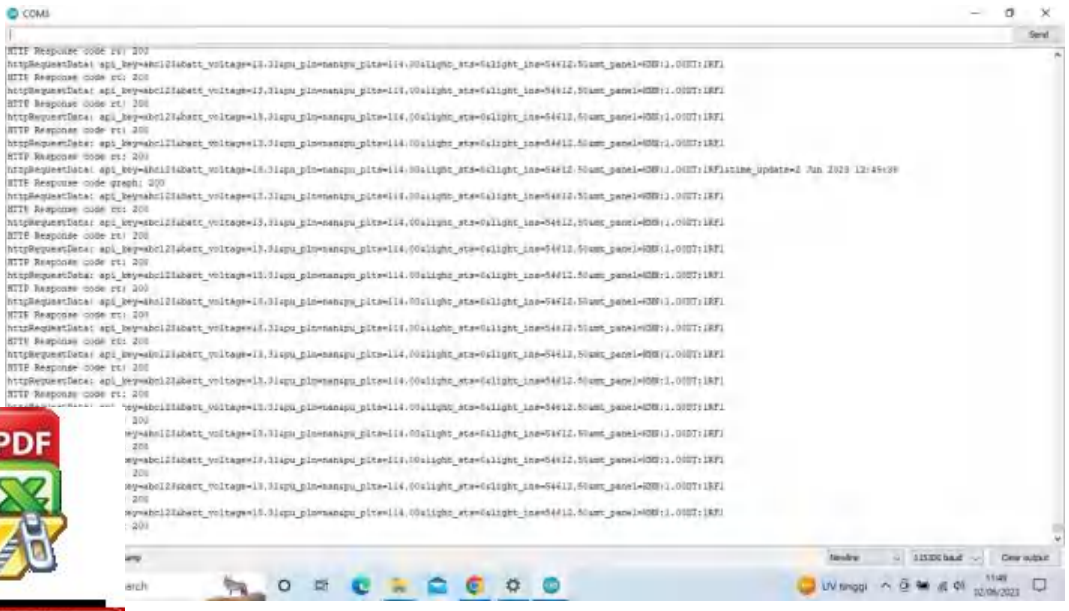





Lampiran 5. Pemantauan *website*, Database *website* dan Serial monitor







Lampiran 6. Proses pengambilan *dataset* dan pengujian sistem lapangan

Lampiran 7. Proses Pencarian algoritme yang tepat untuk sistem

1. Proses evaluasi model menggunakan data *testing*

```
Akurasi RandomForest: 0.9737470167064439
              precision    recall  f1-score   support

           0       0.98      0.98      0.98       954
           1       0.95      0.94      0.95       303

    accuracy                           0.97      1257
   macro avg       0.96      0.96      0.96      1257
weighted avg       0.97      0.97      0.97      1257
```

Gambar Hasil Evaluasi Training *Random Forest*

```
Akurasi DecisionTree: 0.9665871121718377
              precision    recall  f1-score   support

           0       0.98      0.97      0.98       954
           1       0.92      0.95      0.93       303

    accuracy                           0.97      1257
   macro avg       0.95      0.96      0.95      1257
weighted avg       0.97      0.97      0.97      1257
```

Gambar Hasil Evaluasi Training *Decision Tree*

```
315/315 [==============================] - 0s 2ms/step - loss: 0.2995 -
Akurasi: 0.8544152975082397
              precision    recall  f1-score   support

           0       0.88      0.94      0.91       954
           1       0.75      0.59      0.66       303

    accuracy                           0.85      1257
   macro avg       0.82      0.76      0.78      1257
weighted avg       0.85      0.85      0.85      1257
```

Gambar Hasil Evaluasi Training *K-Nearest Neighbor*