In[77]:=
```
makeList[list_, w_] :=
 Table[{i, Take[list, {i, i + w - 1}]}, {i, 1, Length[list] - w + 1}]

getKnnPosition[list_, v_, n_, distance_] := Flatten[Position[list[[All, 2]], #] & /@
   Nearest[list[[All, 2]], v, n, DistanceFunction → distance], 2]

(* non-weighted avergage of Nearest neighbour values *)
(* the value is the base(first element) nearest-
 position + n in the original data *)
knnReg[data_, list_, v_, w_, distance_, n_] :=
 Mean[data[[getKnnPosition[list, v, w, distance] + n]]]

metric = {EuclideanDistance, SquaredEuclideanDistance,
   ManhattanDistance, ChessboardDistance, BrayCurtisDistance,
   CanberraDistance, CosineDistance, CorrelationDistance};

plotKNN[knn_, sym_] := Column[Table[{sym <> ": " <> ToString[metric[[j]]];
    mean = Mean[Abs[knn[[j]][[All, 2]] - knn[[j]][[All, 1]]]];
    st = Sqrt[Variance[Abs[knn[[j]][[All, 2]] - knn[[j]][[All, 1]]]]];
    max = Max[Abs[knn[[j]][[All, 2]] - knn[[j]][[All, 1]]]];
    min = Min[Abs[knn[[j]][[All, 2]] - knn[[j]][[All, 1]]]];
    Legended[
     ListLinePlot[{Take[knn[[j]][[All, 2]], -200], Take[knn[[j]][[All, 1]], -200]},
      PlotStyle -> {RGBColor[128 / 255, 165 / 255, 42 / 255],
        RGBColor[216 / 255, 139 / 255, 28 / 255]}, PlotStyle -> {Blue, Red},
      PlotLabel → sym, ImageSize → 500, PlotRange → All],
     {Row[{LineLegend[{Directive[Thick, RGBColor[128 / 255, 165 / 255, 42 / 255]]},
         {"Actual:{}"}]}],
      Row[{LineLegend[{Directive[Thick, RGBColor[216 / 255, 139 / 255, 28 / 255]]},
         {"Forecast:k-NN:{}"}]}], Row[{"μ_Error=", ToString[mean] <> ""}],
      Row[{"σ_Error=", ToString[st] <> ""}], Row[{"Max=", ToString[max] <> ""}],
      Row[{"Min=", ToString[min, TraditionalForm] <> ""}]}],
    Mean[Abs[knn[[j]][[All, 2]] - knn[[j]][[All, 1]]]], metric[[j]]},

   {j, 1, Length[metric]}]
 ]


nino34 = Drop[Import[
    "/Users/darashayda1xfer/Desktop/Weather/SOI/anom forecast/anomaly6m.csv",
    "csv"], 1];
nino34 = Flatten[nino34[[All, 7 ;; 8]]];
nino340 = Table[If[EvenQ[i] == True, 0, nino34[[i]]], {i, 1, Length[nino34]}];
nino341 = Table[If[EvenQ[i] == True, 1, nino34[[i]]], {i, 1, Length[nino34]}];
Length[nino34]
Length[nino340]
Length[nino341]
```

Out[86]= 1524

Out[87]= 1524

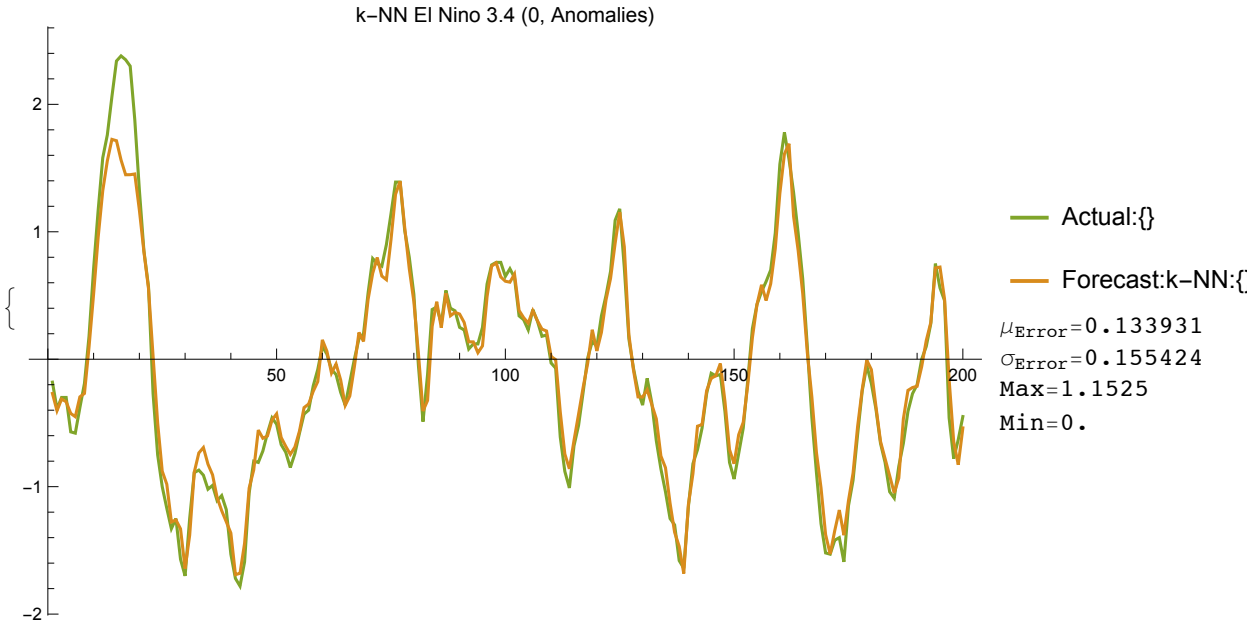
Out[88]= 1524

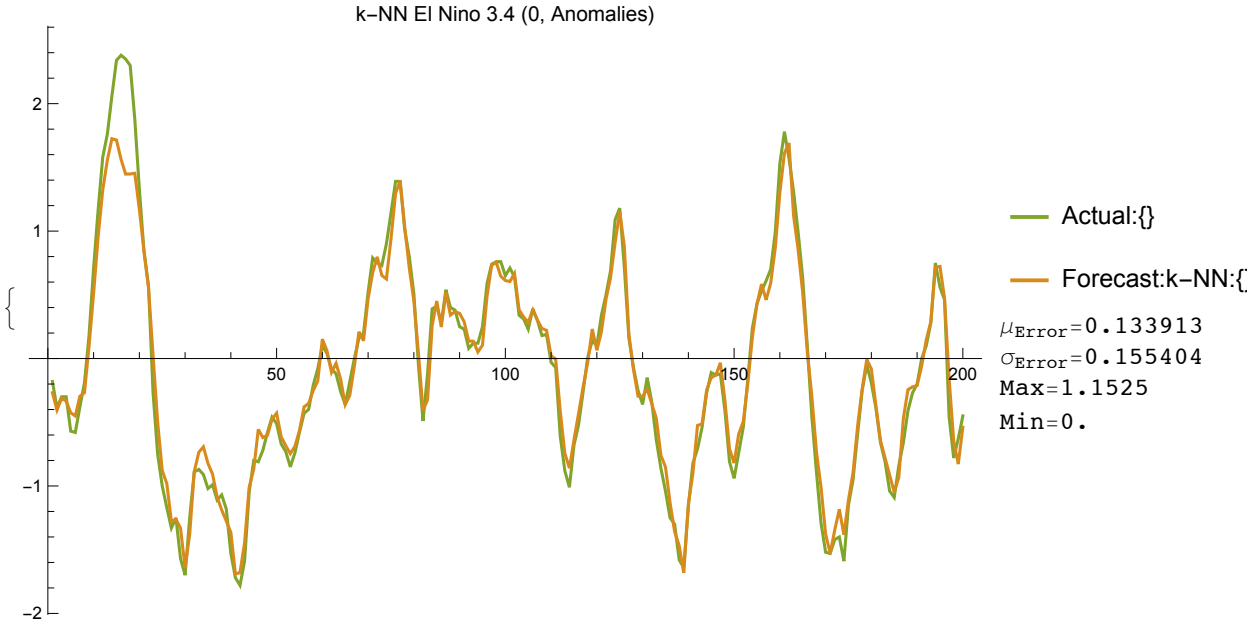
In[89]:=
```
delay = 1;
delta0 = Drop[Drop[-Join[ConstantArray[0, delay], nino340] +
      Join[nino340, ConstantArray[0, delay]], 1], -1];

delay = 1;
delta1 = Drop[Drop[-Join[ConstantArray[0, delay], nino341] +
      Join[nino341, ConstantArray[0, delay]], 1], -1];


delay = 1;
delta = Drop[Drop[-Join[ConstantArray[0, delay], nino34] +
      Join[nino34, ConstantArray[0, delay]], 1], -1];
```

0-Interlace

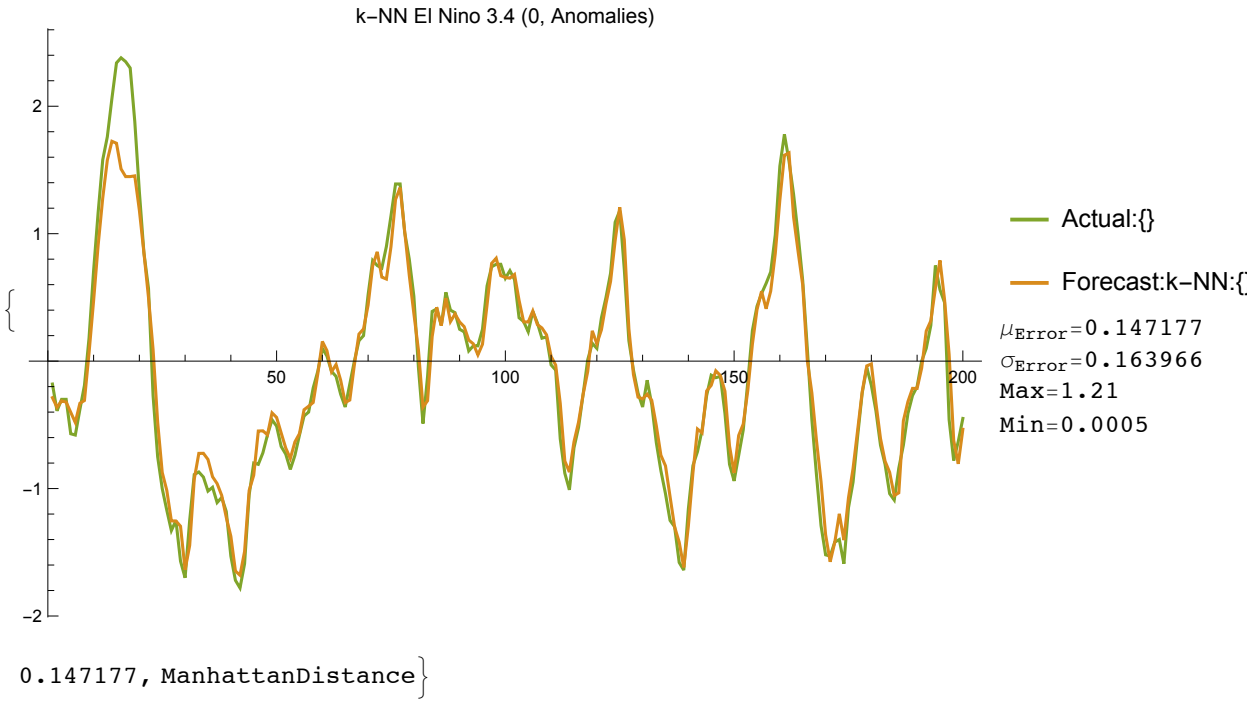
In[95]:=
```
m = 6;
listd = makeList[delta0, m];
n = 0; (*starts from 0 to 5 for next 6 months *)
metric = {EuclideanDistance, SquaredEuclideanDistance,
   ManhattanDistance, ChessboardDistance, BrayCurtisDistance,
   CanberraDistance, CosineDistance, CorrelationDistance};
knn = Table[
   Table[

    (* at i we go back to m-1 previous values *)
    v = Take[delta0, {-(m - 1), 0} + i];
    (* 1-2m to assure all candidate nearest are from the past *)
    {nino340[[i]] +
      knnReg[delta0, Take[listd, {1, i - 2 * m}], v, 20, metric[[j]], n + m + 1],
     nino340[[i + 1]], metric[[j]]},

    {i, 100, Length[delta0] - m, 2}


   ],

   {j, 1, Length[metric]}];
```

In[103]:=
```
plotKNN[knn, "k-NN El Nino 3.4 (0, Anomalies)"]
```

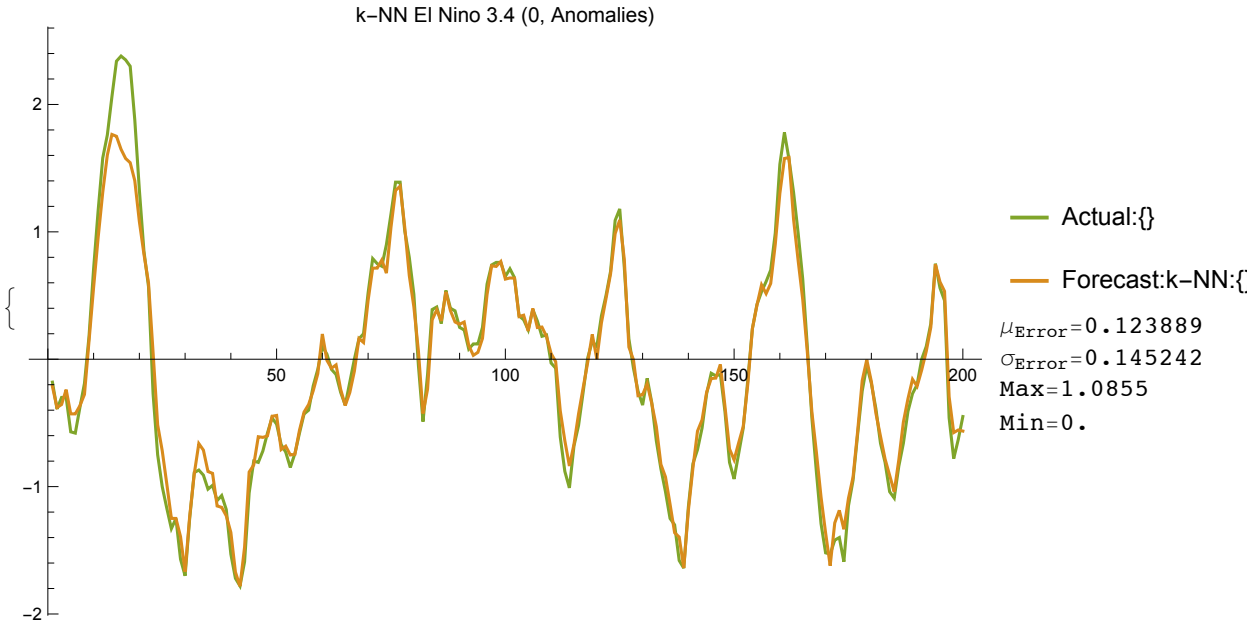




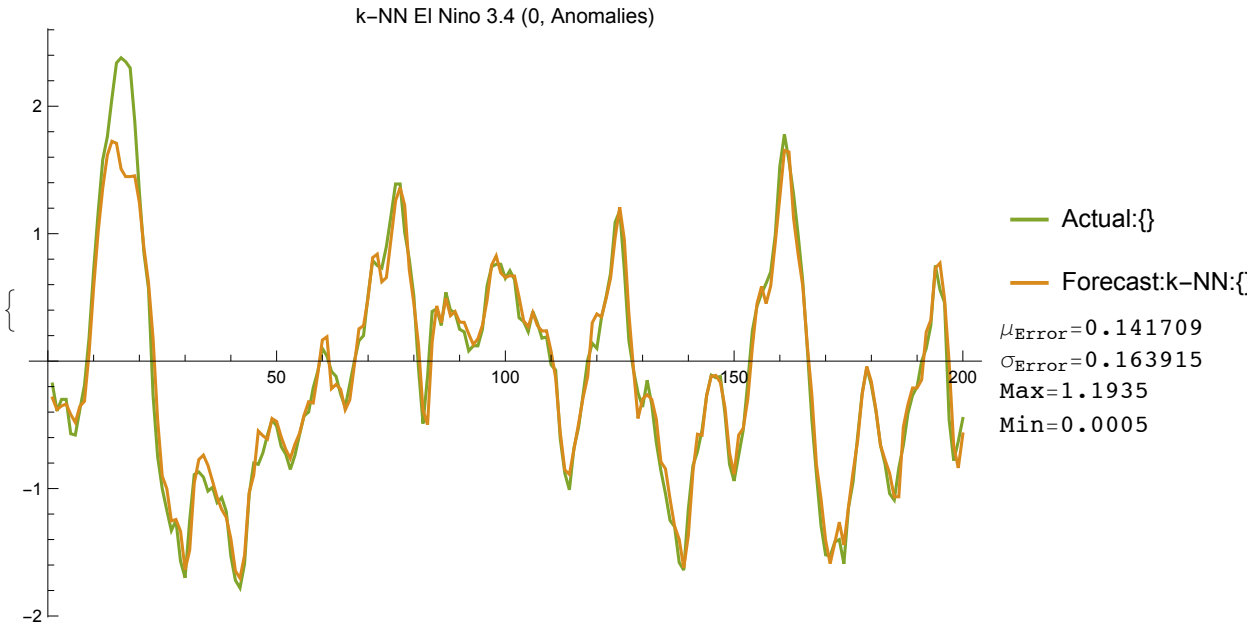
0.133913, SquaredEuclideanDistance}



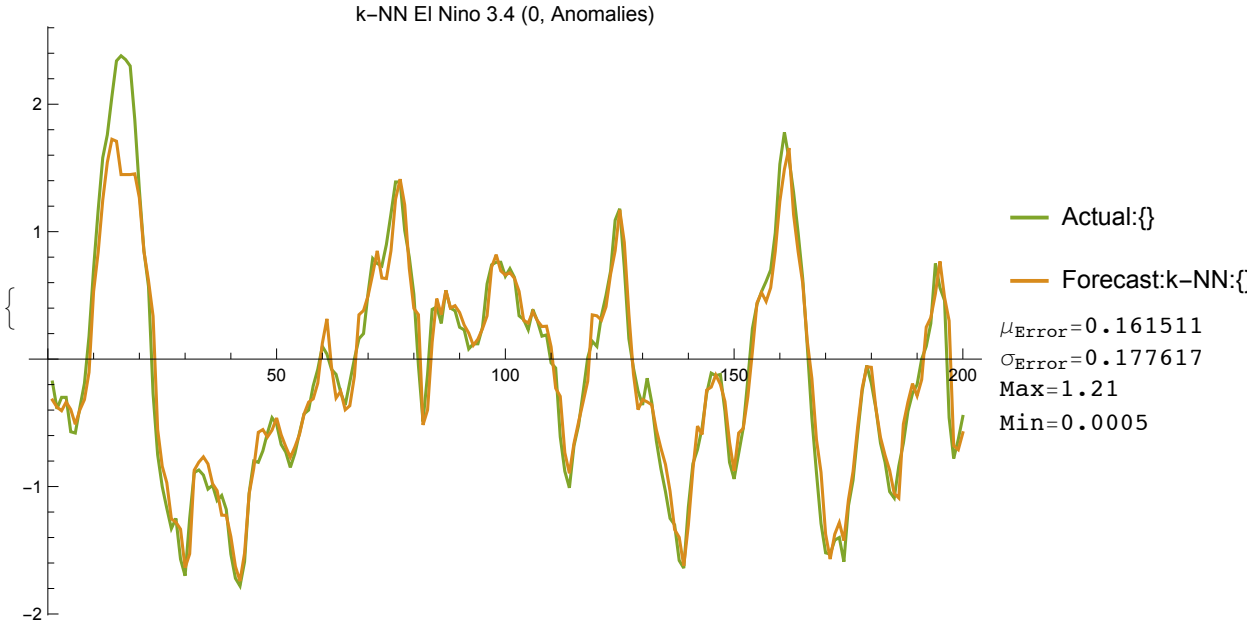
0.147177, ManhattanDistance}

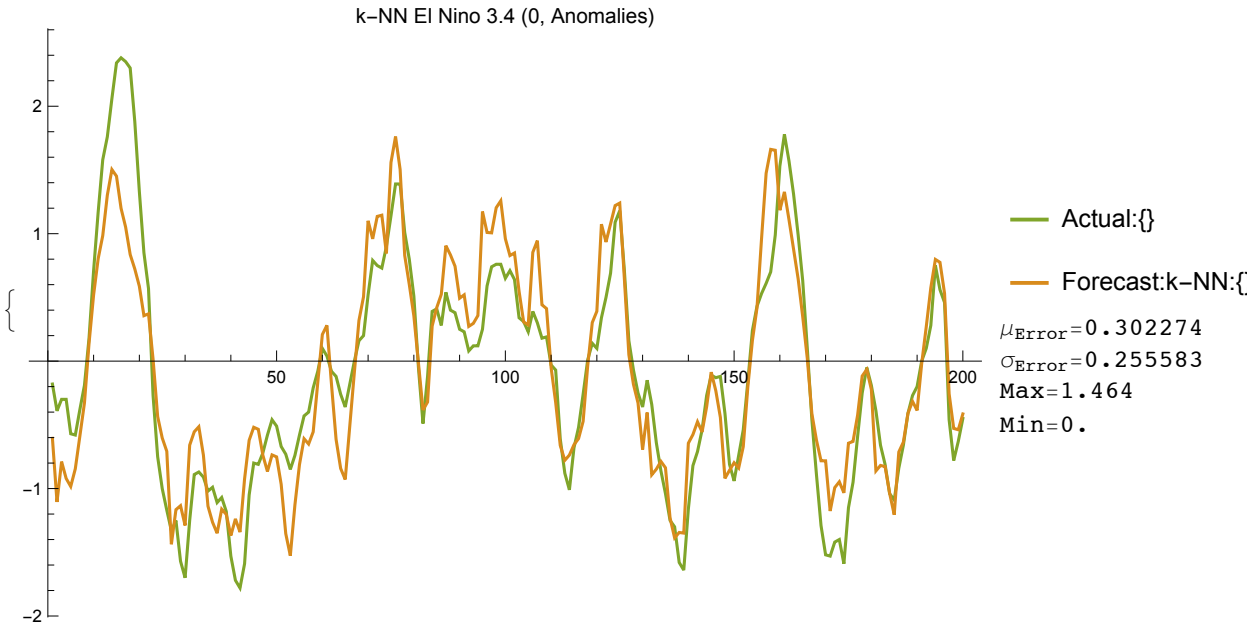


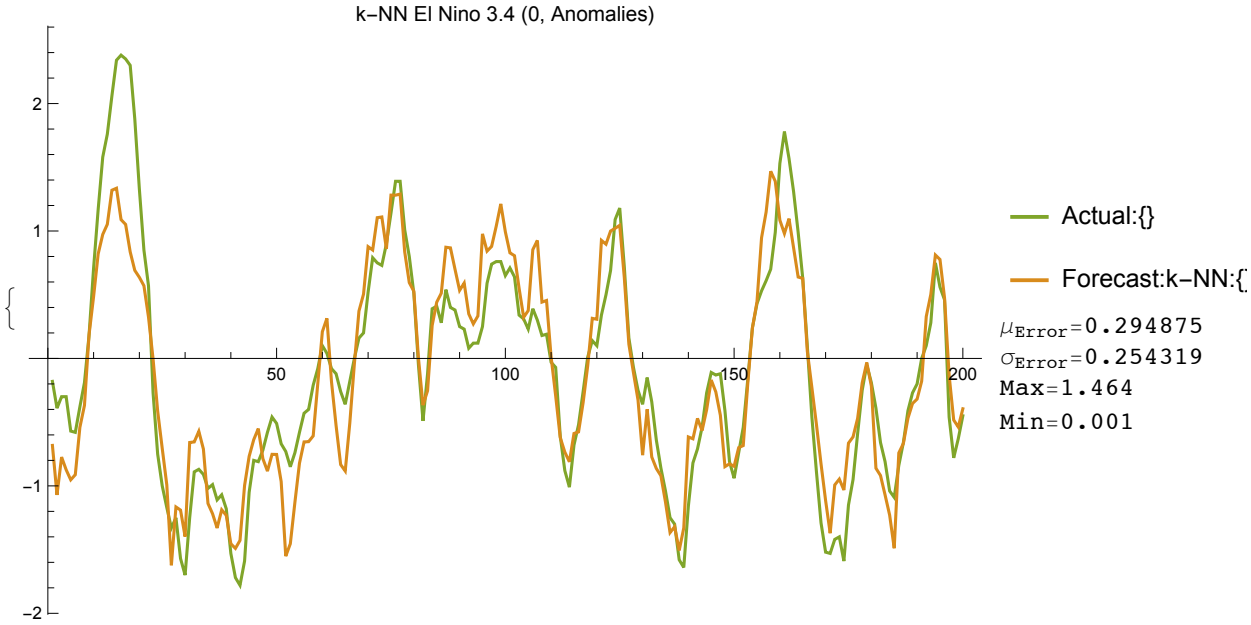
Out[103]= 0.123889, ChessboardDistance}



0.141709, BrayCurtisDistance}





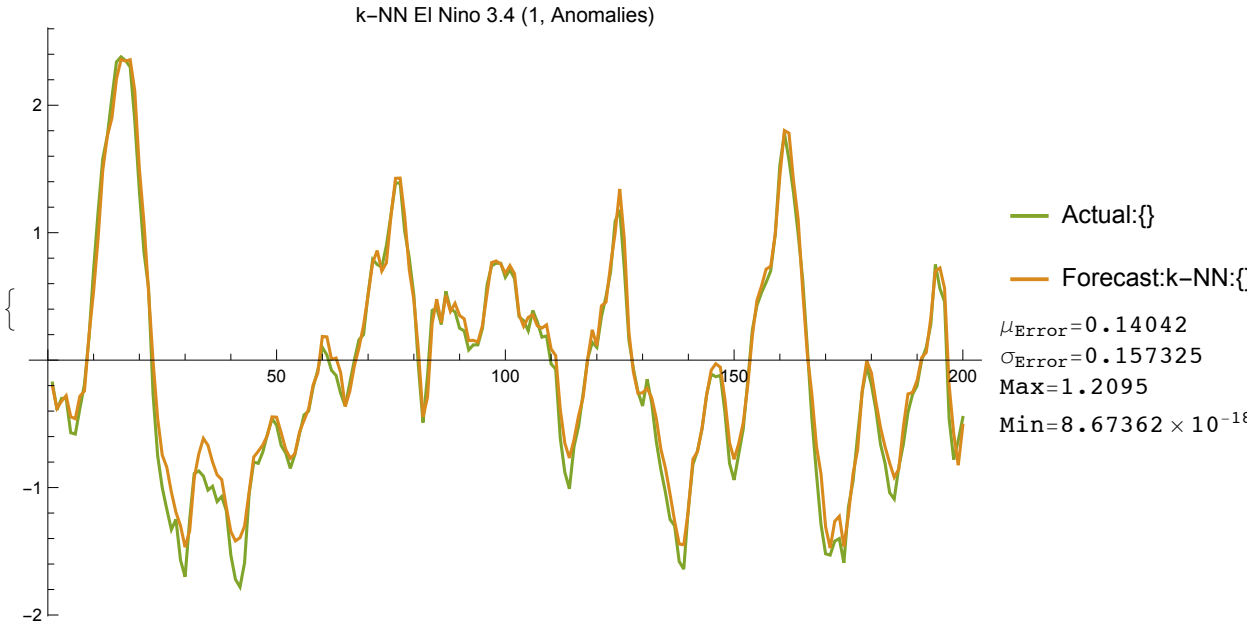


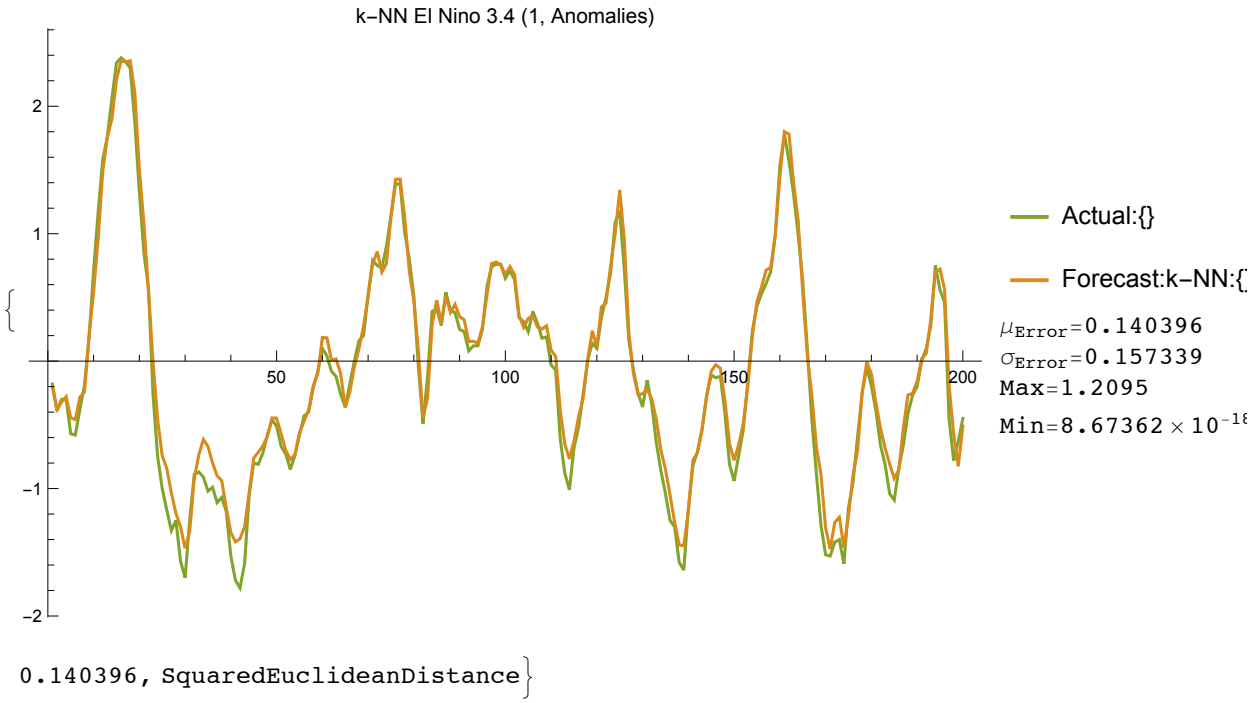
0.294875, CorrelationDistance}

I-Interlace

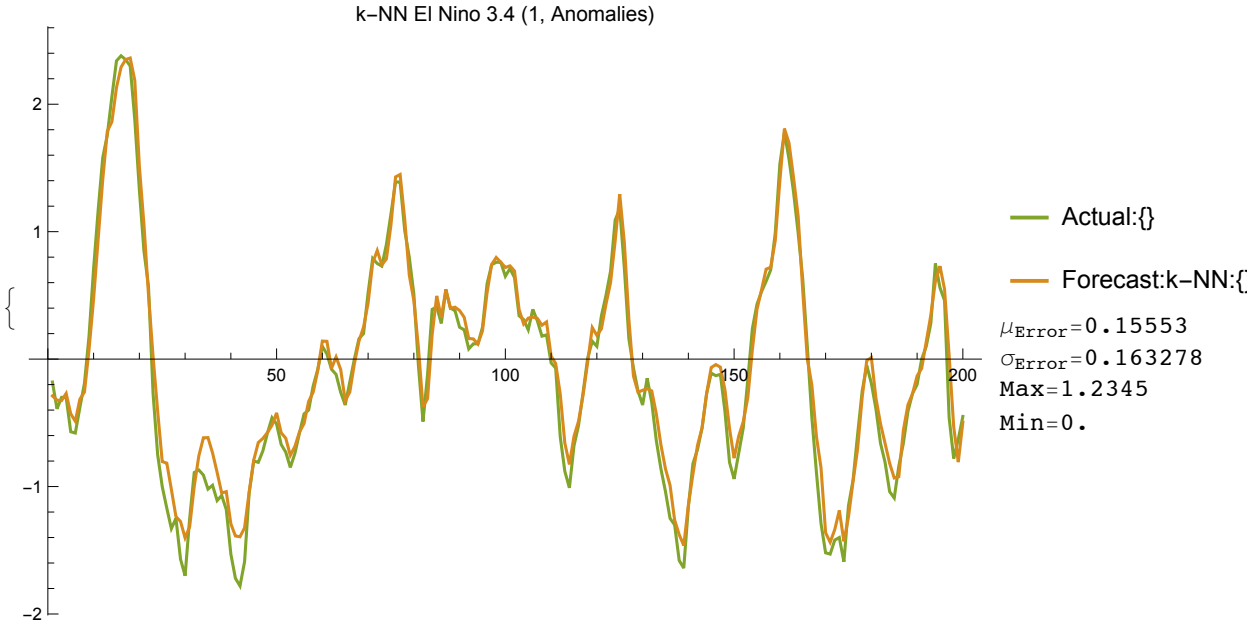
In[104]:=
```
m = 6;
listd = makeList[delta1, m];
n = 0;  (*starts from 0 to 5 for next 6 months *)
metric = {EuclideanDistance, SquaredEuclideanDistance,
  ManhattanDistance, ChessboardDistance, BrayCurtisDistance,
  CanberraDistance, CosineDistance, CorrelationDistance};
knn = Table[
   Table[

    (* at i we go back to m-1 previous values *)
    v = Take[delta1, {-(m - 1), 0} + i];
    (* 1-2m to assure all candidate nearest are from the past *)
    {nino341[[i]] +
      knnReg[delta1, Take[listd, {1, i - 2 * m}], v, 20, metric[[j]], n + m + 1],
     nino341[[i + 1]], metric[[j]]},

    {i, 100, Length[delta1] - m, 2}


   ],

   {j, 1, Length[metric]}];
```

In[108]:=
```
plotKNN[knn, "k-NN El Nino 3.4 (1, Anomalies)"]
```



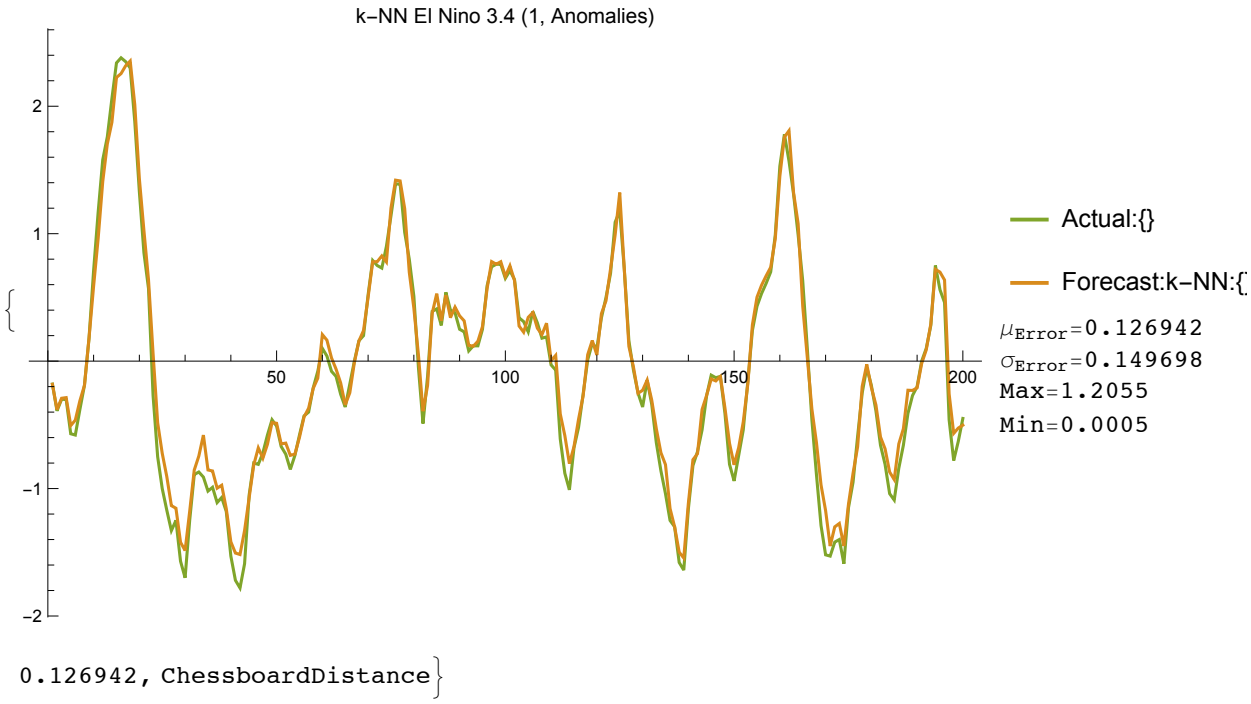


0.140396, SquaredEuclideanDistance}

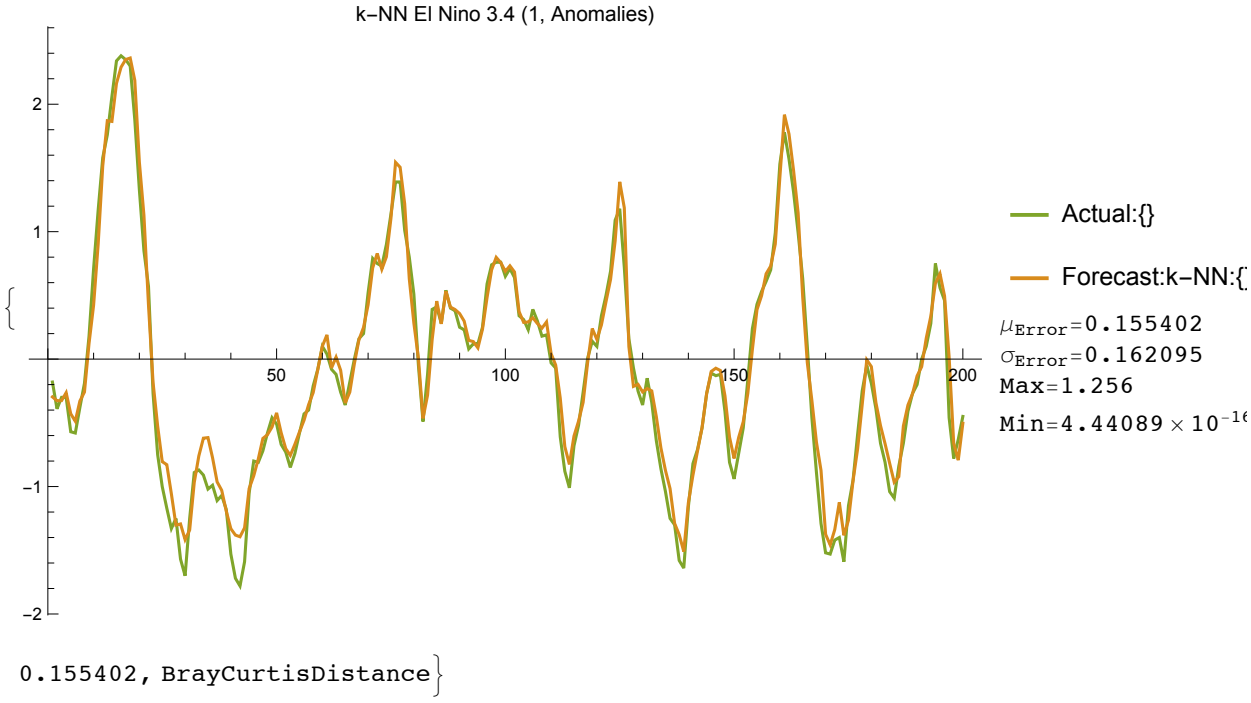


0.15553, ManhattanDistance}

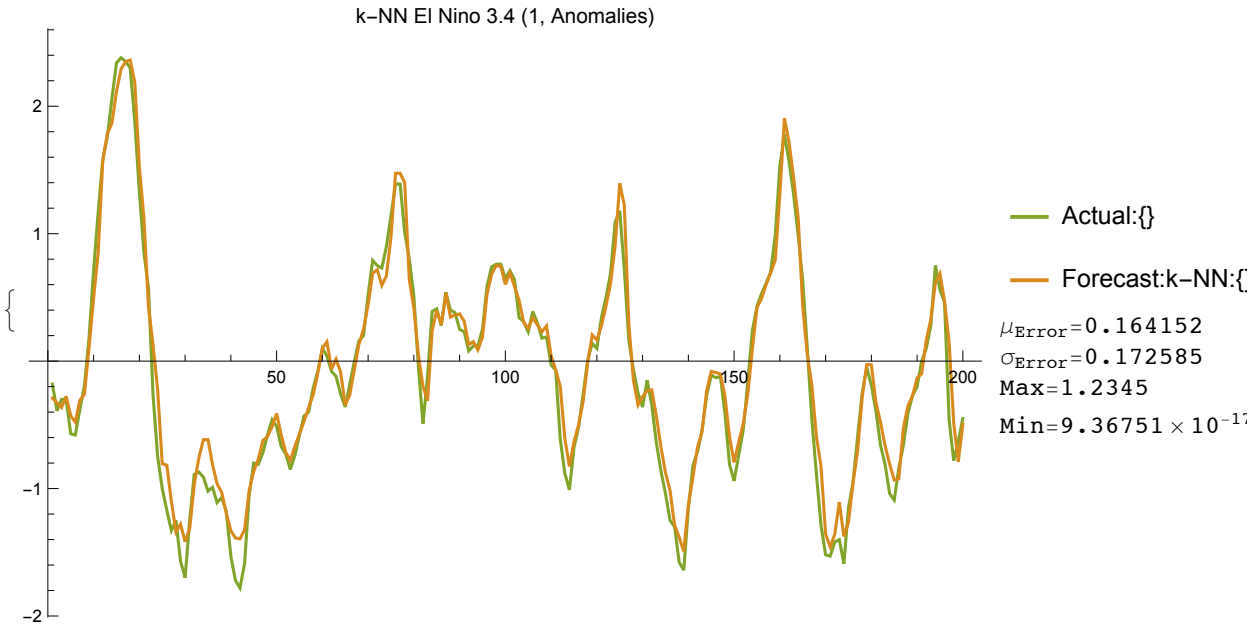
Out[108]=



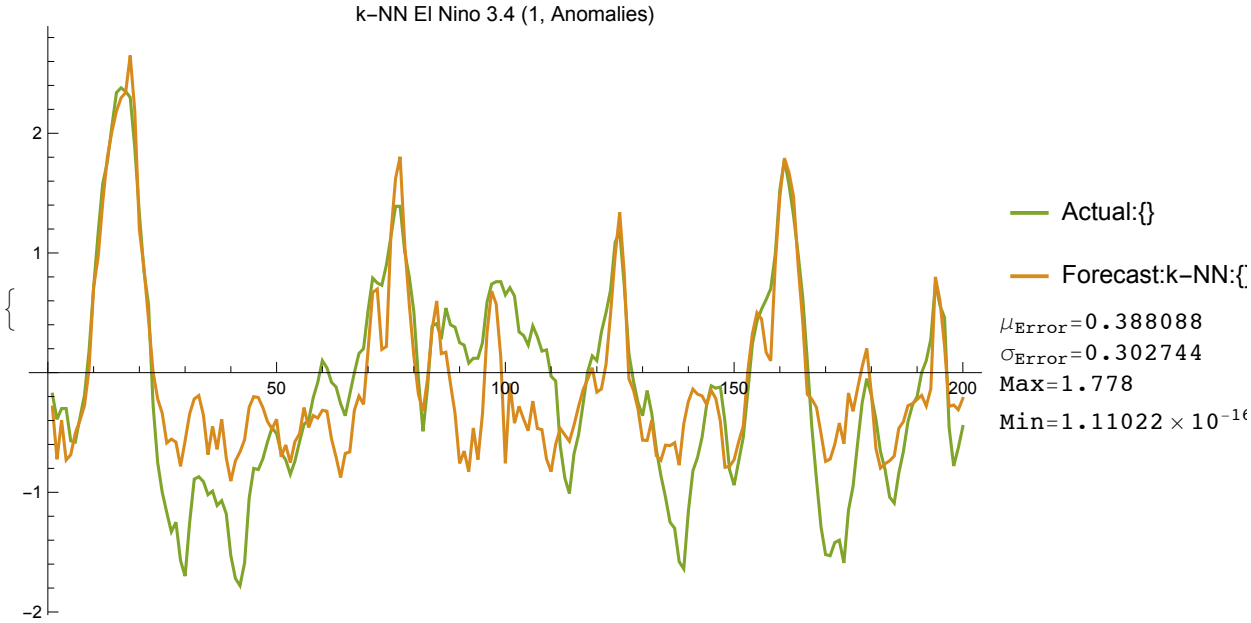
0.126942, ChessboardDistance}

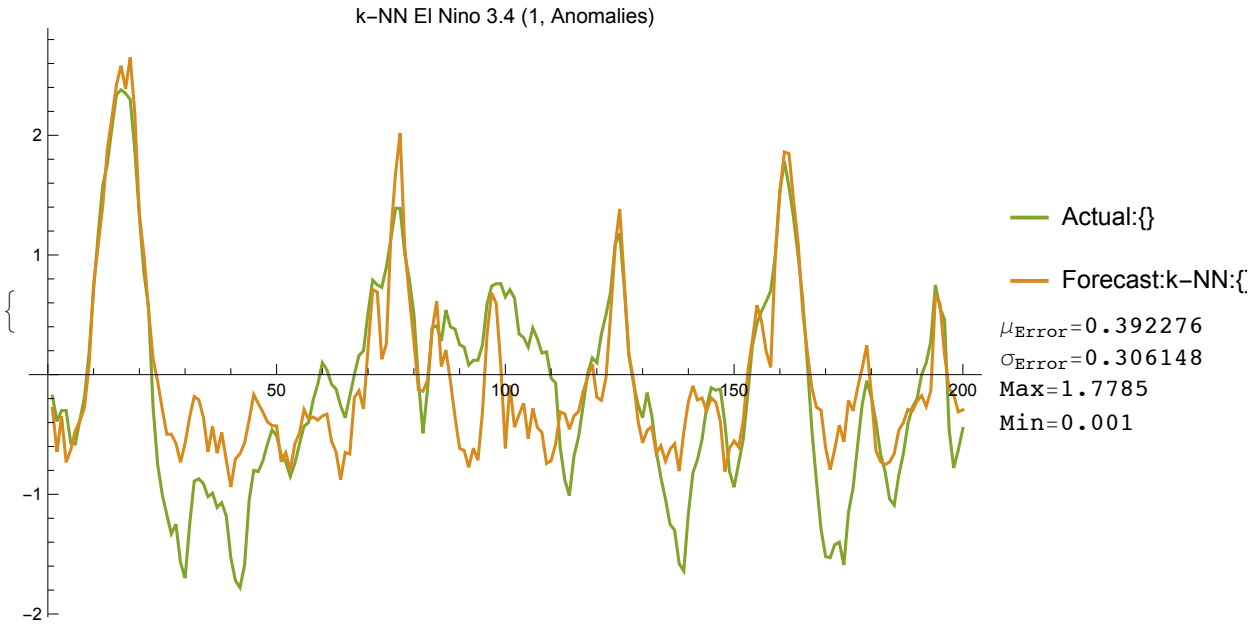


0.155402, BrayCurtisDistance}



0.164152, CanberraDistance}



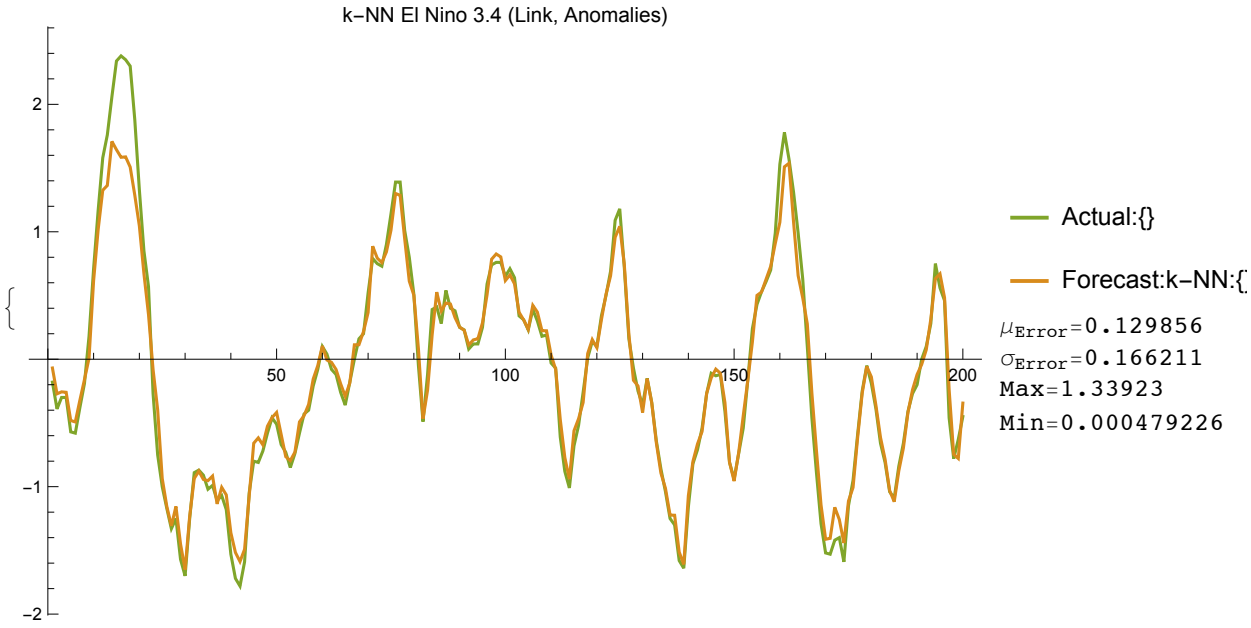


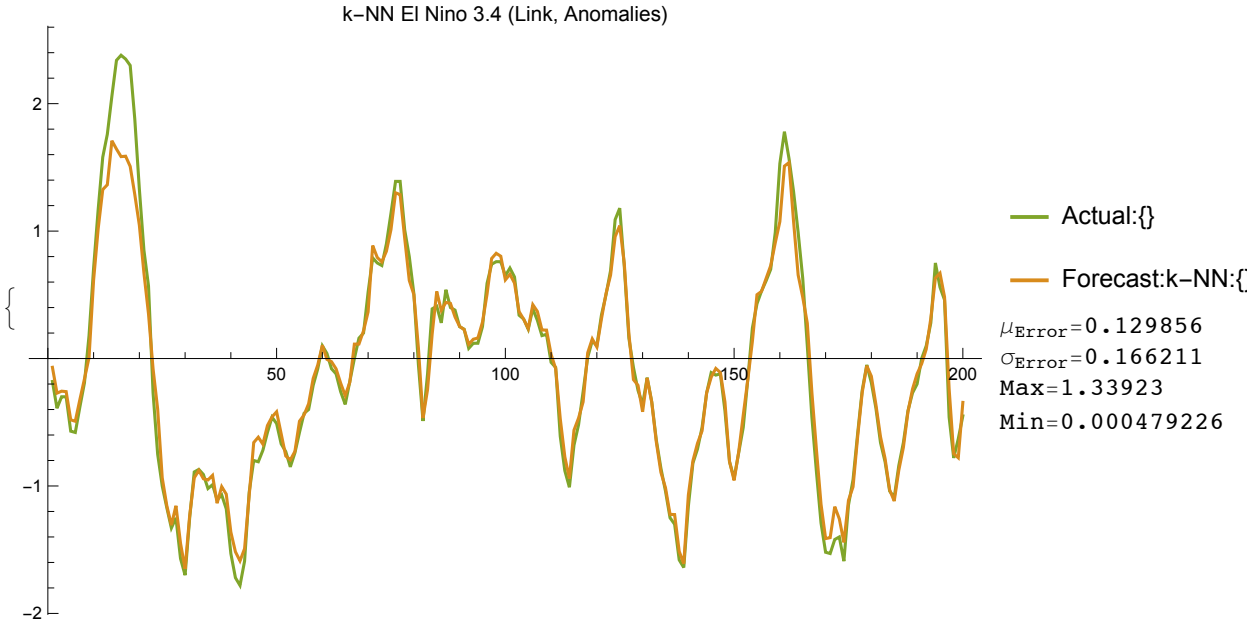

```
0.392276, CorrelationDistance}
```

(Link, Anom) Interlace

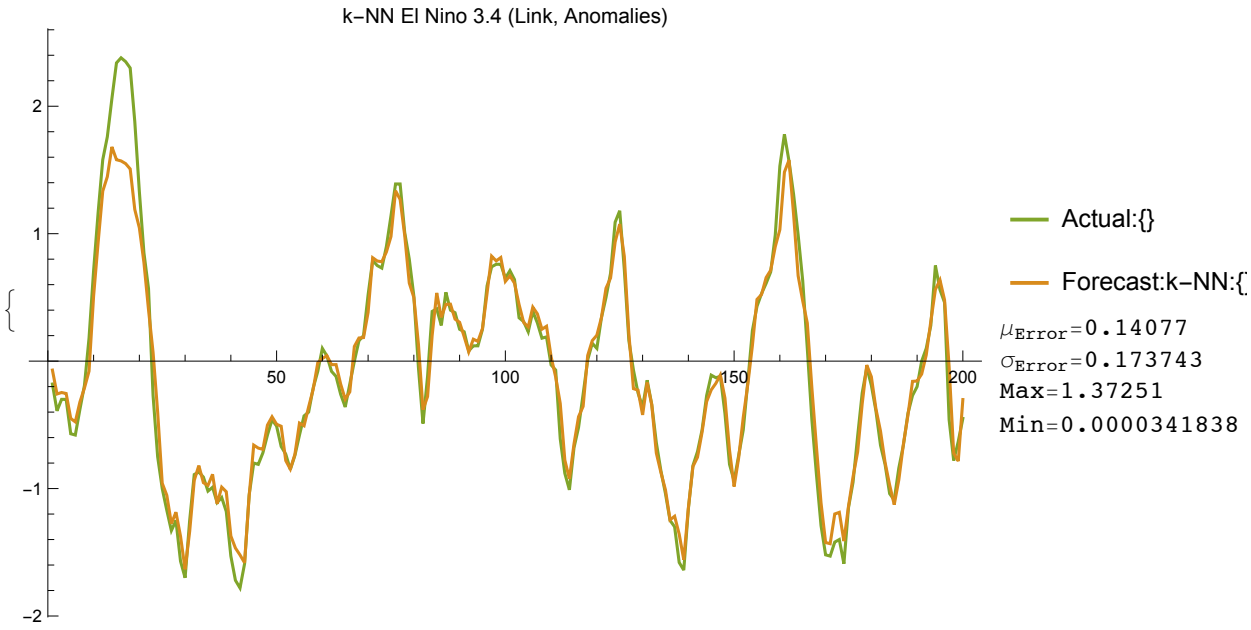
In[115]:=
```
m = 6;
listd = makeList[delta, m];
n = 0; (*starts from 0 to 5 for next 6 months *)
metric = {EuclideanDistance, SquaredEuclideanDistance,
    ManhattanDistance, ChessboardDistance, BrayCurtisDistance,
    CanberraDistance, CosineDistance, CorrelationDistance};
knn = Table[
    Table[

     (* at i we go back to m-1 previous values *)
     v = Take[delta, {-(m - 1), 0} + i];
     (* 1-2m to assure all candidate nearest are from the past *)
     {nino34[[i]] +
       knnReg[delta, Take[listd, {1, i - 2 * m}], v, 20, metric[[j]], n + m + 1],
      nino34[[i + 1]], metric[[j]]},

     {i, 100, Length[delta] - m, 2}


    ],

    {j, 1, Length[metric]}];
```

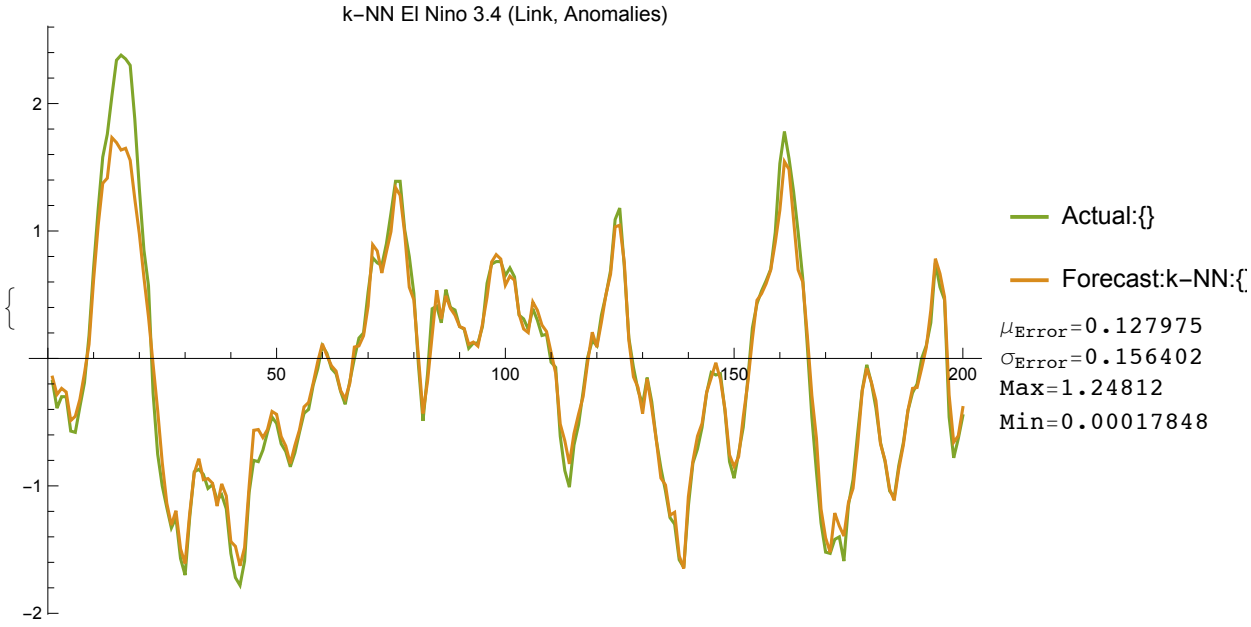
In[120]:=
```
plotKNN[knn, "k-NN El Nino 3.4 (Link, Anomalies)"]
```





0.129856, SquaredEuclideanDistance}

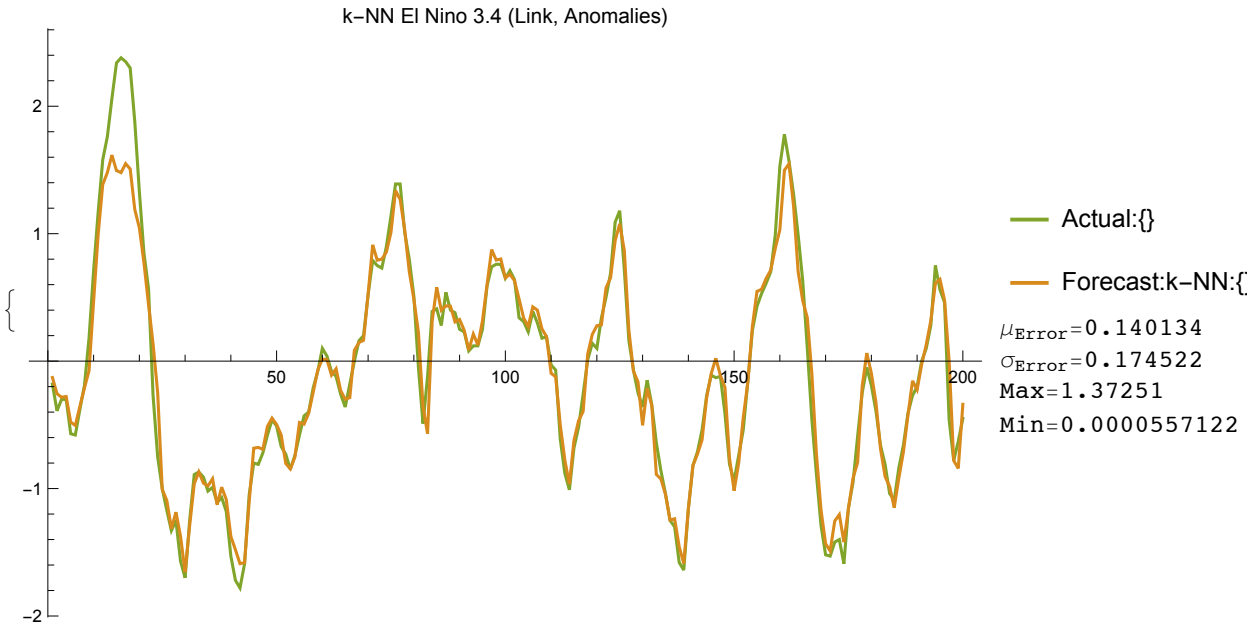




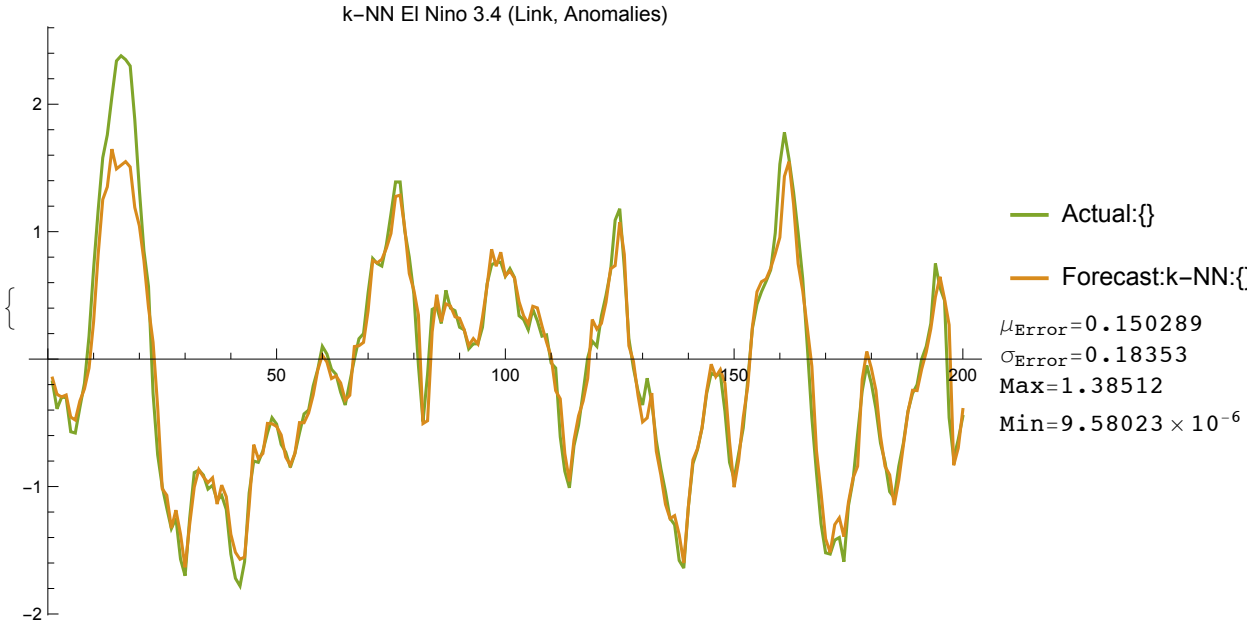
0.127975, ChessboardDistance}

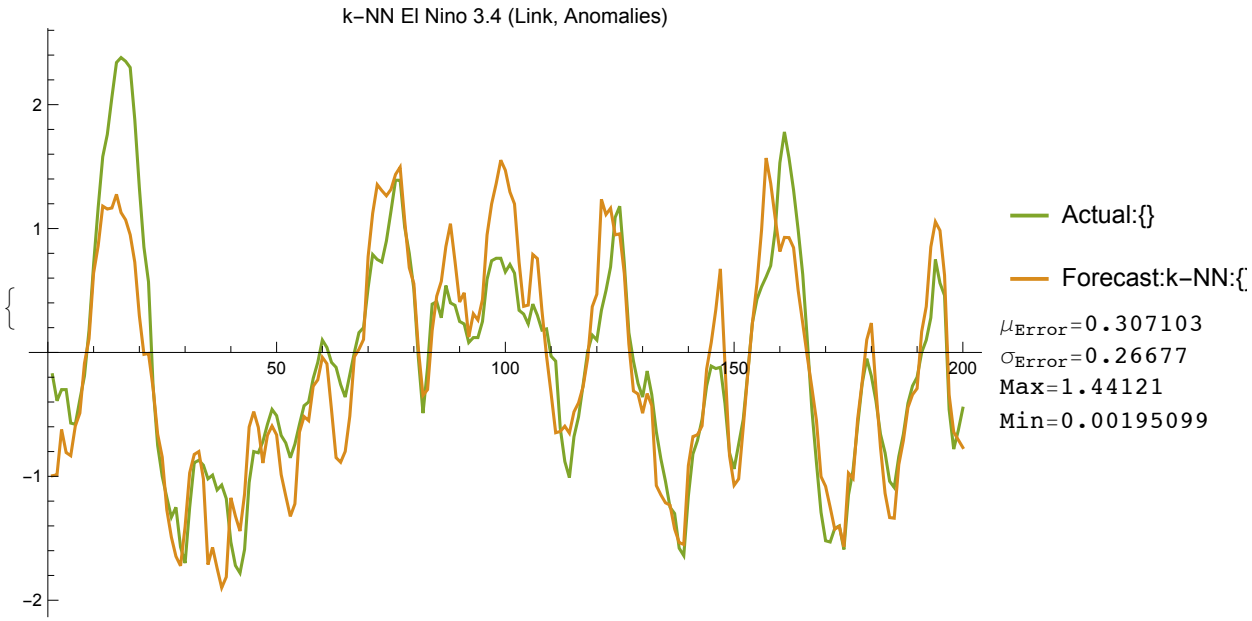
Out[120]=

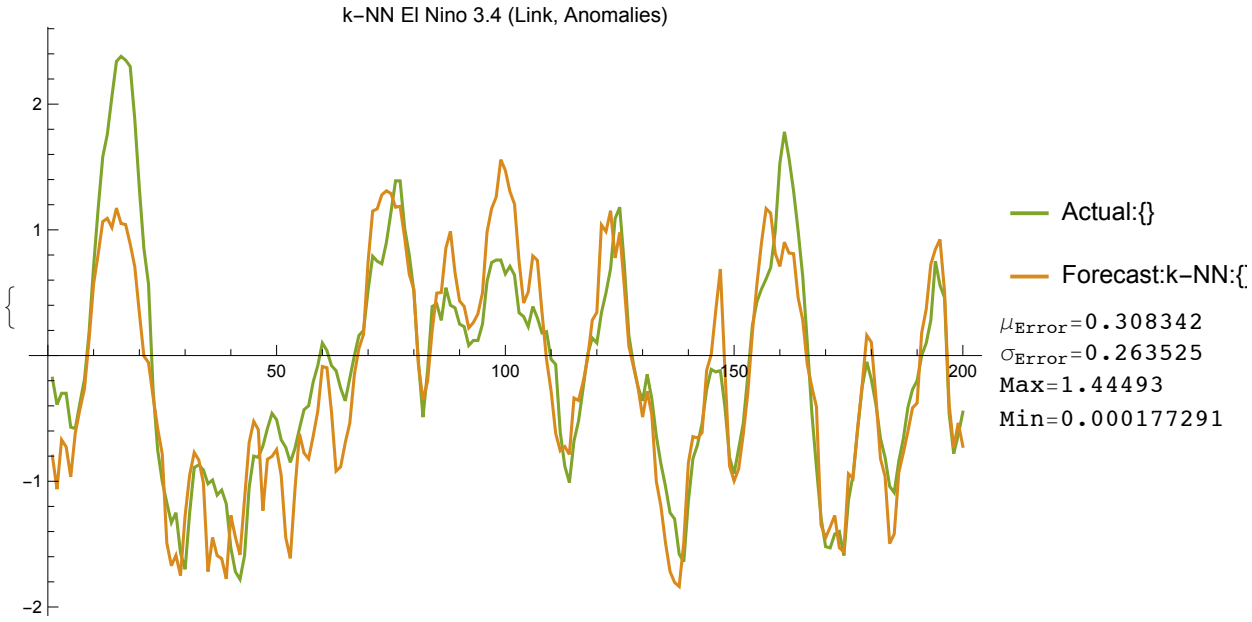
Out[120]=



0.140134, BrayCurtisDistance}








```
0.308342, CorrelationDistance}
```