

```

(* Negentropy ICA *)
x = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
y = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
A = {{5, 10}, {10, 2}};
mt = A.{x, y};
mt = mt - Mean[Transpose[mt]];
ma = Transpose[mt];
ListPlot[{ma[[All]]}, PlotRange → {{-30, 30}, {-30, 30}}];
Covariance[Transpose[mt]]
{{127.7, 72.9295}, {72.9295, 103.205}}

Eigenvalues[Covariance[Transpose[mt]]]
{189.403, 41.5018}

Eigenvectors[Covariance[Transpose[mt]]]
{{-0.76342, -0.645902}, {0.645902, -0.76342}}

d12 = Eigenvalues[Covariance[Transpose[mt]]][[1]]^(-1/2)
d22 = Eigenvalues[Covariance[Transpose[mt]]][[2]]^(-1/2)
dmat = DiagonalMatrix[{d12, d22}]
0.0726618
0.155227
{{0.0726618, 0.}, {0., 0.155227}}

emat = Transpose[Eigenvectors[Covariance[Transpose[mt]]]]
{{-0.76342, 0.645902}, {-0.645902, -0.76342}}

vmat = emat.dmat.Transpose[emat]
{{0.107107, -0.0407123}, {-0.0407123, 0.120782}}

x = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
y = RandomReal[{-Sqrt[3], Sqrt[3]}, 1000];
A = {{5, 10}, {10, 2}};
mt = A.{x, y};
mt = mt - Mean[Transpose[mt]];
(*vmatとmtは独立に計算する*)
zmat = vmat.mt (*2行*標本数*);
{{5, 10}, {10, 2}}

za = Transpose[zmat];
ListPlot[{za[[All]]}, PlotRange → {{-3, 3}, {-3, 3}}];

```

```

(*
w=RandomReal[{-1/2,1/2},2];
*)
w = {1, 0};
gamma = 1;
w = w / Norm[w];
epsilon = 0.0001;
n = Length[x];
cnt = 1;
a = 100;
wbefore = w;
While[cnt < n,
  wbefore = w;
  w = w + (a / (a + cnt)) * (1 / n) *
    Sum[w.zmat[[All, i]] * Exp[-(w.zmat[[All, i]])^2 / 2] * zmat[[All, i]], {i, 1, n}];
  w = w / Norm[w];
  Print["cnt=", cnt];
  Print["w=", w];
  ++cnt;
  If[1 - epsilon <= Abs[w.wbefore] && Abs[w.wbefore] <= 1 + epsilon,
    cnt = n;
    Print["収束した:"];
    Print["w=", w];
    Print["Abs[w.wbefore]=", Abs[w.wbefore]];
  ]
]
{1, 0}

cnt=1
w={0.999648, -0.0265416}

cnt=2
w={0.99881, -0.0487726}

cnt=3
w={0.997734, -0.0672882}

cnt=4
w={0.996578, -0.08266}

cnt=5
w={0.995439, -0.0954021}

収束した:
w={0.995439, -0.0954021}
Abs[w.wbefore]=0.999918

```

```

(* True Value*)
tmat = vmat.A;
truemat = {};
i = 1;
While[i ≤ 2,
  truemat = Append[truemat, tmat[[All, i]] / Norm[tmat[[All, i]]]];
  i++;
];
truemat = Transpose[truemat];
MatrixForm[truemat]

$$\begin{pmatrix} 0.126835 & 0.986294 \\ 0.991924 & -0.165 \end{pmatrix}$$

w = {1, 0}
gamma = 1;
w = w / Norm[w];
epsilon = 0.0001;
n = Length[x];
cnt = 1;
a = 100;
wbefore = w;
While[cnt < n,
  wbefore = w;
  w = w + (a / (a + cnt)) * (1 / n) * Sum[Tanh[w.zmat[[All, i]]] * zmat[[All, i]], {i, 1, n}];
  w = w / Norm[w];
  Print["cnt=", cnt];
  Print["w=", w];
  ++cnt;
  If[1 - epsilon ≤ Abs[w.wbefore] && Abs[w.wbefore] ≤ 1 + epsilon,
    cnt = n;
    Print["収束した:"];
    Print["w=", w];
    Print["Abs[w.wbefore]=", Abs[w.wbefore]];
  ]
]
{1, 0}
cnt=1
w={0.999857, -0.0169216}
cnt=2
w={0.999475, -0.0323923}
cnt=3
w={0.998918, -0.0465071}
収束した:
w={0.998918, -0.0465071}
Abs[w.wbefore]=0.9999
MatrixForm[truemat]

$$\begin{pmatrix} 0.126835 & 0.986294 \\ 0.991924 & -0.165 \end{pmatrix}$$


```