```
GoeritzSignature[K_] :=
  Module[{m = 0, a, c = 0, ds, cs, is, A},
   ds = List @@ PD[K] /.
     x : X[i_, j_, k_, l_] :> If[PositiveQ@x,
        If[OddQ@i, {a_{-i,l}[++c] a_{k,-j}[++c], -1},
         {a_{j,i}[++c] a_{-l,-k}[++c], ++m; 1}],
        If[OddQ@i, {a_{-i,-l}[++c] a_{k,j}[++c], --m; -1},
         {a_{-j,i}[++c] a_{l,-k}[++c], 1}]];
   cs =
    Times @@ ds[[All, 1]] //.
      a_{i_,j_} [x__] a_{j_,k_} [y__] :> a_{i,k}[x, y] /.
     a__[x__] :> a[x];
   A = Table[0, Length@cs, Length@cs];
   Do[is = Position[cs, 2 i - #][[1, 1]] & /@ {1, 0};
    A[[is, is]] += ds[[i, 2]] {{1, -1}, {-1, 1}},
    {i, Length[ds]} ];
   MatrixSignature[A] - m];
```