

What is claimed is:

1. A joint detector/decoder device comprising:  
  
an input circuit configured to receive an input signal;  
  
a survivor splitting circuit configured to produce a plurality of survivors of a next instance based on at least one survivor of a previous instance and based on the input signal;  
  
a survivor discarding circuit configured to discard survivors based on a set of predetermined criteria;  
  
wherein each survivor has an associated bit sequence; and  
  
wherein the set of predetermined criteria comprises a parity check based on whether the survivor's bit pattern satisfies one or more checks of a parity check matrix.
2. The joint detector/decoder device of claim 1, wherein a survivor determination circuit comprising the survivor splitting circuit and the survivor discarding circuit is configured to determine that a survivor survives to the next instance if a metric of the survivor is less than a predetermined metric threshold.
3. The joint detector/decoder device of claim 2, wherein the metric comprises an Euclidean metric.
4. The joint detector/decoder device of claim 2, wherein the predetermined metric threshold is set to a minimum metric plus a constant user-definable threshold parameter.
5. The joint detector/decoder device of claim 1, wherein the survivor determination circuit is further configured to retain a predetermined set of survivors with smallest metrics as the plurality of survivors of the next instance.
6. The joint detector/decoder device of claim 1, wherein the parity check matrix comprises a matrix with entries of zero above a predetermined sub-diagonal of the parity check matrix.
7. The joint detector/decoder device of claim 1, further comprising:  
  
a metric determination circuit configured to determine a metric for survivor paths in a trellis.

8. A joint detection/decoding method comprising:

receiving an input signal;

producing a plurality of survivors of a next instance based on at least one survivor of a previous instance and based on the input signal;

discarding survivors based on a set of predetermined criteria;

wherein each survivor has an associated bit sequence; and

wherein the set of predetermined criteria comprises a parity check based on whether the survivor's bit pattern satisfies one or more checks of a parity check matrix.

9. The joint detection/decoding method of claim 8, further comprising: determining that a survivor survives to the next instance if a metric of the survivor is less than a predetermined metric threshold.

10. The joint detection/decoding method of claim 9, wherein the metric comprises an Euclidean metric.

11. The joint detector/decoder method of claim 9, wherein the predetermined metric threshold is set to a minimum metric plus a constant user-definable threshold parameter.

12. The joint detection/decoding method of claim 8, further comprising: retaining a predetermined number of survivors with smallest metrics as the plurality of survivors of the next instance.

13. The joint detection/decoding method of claim 8, wherein the parity check matrix comprises a matrix with entries of zero above a predetermined sub-diagonal of the parity check matrix.

14. The joint detection/decoding method of claim 8, further comprising: determining, during a metric thresholding section, whether a survivor carries on to the next instance based on a metric of the bit sequence and independent from whether the bit sequence fulfills a predetermined validity criterion.

15. The joint detection/decoding method of claim 14, further comprising: determining, during a parity check section, whether a survivor carries on to the

next instance based on a metric of the bit sequence and based on whether the bit sequence fulfills a predetermined validity criterion.

16. The joint detector/decoder method of claim 8, further comprising:

determining a metric for survivor paths in a trellis.

## Claims

What is claimed is:

1. A joint detector/decoder device comprising:  
an input circuit configured to receive an input signal;  
a survivor splitting circuit configured to produce a plurality of survivors of a next instance based on at least one survivor of a previous instance and based on the input signal;  
a survivor discarding circuit configured to discard survivors based on a set of predetermined criteria;  
wherein each survivor has an associated bit sequence.
2. The joint detector/ decoder device of claim 1,  
wherein a survivor determination circuit comprising the survivor splitting circuit and the survivor discarding circuit is configured to determine that a survivor survives to the next instance if the metric of the survivor is within a predetermined metric threshold.
3. The joint detector/ decoder device of claim 1,  
wherein the survivor determination circuit is further configured to retain a predetermined set of survivors with the smallest metrics as the plurality of survivors of the next instance.

4. The joint detector/ decoder device of claim 1,  
wherein the pre-determined validity criterion comprises a parity check based on whether the survivor's bit pattern satisfies the checks of a parity check matrix.
5. The joint detector/ decoder device of claim 4,  
wherein the parity check matrix comprises a matrix with entries of zero above a pre-determined sub-diagonal of the parity check matrix.
6. The joint detector/ decoder device of claim 3,  
wherein the metric comprises an Euclidean metric.
7. A joint detection/ decoding method comprising:  
receiving an input signal;  
producing a plurality of survivors of a next instance based on at least one survivor of a previous instance and based on the input signal;  
discarding survivors based on a set of predetermined criteria;  
wherein each survivor has an associated bit sequence.
8. The joint detection/ decoding method of claim 7, further comprising  
determining that a survivor survives to the next instance if the metric of the survivor is within a pre-determined metric threshold.

9. The joint detection/ decoding method of claim 7, further comprising:  
retaining a predetermined number of survivors with the smallest metrics as the plurality of survivors of the next instance.
10. The joint detection/ decoding method of claim 7,  
wherein the pre-determined validity criterion comprises a parity check based on whether the survivor's bit pattern satisfies the checks of a parity check matrix.
11. The joint detection/ decoding method of claim 10,  
wherein the parity check matrix comprises a matrix with entries of zero above a pre-determined sub-diagonal of the parity check matrix.
12. The joint detection/ decoding method of claim 7, further comprising:  
determining, during a metric thresholding section, whether a survivor carries on to the next instance based on a metric of the bit sequence and independent from whether the bit sequence fulfills a pre-determined validity criterion.
13. The joint detection/ decoding method of claim 12, further comprising:  
determining, during a parity check section, whether a survivor carries on to the next instance based on a metric of the bit sequence and based on whether the bit sequence fulfills a pre-determined validity criterion.
14. The joint detection/ decoding method of claim 8,

wherein the metric comprises an Euclidean metric.