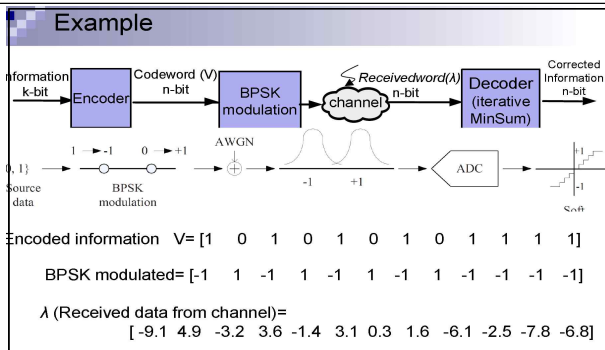


minsum_decoder

- 강의노트와 matlab 코드의 구현을 비교함으로써, 맞게 작성했는 지 판단.
- By comparing the implementation of lecture notes and My matlab code, determine if it is written correctly.



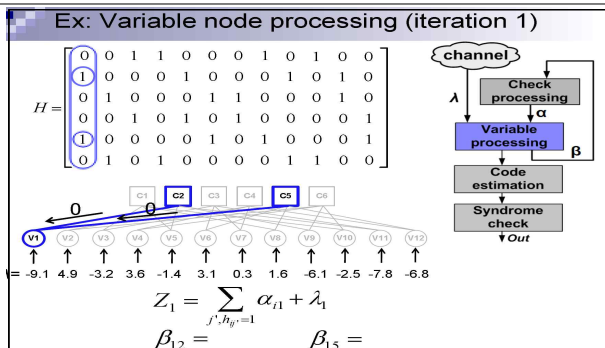
Received data from channel을 위해서, tx파일과 다음과 같이 작성하였고, H도 다음과 같이 설정하였습니다.

For "the received data from channel", the "tx" was written as follows, and H was set as follows.

```
cn=0;
tx=[-9.1 4.9 -3.2 3.6 -1.4 3.1 0.3 1.6 -6.1 -2.5 -7.8 -6.8];
tx=transpose(tx);
%% Check node processing (Iteration 1)
```

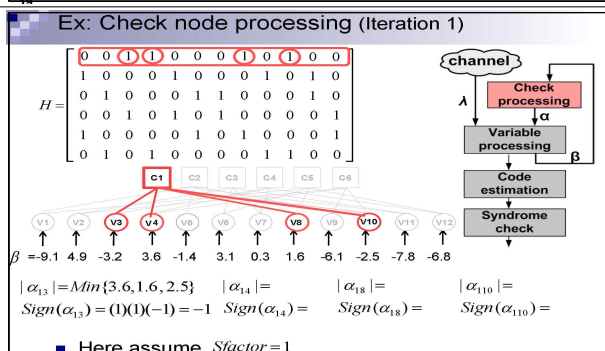
$H =$

```
[0 0 1 1 0 0 0 1 0 1 0 0;
 1 0 0 0 1 0 0 0 1 0 1 0;
 0 1 0 0 0 1 1 0 0 0 1 0;
 0 0 1 0 1 0 1 0 0 0 0 1;
 1 0 0 0 0 1 0 1 0 0 0 1;
 0 1 0 1 0 0 0 0 1 1 0 0];
```



```
cn=0;
tx=[-9.1 4.9 -3.2 3.6 -1.4 3.1 0.3 1.6 -6.1 -2.5 -7.8 -6.8];
tx=transpose(tx);
%% Check node processing (Iteration 1)
% Variable node processing (iteration 1)은 0으로 초기화한 값이기에, 생략
for j=1:K
    Q=find(H(j,:));
    for i=1:length(Q)
        cn(j,i)=tx(Q(i)); %H의 j번째 row에서 1의 위치 파악
    end
end
```

Nothing has changed, so skip it

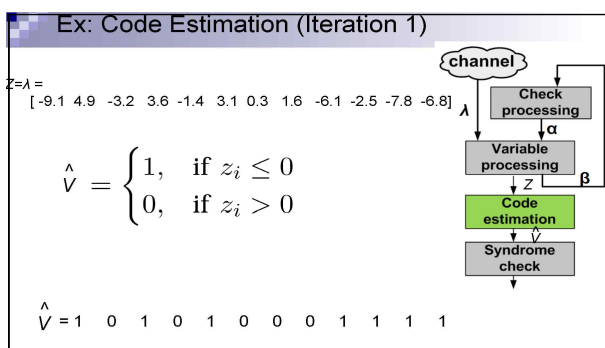


```
QAX =
-1.6000    1.6000    2.5000   -1.6000
-1.4000   -6.1000   -1.4000   -1.4000
-0.3000   -0.3000   -3.1000    0.3000
 0.3000    0.3000   -1.4000    0.3000
-1.6000    1.6000    3.1000   -1.6000
 2.5000    2.5000   -2.5000   -3.6000
```

Min value & abs value

$|a_{1,3}| * sign(a_{1,3}) = -1.6$, $|a_{1,4}| * sign(a_{1,4}) = 1.6$

$|a_{1,8}| * sign(a_{1,8}) = 2.5$, $|a_{1,10}| * sign(a_{1,10}) = -1.6$



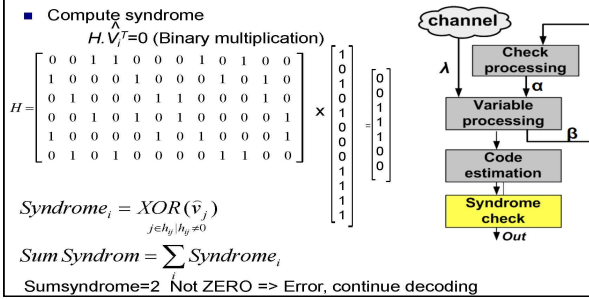
```
% Code Estimation (Iteration 1)
tx2=tx;
for i=1:N
    if tx2(i)>0
        tx2(i)=0;
    else
        tx2(i)=1;
    end
end
syndrome=A2*tx2;
syndrome=mod(syndrome,2);
error=0;
for i=1:K
    error=syndrome(i)+error;
end
```

```
error>> syndrome=mod(syndrome,2)
syndrome =
0
0
1
1
0
0
0
```

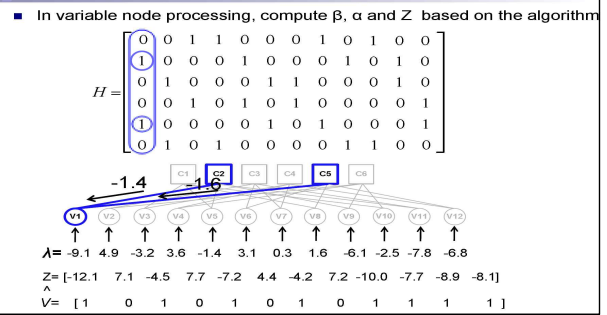
syndrome test값이 0이 아니므로, error가 있기에, iteration 2를 실행합니다.

Since the value of the syndrome test is not 0, there is an error, so run iteration 2.

Ex: Syndrome Check (iteration 1)



Second iteration



```
[zz xx]=size(aa)
```

```
op=zeros(K,N);
```

```
for j=1:N
```

```
    aq(j)=sum(A7(:,j))+tx(j);
```

```
end %aq는 variable node processing
```

```
%tx값을 op의 갯수만큼 빼기 수정해야함.
```

aq : second iteration = variable node processing value.

```
aq =
```

```
-12.1000    7.1000   -4.5000    7.7000   -7.2000    4.4000   -4.2000    7.2000  -10.0000   -7.7000   -8.9000   -8.1000
```

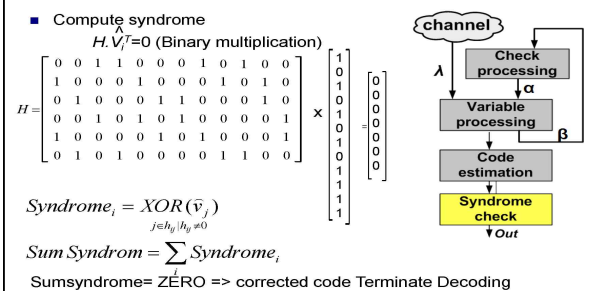
: Z(in lecture note)

```
tx3 =
```

```
1    0    1    0    1    0    1    0    1    1    1    1 :
```

\hat{V} (in lecture note)

Ex: Syndrome Check (iteration 2)



```
error=0;
for i=1:K
    error=syndrome(i)+error;
end

if error ~= 0
    fprintf('error')
else
    fprintf('no error \n')
    break;
end
```

```
no error
decoding endtotal_Number of iterations
iter2 =
```

```
2
```

total iteration : 2.

$H \cdot tx3$ (after variable node processing codeword) = 0.

=> no error & iteration end.