STRUCTURED COMPRESSION SENSING METHOD FOR MASSIVE MIMO-OFDM SYSTEMS

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ABSTRACT:- *In the present world transmission and receiving process can be undergone through wireless networks. The proposed work consists of time based compression in the channels which consist of Multiple Input Multiple Output Orthogonal Frequency (MIMO-OFDM) network. These channels have the different channel estimation schemes and technique. This paper implies that the signal which is received in the time domain sequences of bits. Error or Interference can be eliminated using the MIMO channel estimation path delay. Because of the compression method, Priori information-assisted adaptive structured subspace pursuit (PA-ASSP) algorithm there would be small range of variations takes place. Priori information-Assisted adaptive structured subspace pursuit (PA-ASSP) algorithm consists of smaller number frequency range. The proposed work consists of channel impulse response (CIR) of the frequency domain. It is used to reconstruct the gains and overcome the intensity of the MIMO channel. Thus, the proposed work increases the accuracy of the channel with the least square value algorithm.*

KEYWORDS:

Adaptive Structured Subspace Pursuit Algorithm, Channel impulse Response, MIMO channel

1. INTRODUCTION

There are various number of increasing antennas in the massive Multiple Input and Multiple Output (MMO) systems. By increasing the number of antennas will increase the transmission rate and the more range to transmit the bits. It would give the better performance in the increasing rate of the data and their link available. The increasing trends are adding the n number of antennas which is rapidly called as massive MIMO. These massive MIMO is used in the 5G technology for increasing their better performance rate [2].It is the technique which covers the wide area using Wireless networks [3].Massive MIMO network is one of the technique where the multi user network can be used with the various users and they are connected using n number of Base station antennas. MIMO systems consist of thousand numbers of base stations. There are several numbers of users that are connected towards the same frequency transmitter and receivers. In massive MIMO the gain and the accuracy range depends upon the channel estimation algorithm. These channel estimation technique will be implemented in every base station. MIMO channel show the sparse channel representation of the transmitter signal. By using the n number of antennas, the channel co-efficient and the magnitude range will be lesser than that of the noise and the error rate [4].Orthogonal Frequency Division Multiplexing (OFDM) and this Multiple Input and Multiple Output (MIMO) have the wide range of usage in the 5G networks. These systems which have the wide range of radio spectrum resources [5] ,[6].Due to the disadvantages, this technique have the problem in multipath fading and high spectral efficiency. The standard OFDM technique have the transmission scheme in the cyclic manner which eliminates the inter-block interference (IBI) .IBI interference occurs due to the multipath effects which decrease the amount of gain and the frequency range. The standard OFDM scheme consists is cyclic prefix OFDM (CP-OFDM) have the lesser effect in the IBM interference which is caused by the lesser multipath effects [7].In the proposed method the synchronous OFDM have the interference as Pseudo random noise which happens due to the guard interval and the training sequence [8]. In any case, TDSOFDM experiences IBI in the OFDM information square brought about by the TS with the goal that the obstruction retraction must be connected, which truly influences the execution of the MIMO frameworks. What's more, exact channel estimation is a basic challenge to guarantee framework execution for MIMO frameworks. The customary channel estimation plans are isolated into two viewpoints: TS based plan [9] and recurrence space symmetrical pilot based plan [10]. In any case, the quantity of the time-space preparing and symmetrical pilots in the recurrence space enormously increments as the quantity of radio wire expanded, which genuinely harms the execution of the MIMO-OFDM framework.

2. SYSTEM MODEL

The proposed system PA-ASSP has the following system model.

INPUT PARAMETERS:

1) Measuring the noise interference level matrix X;

2) Sensing the compression matrix Γ ;
3)Initial channel estimation as Tr;
4) Initial Sparsity level as Ko;

Output: The estimation of channels **H** ˆ ; the channel Sparsity level *K*.

Initialize the channel Sparsity level as k

Step1:

Initialize the channel estimation based on the number of iterations

Ω(j-1) =Tr

Step2:

Initialize the channel range based on the channel

$$\mathbf{R}^{j-1} = \mathbf{Y} - \mathbf{\Psi}\hat{\mathbf{H}}_{\Omega^{\mu-1}}$$

Step 3:

If the initial residual is higher then the interference will be lower

$$\left\|\mathbf{R}^{j-1}\right\|_F > |\mathbf{R}^j\|_E$$

Step 4:

Probability of the channel is determined as

$$\mathbf{P} = \mathbf{\Psi}^H \mathbf{R}^{j-1}$$

Step 5:

$$\tilde{\Gamma}^j = \Omega^{j-1} \cup \Pi^k \left(\left\{ \left\| \mathbf{P}_l \right\|_F \right\}_{l=1}^{L} \right)$$

Step 6:

$$\hat{\mathbf{H}}_k = \hat{\mathbf{H}}^{j-1}; \mathbf{R}_k = \mathbf{R}^{j-1}; \Omega_k = \Omega^{j-1}; \mathrm{k} = \mathrm{k}+1$$

Step 7:

$$\hat{\mathbf{H}} = \hat{\mathbf{H}}_{k-1}; K = k-1$$

In order to improve the efficiency and reliability of MIMO channel estimation, PA-ASSP algorithm is proposed based on ASSP algorithm which is represented in Algorithm 1. Firstly, it is strongly promoted that the prior information is used as an initial condition in the PA-ASSP algorithm to drastically extent the accuracy and the reliability of sparse channel reconstruction. At the same time, the number of iterations and the complexity of the algorithm are reduced. Specifically the proposed PA-ASSP algorithm has two distinct differences from the ASSP algorithm.

3. COMPARISON ALGORITHM

3.1 SPARSITY ADAPTIVE SUBSPACE PURSUIT (SASP) ALGORITHM:

It is a normalized signal-to-noise ratio (SNR) measure, also known as the "SNR per bit". It is especially useful when comparing the bit error rate (BER) performance of different digital modulation schemes. Figure 3.1.a shows the comparison of ber and snr

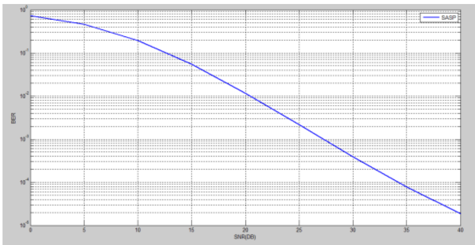

Figure 3.1.a BER vs SNR (SASP)

The NMSE vs SNR of the existing algorithm is shown in the figure 3.1.b

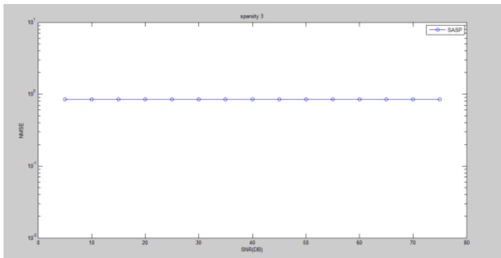

Figure 3.1.b NMSE vs SNR(SASP)

ADAPTIVE STRUCTURED SUBSPACE PURSUIT (ASSP) ALGORITHM:

Adaptive structured subspace pursuit (ASSP) algorithm at the user is proposed to jointly estimate channels associated with multiple OFDM symbols from the limited number of pilots, whereby the spatio-temporal common sparsity of MIMO channels is exploited to improve the channel estimation accuracy. The BER vs SNR comparison of ASSP is shown in the figure 3.2.a

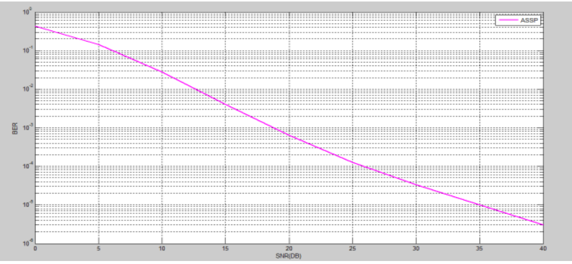

Figure 3.2.a BER vs SNR (ASSP)

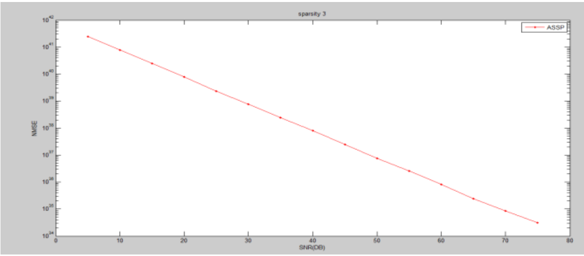

Figure 3.2.b NMSE vs SNR (ASSP)

The NMSE vs SNR of the ASSP algorithm is shown in the figure 3.2.b

ASSISTED ADAPTIVE STRUCTURED SUBSPACE PURSUIT (PA-ASSP)

The BER vs SNR graph of the proposed priori information assisted adaptive structured subspace algorithm (PA-ASSP) is shown in the graph 3.3.a

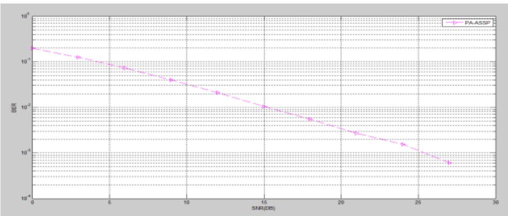

Figure 3.3.a BER vs SNR (PA-ASSP)

The graph 3.3.b shows the graph of SNR vs NMSE of the proposed (PA-ASSP) algorithm.

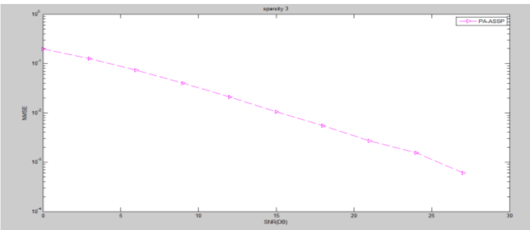

Figure 3.3.b NMSE vs SNR(PA-ASSP)

4. SIMULATION RESULTS

In this part, proposed algorithm results can be obtained as the following. The experiments can be done and the simulation is obtained using the MATLAB 2014b software. The simulation parameters of the proposed work is shown in the table 1.1

Sampling frequency (fs)	7.56MHz
Length of the PN sequence (M)	256
Length of the OFDM symbol (N)	3780
Doppler shift (fd)	80Hz
The number of antennas	8x4
The number of pilots (Np)	25

Table 1.1 Simulation Parameters

In addition to that 8x4 antennas is used to obtain the 6-tap model which is known as ITU vehicular-B modulation scheme. The modulation scheme adopted in the experiment is the Quadrature Amplitude Modulation (QAM) Scheme. This technique is included in PA-ASSP to decrease the error rate and increase the transmission rate as shown in the figure. The given figure shows the comparison of proposed algorithm with the other existing algorithm. Various parameters have been compared to obtain the performance measure of proposed work. Figure1.5 shows the ber and snr comparison of the proposed work. Figure 1.6 shows the snr vs nmse comparison of the proposed work.

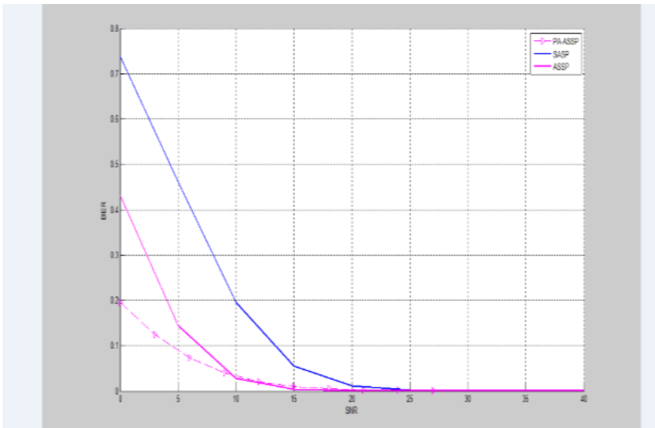

Figure 1.5 BER and SNR comparison

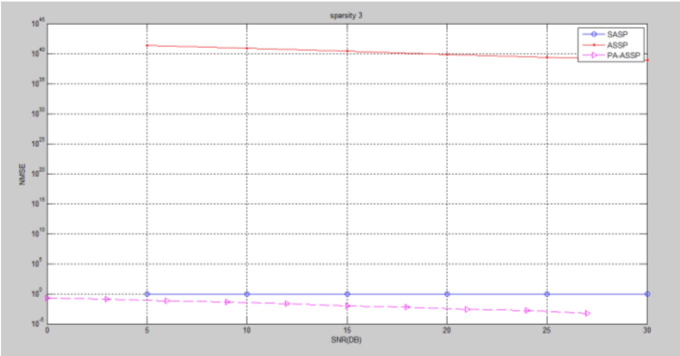

Figure 1.6 NMSE and SNR comparison

V.CONCLUSIONS

In this paper, we proposed a PA-ASSP time-frequency joint channel estimation scheme for MIMO systems, which radically outperforms the traditional scheme in spectrum efficiency, reliability and computational complexity. First of all, the TFT-OFDM for the MIMO approach scheme produces larger spectral efficiency as well as extra correct channel estimation.

Furthermore, the proposed PA-ASSP algorithm for correct channel estimation has better reliability and minimizes complexity than the classical SP algorithm and the accelerated ASSP algorithm. Simulation outcome show that the proposed MIMO channel estimation scheme can obtain better effectively and robustness than other existing channel estimation.

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