**Supplementary Material1:**

**Psedo-code and computational complexity analysis**

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| **SpBLRSR** |
| **Input: *HSD***, ***HSS*,** ***HDD*** and Ω  1: **Initialize: *X*0**= ***M*0** =***A*0** = ***C***0 = ***Y*10**=***Y*20** *=* 0, *δ* = 0.01, *ε* = 1e-3, *λ* = 0.25, *μ* = 4, *p*=0.8, *α* = 0.4;  2:  ;  3: **while** not converged **do**:  4: Fix others and update ***Xk+*1** by solving (13) and (14);  5: Fix others and update ***Mk+*1** by solving (16);  6: Fix others and update ***Ak+*1**by solving (19);  7: Fix others and update ***Ck+*1** by solving (21);  8: Fix others and update ***Y1k+*1** and ***Y2k+*1** by solving (22);  9: Check the convergence conditions , ,  10: **End while**  11: **Output**: **C**omplete m7G-disease block matrix ***X***  12: **Slice** the ***XSD***from ***X*** |

The computational complexity analysis of SpBLRSR is dominated by the updating process of ***X***, ***M***, ***A***, ***C.*** For the sake of convenience, we denoted *N* as *m*+*n*. Hence, ***X***∈***RN×N***, ***M***∈***RN×N***, ***A***∈***RN×N*** , ***C***∈***RN×N***.

Firstly, for updating ***X***, its updating rule (13) and (14) perform matrix addition operation 5 times, matrix multiplication operation 2 times, matrix inversion operation 1 time and hardmard product 1 time, thus the time complexity for updating ***X*** is ***O***(3*N3*). Additionally, GMST operation is applied on the updating of ***M*** with complexity O(*N3*). What’s more, for updating ***A***, its updating rule (19) performs matrix addition operation 3 times, matrix multiplication operation 3 times and matrix inversion operation 1 time. In total, the complexity of updating ***A*** is ***O***(4*N3*). Finally, the time complexity for updating***C*** is ***O***(*N3*). Thus, the time complexity of all the steps is ***O***(9*N3*). If the number of iteratisons is *k*, then the total complexity of SpBLRSR is ***O***(9*k*\**N3*).