Requirements for Literature Readings

1. Where are the hard knapsack problems[1]?
   1） Problem description
   2） The features of all current algorithms for KP problems.
   3） Experiment setups
   4） Features of difficult instances
   5） Conclusion

2. Exact algorithms for NP hard problems: a survey [2]
   1) Introductions: problems description and key points of the paper
   2) Technical preliminaries: symbol representation convections and two classes of optimization problems
   3) Dynamic programming across the subsets
      a) TSP problem (solutions , complexities and open problems)
      b) Graph coloring(solutions , complexities and open problems)
   4) Pruning the search tree
      a) Satisfiability problem (Solutions , complexities and open problems)
   5) Preprocessing the data
      a) Two toy problems
      b) Subset problem
      c) Knapsack problem
   6) Local search
      a) 3-Satisfiability problems
   7) Conclusion

3. On the All-Pairs-Shortest-Path [3]
   1) Problem descriptions
   2) Proofs of claim 1-4
   3) The principle and procedures of the algorithm
   4) Complexity analysis of the algorithm
   5) Implementation (including a data set and c++ codes, preferred in using gnu c++ complier)

4. A New Efficient Algorithm for Computing the Longest Common Subsequence[4]
   1) Problem description and key points of the paper
   2) The principle of the new algorithm
   3) Complexity analysis of the algorithm
   4) Implementation (including a data set and c++ codes, preferred in using gnu c++ complier)

5. A Hybrid Algorithm for the Unbounded Knapsack Problem [5]
   1) Problem description
   2) Definitions of Dominances and bounds
   3) Solutions of DP and B&B
   4) Algorithm descriptions and implementations of new hybrid algorithm

5) Algorithm tests on two data sets: SS-UKP and SC-UKP

6. Weighted A∗ search – unifying view and application [6]
   1) Introductions: problem description and key points of the paper
   2) Backgrounds:
      a) A* search
      b) Weighted A* search
         i. Constant inflation
         ii. Dynamic weighting
         iii. Search effort estimate
   3) Implementation (c++ source code) of the algorithm
   4) Experiments(one dataset with comparison to A* algorithm)

7. All-Pairs Shortest Paths in $O(n^2)$ Time with High Probability[7]
   1) Problem description and related works
   2) The principle of proposed algorithm
   3) The analysis of algorithm complexity
   4) Implementation (c++ source code) of the algorithm

8. Polylogarithmic approximation for edit distance and the asymmetric query complexity[8]
   1) Problem description and related works
   2) The principle of proposed algorithm
   3) The analysis of algorithm complexity
   4) Implementation (c++ source code) of the algorithm

References:

[1] D. Pisinger, "Where are the hard knapsack problems?," *Computers & Operations Research*, vol. 2003, no. February, May 2004.

[2] G. Woeginger, *Exact algorithms for NP-hard problems: A survey*. Springer-Verlag, 2003.

[3] R. Seidel, "On the all-pairs-shortest-path problem in unweighted undirected graphs," *Journal of Computer and System Sciences*, vol. 51, no. 3, pp. 400-403, Dec. 1995.

[4] C. S. Iliopoulos and M. S. Rahman, "A New Efficient Algorithm for Computing the Longest Common Subsequence," *Theory of Computing Systems*, vol. 45, no. 2, pp. 355-371, Jan. 2008.

[5] V. Poirriez, N. Yanev, and R. Andonov, "A hybrid algorithm for the unbounded knapsack problem," *Discrete Optimization*, vol. 6, no. 1, pp. 110-124, Feb. 2009.

[6] R. Ebendt and R. Drechsler, “Weighted A* search - unifying view and application,” *Artificial Intelligence*, vol. 173, no. 14, pp. 1310-1342, Sep. 2009.

[7] Y. Peres, D. Sotnikov, B. Sudakov, and U. Zwick, “All-Pairs Shortest Paths in $O(n^2)$ Time with High Probability,” in *2010 IEEE 51st Annual Symposium on Foundations of Computer Science*, 2010, pp. 663-672.

[8] A. Andoni, R. Krauthgamer, and K. Onak, “Polylogarithmic approximation for edit distance and the asymmetric query complexity,” in *2010 IEEE 51st Annual Symposium on Foundations of Computer Science*, 2010, pp. 244-252.