**Winter Workshop in Algorithms, Optimization and AI** (Last Updated on 5 Feb 2021)

**Workshop Schedule**: 2pm – 5pm **Zoom Link URL**: <www.limandrew.org/zoom>

**Instructor:** Andrew Lim (url: <www.limandrew.org>)

Sharing of codes and materials: <https://github.com/limandrewtraining/workshop-algo-opt-ai>

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| **Before** Lesson #1 | Preliminaries: (before start of class)  TRY to WATCH the following videos. If possible, we will  TRY to USE google colab @ <https://colab.research.google.com/>  Introduction of Anaconda and Jupyter notebook  <https://www.youtube.com/watch?v=Z31TOyvIgdE> (Win)  <https://www.youtube.com/watch?v=iPsOCj_wKvY> (Mac)  Introduction to PyCharm  <https://www.youtube.com/watch?v=BmnU6DfVrl8> (Win)  <https://www.youtube.com/watch?v=dwmyvyZCQHE> (Mac)  Introduction to Online Judge @ workshop.limandrew.org  <https://www.youtube.com/watch?v=wv_lDn1SgC0>  Practice Exercise – Prac0 on the online judge (P4 to P10): Deadline Feb 2, 2359hrs  <https://www.youtube.com/watch?v=1aeUWMl0uRM> (P4)  <https://www.youtube.com/watch?v=2YB71wL9OZA> (P5)  <https://www.youtube.com/watch?v=OCBodCHnX5g> (P6)  <https://www.youtube.com/watch?v=Fq4uNsWBZgs> (P7)  <https://www.youtube.com/watch?v=XDuXrjJivNs> (P8)  <https://www.youtube.com/watch?v=jTebvUVT1GM> (P9)  Markdown Language  <https://www.youtube.com/watch?v=fSMl7pUENV>0  Jupyter Notebook and RISE  <https://www.youtube.com/watch?v=lqA4DK5WAUc> |
| Feb 1, 2021  Mon #1 | Introduction to the Python Programming Language  Jupyter notebook can be found:  Getting familiar with the online judge (Practice 0)  Everyone should get Practice 0 done asap |
| Feb 3, 2021  Wed #2 | Modules and Functions  Programming Test #1 |
| Feb 5,2021  Fri #3 | Lab to help students with Pract0, Homework1 and Test1  By the Feb 7, 2021, you should complete the above |
| Feb 8, 2021  Mon #4 | OOP and Regular Expressions  Interesting Python Packages  Time Complexity and Problem-Solving Strategies – Divide and Conquer and Greedy |
| Feb 10, 2021  Wed #5 | Problem-Solving Strategies – Dynamic Programming, Graphs and Search  Sharing and Discussion  Research Problem 1: Prescriptive Analytics Problems  Research Problem 2: Predictive Analytics Problems |
| Feb 18, 2021  Thu #6 | Problem-Solving Strategies – Branch and Bound, and Computational Complexity, Optimization |
| Feb 20, 2021  Sat #7 | Metaheuristics |
| Feb 22, 2021  Mon #8 | Linear Regression and Classification, Non-linear Models |
| Feb 24, 2021  Wed #9 | Tree Based Models, SVM |
| Feb 26, 2021  Fri #10 | Unsupervised Learning |
| Mar 3, 2021  Wed #11 | Project Presentations (Session 1 and Session 2) |

**Notes for Meetings**

Potential Research Problems discussed on Feb 1, 3 2021.

1. The mobile phones has many sensors: Accelerometer, Gyroscope, Magnetometer, GPS, Barometer, Microphone, Cameras, Bluetooth, Wifi. Assuming that we finger-printed the reading of all the pathways in a shopping mall, given the sensory readings at a particular location, can you tell where the location is? Given a contiguous set of locations, can you tell construct the exact path?
2. Ride sharing of buses at High-Speed Rail (高铁站)。 Constraints to be imposed on the ride time of passengers. Other constraints should be developed. Any interested students, we can discuss.
3. Given a sequence kn customers (S1, S2, …. S(kn)), select k subsequences of n customers each where the relative order of any Si and Sj is preserved such that the sum of the k subsequences starting and ending at a fixed depot is minimized.
4. Given the telco information on mobile phone users, what can we do about it?

Telco data come in two files below:



