

CASH Dynamic Opportunity Investment Limited

Interview 1 2011 Sep 20 09:00 - 11:15
Interview 2 2011 Sep 27 09:15 - 12:00
Interview 3 2011 Oct 03 14:15 - 19:00
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Algorithm trading

- For least square fitting $AX = B$, we have $X_{\text{opt}} = \text{inv}(A.'A)(A.'B)$, this is correct if all observations of X are uncorrelated. What happens to the solution of X if observations of X are correlated?
- Given 2 time series X_t and Y_t , if they are correlated, how can we find out whether X_t leads Y_t , or in the other way round, how can we find out the time lag?
- Given a time series X_t , where $t = [-N, 0]$ (i.e. $t = 0$ for now), if it follows a straight line model, how can we detect change point (i.e. the point at which the trend switches to another straight line model)? Suppose the change point $-n$, where $-n$ lies within $[-N, 0]$, how can we minimise n ?

Quant finance

- What is implied volatility?
- What is the method we use to solve implied volatility? What are the disadvantages?
- What is the method we use to price American put option? What are the disadvantages?

Singular covariance matrix

- What is the area of 2D circle?
- What is the volume of 3D sphere?
- What is the volume of ND sphere?
- What is the volume ratio of ND sphere to ND enclosing cube (while N tends to ∞)?
- What covariance matrix tends to be singular as dimension increases?
- What is ridge regression (Tikhonov regularization)?

Database and searching algorithm

- How to search according to staff name?
- How to search according to staff department?
- How does table index help in the above searching?
- What is the complexity of linear search?
- What is the complexity of binary search with table index?
- What happens to table index when new entry is added?

C++ and OOP

- Why don't we use global variable?
 - It is OK to have global variable in .c, but beware of multithread.
 - It is not OK to have global variable in .h, since multiple declaration.
- Why do functions run slower when they are invoked for the first time?
- What are the differences between dll and lib?
- What are the disadvantages of using template? (ans: bulk lib & compile time)
- What are the disadvantages of using inline? (ans: bulk lib & slower time)
- How can we justify everytime we use inline? (ans: measure change in time)
- How can we verify if inline is successful? (ans: measure change in dll sz)
- What are the differences between fopen and ofstream? (ans: RAII and exception)
- What is virtual function?
- What is pure virtual function?
- What is polymorphism? Why is it slow?
- What is stack unwinding?
- Does `std::auto_ptr<T>` support array of T ? Why or why not? (delete vs delete[])
- What is the difference between `++i` and `i++`?
- What is the difference between heap memory and stack memory? Which one is faster?
- What is quick sort? What is its complexity on average and in worst case?

Why Black Scholes model doesnt work?

- There is jump.
- There is stochastic volatility.
- Perfect hedge is not possible, as there is transaction cost.
- Brownian model assumes normal, i.e. negative underlying price is possible, and negative part is not involved in the integration of risk neutral pricing.

Other sites

- Ridge Regression
- Singular Value Decomposition
- Principal Components Analysis
- Generalized Least Squares
- Least square for uncorrelated data
- Least square for correlated data

- [http://en.wikipedia.org/wiki/Functional_\(mathematics\)](http://en.wikipedia.org/wiki/Functional_(mathematics))
- http://en.wikipedia.org/wiki/Least_squares
- http://en.wikipedia.org/wiki/Ridge_regression
- <http://en.wikipedia.org/wiki/N-sphere>
- http://en.wikipedia.org/wiki/Singular_matrix
- http://en.wikipedia.org/wiki/Singular_value_decomposition
- http://en.wikipedia.org/wiki/Correlation_does_not_imply_causation