**Personal Statement**

First of all, thank you for reading my statement in the application letter of countless applicants. Here, I would like to express my sincere greetings to you: "Professor, thanks for your hard work!"

I am Zhao Ruidong, a postgraduate student who are studying in HKUST in this year and my major is Data-Driven Modeling. In this term, I have the courses of Scientific Programming and Visualization, Stochastic Processes and Applications, Algorithm and Object-Oriented Programming for Modeling, Quantitative Analysis of Time Series. I learn the knowledge of Python programming language and its application to scientific programming (packages such as Scipy, Numpy, Matplotlib) as well as the visualization techniques for data from scientific computing, everyday life, social media, business, such as stock price, housing price, highway traffic data, weather data and so on. I learn many algorithms such as data structures (such as list, queue, stack), algorithms (such as recursion, sorting and searching), concepts and design patterns of object-oriented programming and so on. Some financial knowledges such as time series models and wealth game are also mentioned. During this term, I have also followed a project focusing on building the AI model on mahjong, and I have learned a lot from all of these. In addition, due to my personal plan, I have chosen a lot of data and economic courses when I was under graduated, such as University physics (85), data and analysis (88), linear programming (91), optimization in economic management (90), all of them have achieved good scores. In addition, I also won the Science and Technology Innovation and Spiritual Civilization Scholarship in 2018. They are all making a good basement for my courses and works now. When it comes to professional knowledge, I think English ability is also very important. In terms of written examinations, my College English Test-6 is 517. I also have won the second prize of the National Research Institute Cup Reading Contest in 2017.

From my college, I have actively participated in research work. An article I wrote won the Bronze Award in the Future City International Paper Contest in 2018, and the other article on physics won the third prize in the campus physical competition in 2017. I also participated in the provincial innovation and entrepreneurship training program, and has achieved some results. We are currently writing a paper and applied a national invention patent. In the project, I participated in the writing of the declaration form in small groups. In addition to indoor work and discussion, we also visited local rivers and communities., and conducted on-site water velocity measurement experiments. The knowledge I have learned in books can be finally experienced by myself. After that we participate in the discussion of the Professor's daily research group, responsible for the production of ppt, etc.. Through these experiences, I have enhanced my hands-on ability, ability to coordinate and cooperate with others, and also let me have a certain understanding of scientific research projects. I started to have a strong interest in mathematics. However, I missed the chance to enter into the school of mathematics when I came into the University. Luckily, I still had many courses on mathematics. Like calculus, it is the cornerstone of my path to mathematics, and linear algebra has opened the new world on space folding and vector scaling. Probability theory and statistics allow me to look at problems more rationally in life. I participated in a conference on global energy as a volunteer when I was a freshman. Because there were so many participants and guests, we had to deal with the data information of them individually. That is the first time I was developing an interest in data processing in general. In this project, I feel the importance of data and modeling even more deeply. Because the responsible professor is one of the authors of the EFDC (The Environmental Fluid Dynamics Code) model, we often need to deal with the data using MatLab and SPSS software. In addition, I have also listened to several academic lectures, including thematic reports such as "Financial Risk" and "Big Data Technology and Application ", so I have a certain understanding of these research.

Furthermore, I also participated in the Project Management project of UCLA in the United States from July to August 2018. I studied the Project Management course and the final school score was 95 by converting the score of UCLA. In this project, I led the team and acted as a reporter. Active learning gave me a deeper understanding of project management and let me take more responsibility. When I was doing program, I proposed to design a new type of point to point logistics system in which the demand was predicted by the algorithm and the orders were delivered automatically, denoted as "Lightning", which was unanimously recognized by teammates. The relevant knowledge was not been touched before, and various questions and differences were running through the entire project. Initially, we didn't start very quickly because we felt that there were a lot of problems. The professor's suggestion was to implement the simplest version first, and then modify it on the basis of the first one, instead of trying to consider everything from the beginning. This was the first time we contacted the way, so there was some confliction in our hearts. Now I recognized that was called as Worse-is-better. We had to do ppt every week, and we extended to double our ppt in a short time. I was shocked by my potential. In the final stage of the show, the teacher hoped that we could perform our setting in addition to the traditional presentation. I temporarily utilized a mobile phone to compose and play, vividly showing the nature of our project, and I also gained a sense of achievement that I had never had before. In fact, since my undergraduate major is a joint training program with the University in UK, the majority of the professional foundation courses have been taught and evaluated by the British teachers. Thus, we can not only adapt to the English teaching environment, but also exercise our indispensable ability to do presentation, cooperate with classmates, think independently, and actively communicate with teachers. I am also good at completing the English report and looking up English literature.

My life is equally colorful. In my spare time, I have actively participated in the public welfare, and have awarded as the outstanding volunteer of the Nanjing Ming Great Wall Bilingual Volunteer Service in 2017 and 2018, Nanjing Jianye Lixing social work office “Excellent Childhood, Accompanying with Love” excellent volunteer, Campus 2018 excellent volunteer, excellent volunteer of International Youth Summit on Energy & Climate Change, etc. I also love sports, such as playing football, and have won the freshman cup football championship in campus in 2017. I also like writing. I used to be a WeChat pusher in the student union, and I insist on running my own WeChat public account.

I am confident that I am with strong backgrounds in engineering of my college, and I have a wealth of knowledge and deeply understanding to the application field. Therefore, I can provide a novel and unique perspective on the issues and the diverse learning life can provide me to own a deeper understanding to the new research filed. Thanks for your attention!

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library(FinTS)

library(fpp2)

library(forecast)

library(fUnitRoots)

data=read.csv(’D:/1HKUST−DDM/5053/assi/final/IBM.csv’,header=T)

#closeprice

closep=data[,2][1:2620]

plot(closep,type=’l’,main=’Figure1:IBMClosePricePlot’,ylab=’Closeprice’)

unitrootTest(closep,main=’’)

#lgrtn

y=na.omit(100∗diff(log(closep)))

plot(y,type=’l’,main=’Figure3:LogReturnPlot’,ylab=’LogReturn’)

unitrootTest(y)

tsdisplay(y)

acf(y,36,main=’Figure6:ACFofLogReturn’)

pacf(y,36,main=’Figure7:PACFofLogReturn’)

Box.test(y,lag=10,type=’Ljung’)

#p

fit<−ar(y,method=”mle”)

round(fit$aic,2)

fit<−Arima(y,order=c(9,0,0),include.mean=False)

fit

Box.test(fit$residuals,10,type=”Ljung”)

pv=1−pchisq(2.1058,1)

pv

#predict

fit%>%forecast(h=127)%>%autoplot(include=80)

summary(fit)

rtn<−predict(fit,127)$pred

rtn<−predict(fit,127)$pred

rtnp<−data[,3][2620:2746]

resid<−rtnp−rtn

Box.test(resid,10,type=”Ljung”)

rtn=exp(rtn/100)

pre<−c(data[,2][2620])

for(xinrtn){

pre<−c(pre,pre[length(pre)]∗x)

}

real=data[,2][2621:length(data[,2])]

autoplot(ts(real,start=1,frequency=1),series=”real”)+

autolayer(ts(pre,start=1,frequency=1),series=”prediction”)

#AEMAE

ae=0

len=min(length(pre),length(real))

for(iin1:len){

ae=ae+abs(pre[i]−real[i])

}

ae

mae=ae/len

mae

data=read.csv(”E:\\IBM(1).csv”,header=T)[,4][2:2747]

da=read.csv(”E:\\IBM(1).csv”,header=T)[,4][2:2620]

library(fGarch)

Box.test(da,10,type=”Ljung”)

#ARCHEffect

da1=da−mean(da)

da12=da1ˆ2

Box.test(da12,lag=10,type=’Ljung’)

library(FinTS)

ArchTest(da12,lags=10)

#fitar9−garchmodel

library(rugarch)

#spec1=ugarchspec(variance.model=list(model=”fGARCH”,submodel=”GARCH”),mean.model=list(

armaOrder=c(9,0)))

#spec1=ugarchspec(variance.model=list(model=”gjrGARCH”),mean.model=list(armaOrder=c(2,0))

)

garch11.spec=ugarchspec(variance.model=list(model=”sGARCH”,

garchOrder=c(1,1)),mean.model=list(

armaOrder=c(9,0)))

mm=ugarchfit(spec=spec1,data=da)

mm###seeoutput

f=ugarchforecast(mm,n.ahead=127)

f

stresi=residuals(f,standardize=T)

#Box.test(stresi,10,type=”Ljung”)

#Box.test(stresiˆ2,10,type=”Ljung”)

a1=read.table(”E:\\prd.txt”,header=T)[,2]

b1=read.table(”E:\\prd.txt”,header=T)[,1]

a1nm=a∗nm

b1a1=b1+a1nm

c=data[2620:2746]

plot(1:127,c,xlim=c(1,127),type=”l”,ylab=””,xlab=””,main=”logreturn”,col=”blue”)

lines(1:127,b1a1,type=”l”,col=”red”)

legend(”bottom”,ncol=2,c(”real”,”forecast”),col=c(”blue”,”red”),lty=1,lwd=2)

#checkresidual

re=c−b1a1

Box.test(re,10,type=”Ljung”)

Box.test(reˆ2,10,type=”Ljung”)

r2=exp(b1a1)−1

preprice2=c()

rs2=read.csv(”E:\\IBM(1).csv”,header=T)[,2][2620]

for(jin1:127)

{

newr2=rs2∗(r2[j]+1)

preprice2[j]=newr2

rs2=newr2

}

real=read.csv(”E:\\IBM(2)(1).csv”,header=T)[,2][2621:2747]

plot(1:127,real,xlim=c(1,127),type=”l”,ylab=””,xlab=””,ylim=c(100,140),main=”ClosePrice”

,col=”blue”)

lines(1:127,preprice2[1:127],type=”l”,ylim=c(100,140),col=”red”)

legend(”bottom”,ncol=2,c(”real”,”forecast”),col=c(”blue”,”red”),lty=1,lwd=2)