mid-term-q9

Pradeep Paladugula

2/23/2020

data <- read.csv('iris\_exams.csv')  
str(data)

## 'data.frame': 300 obs. of 6 variables:  
## $ id : Factor w/ 300 levels "S001","S002",..: 1 2 3 4 5 6 7 8 9 10 ...  
## $ Species : Factor w/ 3 levels "setosa","versicolor",..: 1 1 1 1 1 1 1 1 1 1 ...  
## $ Sepal.Length: num 4.75 5.07 5.24 5.48 4.9 ...  
## $ Sepal.Width : num 3.3 3.68 3.44 3.96 2.81 ...  
## $ Petal.Length: num 1.44 1.21 1.59 1.53 1.49 ...  
## $ Petal.Width : num 0.235 0.111 0.405 0.272 0.345 ...

head(data)

## id Species Sepal.Length Sepal.Width Petal.Length Petal.Width  
## 1 S001 setosa 4.746510 3.301532 1.441511 0.2348507  
## 2 S002 setosa 5.072022 3.678133 1.208144 0.1114255  
## 3 S003 setosa 5.241044 3.442049 1.585426 0.4054026  
## 4 S004 setosa 5.475311 3.960215 1.533434 0.2724266  
## 5 S005 setosa 4.900481 2.806450 1.486378 0.3452578  
## 6 S006 setosa 5.580621 3.857734 1.875316 0.3060997

tail(data)

## id Species Sepal.Length Sepal.Width Petal.Length Petal.Width  
## 295 S295 virginica 6.420805 2.605291 5.438116 1.901885  
## 296 S296 virginica 6.718278 3.046628 5.997826 2.097364  
## 297 S297 virginica 6.398033 2.889846 5.206807 1.977526  
## 298 S298 virginica 6.965136 3.010309 5.946944 2.422499  
## 299 S299 virginica 6.253522 2.558635 5.585143 1.732517  
## 300 S300 virginica 5.449870 2.400979 5.001774 1.596633

sepalLength <- data$Sepal.Length  
sepalWidth <- data$Sepal.Width  
petalLength <- data$Petal.Length  
petalWidth <- data$Petal.Width  
table(sepalLength)

## sepalLength  
## 4.41658959185469 4.4821359945237 4.50248403777686 4.517352775503   
## 1 1 1 1   
## 4.57767717425877 4.60424781079489 4.61192315901718 4.64523416020062   
## 1 1 1 1   
## 4.64986714093163 4.65605371626218 4.66745756412733 4.68422061277541   
## 1 1 1 1   
## 4.71026383504739 4.71093406452586 4.71785378742658 4.72957962779023   
## 1 1 1 1   
## 4.73828856156442 4.74407354775399 4.74651004767612 4.76473035810182   
## 1 1 1 1   
## 4.77340886292132 4.77517221204482 4.79838546667627 4.8027571367844   
## 1 1 1 1   
## 4.80490870105223 4.80732372754809 4.82128304073778 4.83067221773728   
## 1 1 1 1   
## 4.84299888357368 4.85098578259546 4.87632461533947 4.882821849281   
## 1 1 1 1   
## 4.8876936303863 4.90048145153003 4.90688554429962 4.92949580628757   
## 1 1 1 1   
## 4.94657358417209 4.99580103191492 4.99843169291639 5.00080492923161   
## 1 1 1 1   
## 5.00952195246673 5.01480581881765 5.02794382069145 5.03346411192103   
## 1 1 1 1   
## 5.03547748567654 5.03586865415284 5.05202605402852 5.05235820169977   
## 1 1 1 1   
## 5.05724556519149 5.06737128910224 5.06909998165032 5.07202224018441   
## 1 1 1 1   
## 5.08406889523605 5.08625980269097 5.09185832562058 5.09955769117594   
## 1 1 1 1   
## 5.10438461691154 5.10794419521979 5.11618037580775 5.11680769120645   
## 1 1 1 1   
## 5.13144055240856 5.13390746418438 5.14383111438554 5.1534635275486   
## 1 1 1 1   
## 5.15843124955769 5.16730561871441 5.17443764199833 5.17606117520485   
## 1 1 1 1   
## 5.17793832328029 5.18002325436471 5.1891870311765 5.18957598312568   
## 1 1 1 1   
## 5.19655483414365 5.20243402045777 5.20341173825046 5.21091475531749   
## 1 1 1 1   
## 5.21356860732787 5.21615145694535 5.21938312318275 5.2309623759674   
## 1 1 1 1   
## 5.24023819710112 5.24104380428053 5.24274954184665 5.25242632777053   
## 1 1 1 1   
## 5.27646284390715 5.27840945948534 5.28843123767399 5.28896907287212   
## 1 1 1 1   
## 5.29375016299244 5.30035847594381 5.30516264211407 5.3055309239951   
## 1 1 1 1   
## 5.3097175492907 5.33186427090479 5.33633579461535 5.34039300358635   
## 1 1 1 1   
## 5.37258265658574 5.38055577755239 5.3822763723082 5.38362687709021   
## 1 1 1 1   
## 5.40393740641121 5.41778209353835 5.42739184909665 5.42773993997964   
## 1 1 1 1   
## 5.43493015649679 5.4431486644295 5.44987023072841 5.45262856886669   
## 1 1 1 1   
## 5.45615731066094 5.46083896354151 5.47531082705169 5.47575812402061   
## 1 1 1 1   
## 5.48261821166702 5.4866014809713 5.49905728062132 5.50849751711296   
## 1 1 1 1   
## 5.51692533932109 5.51821807842975 5.52251833469393 5.53568679183426   
## 1 1 1 1   
## 5.54628476270597 5.56223767288504 5.56921009278531 5.57146950930396   
## 1 1 1 1   
## 5.58052786782646 5.58062060290296 5.58841716825442 5.60233029214586   
## 1 1 1 1   
## 5.62312807854429 5.64182121218625 5.6557427336441 5.65715072017938   
## 1 1 1 1   
## 5.6586060079553 5.66013213252422 5.67634682511788 5.68923004948237   
## 1 1 1 1   
## 5.69564098885741 5.69881931920488 5.72750647735207 5.73200021743506   
## 1 1 1 1   
## 5.74628440349807 5.76337488909678 5.76828128493878 5.77117078116816   
## 1 1 1 1   
## 5.77251912169557 5.77660425155775 5.78613640633664 5.79860870228126   
## 1 1 1 1   
## 5.79914548547159 5.84346620935803 5.84358071618154 5.8446130859776   
## 1 1 1 1   
## 5.84943121847989 5.85071330294489 5.86653816829503 5.86753456201796   
## 1 1 1 1   
## 5.89548024228745 5.90334043378799 5.92740537937011 5.92741302636858   
## 1 1 1 1   
## 5.92756945032742 5.94485513780647 5.9475635131956 5.95594401202911   
## 1 1 1 1   
## 5.96390300417919 5.97429524942068 5.98721534766311 5.99370708130701   
## 1 1 1 1   
## 5.99671720250475 5.99855917944816 6.00140005081636 6.0254883872123   
## 1 1 1 1   
## 6.0263790157775 6.03651639292133 6.04541785181604 6.0559395979447   
## 1 1 1 1   
## 6.05838213349761 6.06655221122267 6.07549359802964 6.08428137043358   
## 1 1 1 1   
## 6.08823234100392 6.11544003742157 6.11780566357542 6.11900338428151   
## 1 1 1 1   
## 6.1220920408281 6.12726261892591 6.12776952630297 6.13495565414158   
## 1 1 1 1   
## 6.14425236086049 6.15296732766879 6.16084540482691 6.16731026318324   
## 1 1 1 1   
## 6.18513287913459 6.19492528486657 6.20912760449901 6.20926426877674   
## 1 1 1 1   
## 6.21681092925685 6.22489212886378 6.23323881741112 6.25352229277856   
## 1 1 1 1   
## 6.25522094855946 6.25671461262939 6.25682972600261 6.26108803160133   
## 1 1 1 1   
## 6.27313107524881 6.2826741140767 6.29168698999305 6.30499782049244   
## 1 1 1 1   
## 6.31911443318753 6.32216775252454 6.32532753660824 6.33041684816937   
## 1 1 1 1   
## 6.33541902458357 6.34654136716572 6.364114490349 6.36477452693263   
## 1 1 1 1   
## 6.37391373749948 6.39803318253931 6.40009200398247 6.41466990862486   
## 1 1 1 1   
## 6.42080467198405 6.43069874557492 6.4357492785014 6.43673119246393   
## 1 1 1 1   
## 6.44290267716072 6.461433117431 6.46265705909202 6.46278088695202   
## 1 1 1 1   
## 6.46315917008682 6.4847769869636 6.49220564147427 6.49606992418457   
## 1 1 1 1   
## 6.49883355750631 6.49926330128926 6.49971652673914 6.51498860610701   
## 1 1 1 1   
## 6.51611507564499 6.52106518135867 6.53074842342189 6.53147004250928   
## 1 1 1 1   
## 6.54554527933422 6.54792190928188 6.55055065229158 6.56191976162256   
## 1 1 1 1   
## 6.5954280357004 6.59673747494709 6.60816921600818 6.6180858706446   
## 1 1 1 1   
## 6.61902748649745 6.62195898895121 6.62704770405402 6.63605553436801   
## 1 1 1 1   
## 6.65537063350497 6.66701131686197 6.67019925070381 6.68985954142925   
## 1 1 1 1   
## 6.69614994351863 6.69922943492147 6.708597541963 6.70944372944937   
## 1 1 1 1   
## 6.71028854217374 6.71407384361471 6.71827826644522 6.72944261242632   
## 1 1 1 1   
## 6.77097598109501 6.77369839311711 6.78371006680482 6.78839003993388   
## 1 1 1 1   
## 6.83441270905949 6.87235185966091 6.90200652712078 6.90457002038203   
## 1 1 1 1   
## 6.91312476859304 6.91445242378798 6.92205542424831 6.92820660607567   
## 1 1 1 1   
## 6.93743588172466 6.95532014737706 6.96513551546829 6.97127130795151   
## 1 1 1 1   
## 6.99526031337153 7.0584128760998 7.07029845632318 7.1088575673611   
## 1 1 1 1   
## 7.12354618178959 7.1430931271173 7.153953505771 7.17663921013385   
## 1 1 1 1   
## 7.29847630211876 7.34135251866934 7.36213645452379 7.39455496322285   
## 1 1 1 1   
## 7.43985578622155 7.4644871602633 7.49521524219304 7.55862731022967   
## 1 1 1 1   
## 7.59707476057148 7.70857797590356 7.79616943909278 8.47763012983705   
## 1 1 1 1

table(sepalWidth)

## sepalWidth  
## 1.7964781574081 1.91214826223736 1.98215918236466 2.08354152106287   
## 1 1 1 1   
## 2.11480503664179 2.1939199919546 2.22940204611245 2.23968834319714   
## 1 1 1 1   
## 2.2502336356291 2.28393752957598 2.28486632643824 2.30962481164909   
## 1 1 1 1   
## 2.31142576947603 2.33014329396829 2.34472358448862 2.40097908597937   
## 1 1 1 1   
## 2.40385985546518 2.43207738569098 2.43523586207643 2.43795919414324   
## 1 1 1 1   
## 2.44500080294883 2.4512664857323 2.45637576767206 2.46779754160483   
## 1 1 1 1   
## 2.46821111812696 2.48007623231433 2.51173137720756 2.51287495475747   
## 1 1 1 1   
## 2.51781430101619 2.52076841731366 2.52117287522218 2.52654865290939   
## 1 1 1 1   
## 2.55863543640534 2.56167381325616 2.56323334849152 2.57119142703765   
## 1 1 1 1   
## 2.57482510707452 2.57634156079885 2.57954677419143 2.58041644675233   
## 1 1 1 1   
## 2.59039019503733 2.59103478906349 2.6011387508382 2.60427514908676   
## 1 1 1 1   
## 2.60449744952637 2.60524403096849 2.60529129453712 2.61513102944778   
## 1 1 1 1   
## 2.61677489005523 2.62569238105526 2.633503587338 2.63545029993565   
## 1 1 1 1   
## 2.63689043920651 2.64794362662549 2.65034735074614 2.65484072919318   
## 1 1 1 1   
## 2.65617141343915 2.66222416991536 2.66559499828595 2.6752613521737   
## 1 1 1 1   
## 2.67551972946603 2.67576977867468 2.67755121727391 2.67789738126833   
## 1 1 1 1   
## 2.68644572124666 2.69545013629099 2.69741931235617 2.70020861536365   
## 1 1 1 1   
## 2.70477173078014 2.70893203854974 2.7098068032621 2.71338391091849   
## 1 1 1 1   
## 2.7150278925171 2.71614832948002 2.71732189519516 2.72052142479434   
## 1 1 1 1   
## 2.72756771211368 2.72806805853518 2.73207666375912 2.73322233164714   
## 1 1 1 1   
## 2.73669703048482 2.7367961635395 2.73754580578275 2.74562384418544   
## 1 1 1 1   
## 2.75043075671566 2.75162883132506 2.75260118973298 2.75360174004496   
## 1 1 1 1   
## 2.75611644595187 2.75955126327117 2.7602873918142 2.76723102554656   
## 1 1 1 1   
## 2.76955455477243 2.76975278201862 2.77225461904682 2.77515519547461   
## 1 1 1 1   
## 2.77644709446171 2.77684935388003 2.77965643397467 2.78781525073842   
## 1 1 1 1   
## 2.79123382730092 2.79206136471197 2.79537184756345 2.79935286322855   
## 1 1 1 1   
## 2.8012234106436 2.80162844845462 2.80243139520506 2.8030510593326   
## 1 1 1 1   
## 2.80645046673791 2.80953775191934 2.81515307714849 2.81631958085323   
## 1 1 1 1   
## 2.82658834550103 2.83136723473489 2.8341438142767 2.83483323360412   
## 1 1 1 1   
## 2.83528743094255 2.83855723600398 2.84068294321026 2.88246749565141   
## 1 1 1 1   
## 2.88479614439877 2.88984550894164 2.89352137694839 2.89683124489812   
## 1 1 1 1   
## 2.89912215973897 2.8993531496653 2.90588187577957 2.90835044082736   
## 1 1 1 1   
## 2.90900150651557 2.91109140682363 2.91293873487903 2.91691485447771   
## 1 1 1 1   
## 2.92288094268125 2.92328695063585 2.92602990592069 2.92919146079831   
## 1 1 1 1   
## 2.93163028937221 2.93594072046366 2.93742632853868 2.93858508831328   
## 1 1 1 1   
## 2.93907372898446 2.94092444794386 2.95134088871681 2.96451233688884   
## 1 1 1 1   
## 2.97394216672486 2.97409919790805 2.97780398552661 2.97802002013623   
## 1 1 1 1   
## 2.98813111690262 2.99167089588079 2.9927148418742 2.99404466294041   
## 1 1 1 1   
## 2.99467675543085 2.99985592018086 3.0036835213527 3.00682671974396   
## 1 1 1 1   
## 3.00889408606225 3.0103087275631 3.01315933782502 3.01759215873547   
## 1 1 1 1   
## 3.02981623827391 3.0304157741621 3.03571120836874 3.03992498537327   
## 1 1 1 1   
## 3.04550764673309 3.04662803425943 3.05788149612908 3.06301446636081   
## 1 1 1 1   
## 3.07730516584292 3.0781512886812 3.08136747386587 3.09324855666432   
## 1 1 1 1   
## 3.09422921822555 3.09727143369096 3.10134749745293 3.10665398169735   
## 1 1 1 1   
## 3.10942752016897 3.11098199785011 3.1120924912299 3.11848841459088   
## 1 1 1 1   
## 3.11869271874511 3.12920713068219 3.13022038505322 3.13110200008455   
## 1 1 1 1   
## 3.15576394710614 3.15638390180053 3.1672731374109 3.17240434007987   
## 1 1 1 1   
## 3.18318583183513 3.18370318934844 3.18981327346044 3.20719030325606   
## 1 1 1 1   
## 3.22594546171597 3.22598459632421 3.2282535765753 3.23046412560324   
## 1 1 1 1   
## 3.23254000486102 3.23307835431426 3.23706963661081 3.24469330013386   
## 1 1 1 1   
## 3.25085707290344 3.25559315563516 3.25850998671582 3.27024253415166   
## 1 1 1 1   
## 3.28182163638962 3.2861869980782 3.29552025538861 3.29674890548518   
## 1 1 1 1   
## 3.30153202336238 3.30811194202062 3.30880172045944 3.31617687849577   
## 1 1 1 1   
## 3.32941461047546 3.33254543465489 3.33380707265884 3.33468073714813   
## 1 1 1 1   
## 3.33707858705783 3.34142733617206 3.34173955171396 3.34205383053784   
## 1 1 1 1   
## 3.34775867674198 3.34900389717875 3.35327101022508 3.36893515547805   
## 1 1 1 1   
## 3.3717745536784 3.38390173868927 3.38568743952784 3.3858937535632   
## 1 1 1 1   
## 3.39784671017556 3.40682631902613 3.41566027199479 3.41750362112934   
## 1 1 1 1   
## 3.43867267392993 3.44204880999436 3.45553822091828 3.45674558690582   
## 1 1 1 1   
## 3.45999361054457 3.46572201846225 3.48045938173111 3.49334414897819   
## 1 1 1 1   
## 3.49954223183044 3.50198033445976 3.50893640094991 3.51040213012171   
## 1 1 1 1   
## 3.5355562749558 3.53708758387622 3.53960144247244 3.54602582007896   
## 1 1 1 1   
## 3.54659042393261 3.58660936661121 3.58786774053836 3.58846652799739   
## 1 1 1 1   
## 3.59422428769365 3.60098193174393 3.60226179390117 3.62579755824312   
## 1 1 1 1   
## 3.63349575379754 3.64227394141007 3.64691684052279 3.65618725625557   
## 1 1 1 1   
## 3.6584783758867 3.65859352466317 3.67305692351572 3.67450830870883   
## 1 1 1 1   
## 3.67713034776263 3.67813319722033 3.67824109328319 3.68323045886807   
## 1 1 1 1   
## 3.68462080724511 3.70385802139337 3.70595270731827 3.71207289735834   
## 1 1 1 1   
## 3.72984791486533 3.73136753976741 3.76979880887002 3.77562707106366   
## 1 1 1 1   
## 3.77787922207968 3.79312485288506 3.80675455510466 3.81663031019354   
## 1 1 1 1   
## 3.81777636654882 3.82967906684142 3.83960626391343 3.85773375880643   
## 1 1 1 1   
## 3.92461491249015 3.93674164856588 3.95099114561516 3.96021466805863   
## 1 1 1 1   
## 3.96410260138631 4.03298821157294 4.05492301495496 4.06496974650641   
## 1 1 1 1   
## 4.08152918279201 4.12217791958078 4.24117008789902 4.28422516607609   
## 1 1 1 1   
## 4.37653568047671 4.48924638540156 4.54719400378879 4.81000440564116   
## 1 1 1 1

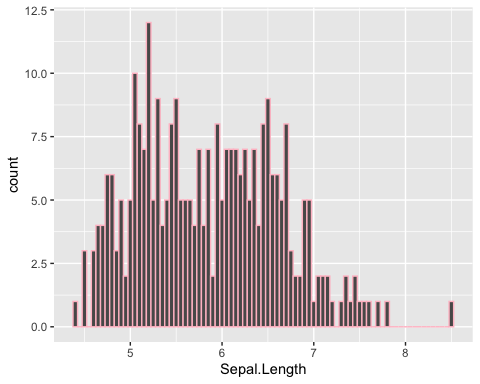
table(petalLength)

## petalLength  
## 1.1353056534721 1.15925471151847 1.18687832979319 1.20814381984841   
## 1 1 1 1   
## 1.23066774542156 1.26015178942244 1.278908021955 1.29884424920899   
## 1 1 1 1   
## 1.30169420410351 1.31044078267739 1.31110239041733 1.31181851443353   
## 1 1 1 1   
## 1.31265540239302 1.31795735362009 1.32568053519611 1.32670171834393   
## 1 1 1 1   
## 1.338766388686 1.33971339920987 1.33975471314705 1.34587995903716   
## 1 1 1 1   
## 1.34640058748447 1.35320689878662 1.3588261270032 1.37433045125566   
## 1 1 1 1   
## 1.37645314701212 1.39073842419609 1.39341859049934 1.39499321308329   
## 1 1 1 1   
## 1.39573050174733 1.39633012091333 1.40757917391376 1.40853666407088   
## 1 1 1 1   
## 1.40927513015153 1.41840816683028 1.42568088558266 1.43019420743275   
## 1 1 1 1   
## 1.44151069041796 1.44333916888689 1.449731899986 1.45100715434871   
## 1 1 1 1   
## 1.45247730701486 1.45272027734354 1.45501316443386 1.45843032434936   
## 1 1 1 1   
## 1.46111658684637 1.47517669440223 1.47686995586081 1.47714479494002   
## 1 1 1 1   
## 1.48249378274421 1.48281148875212 1.48637840955451 1.48776077587713   
## 1 1 1 1   
## 1.49220584245728 1.49240644953113 1.49313673770374 1.49439298359402   
## 1 1 1 1   
## 1.49660554574988 1.50057584634205 1.50449235431118 1.51126616995126   
## 1 1 1 1   
## 1.51301213978419 1.52390113537162 1.5240541970807 1.52582212218277   
## 1 1 1 1   
## 1.53076860790608 1.53343394557587 1.53984706434351 1.5445846637952   
## 1 1 1 1   
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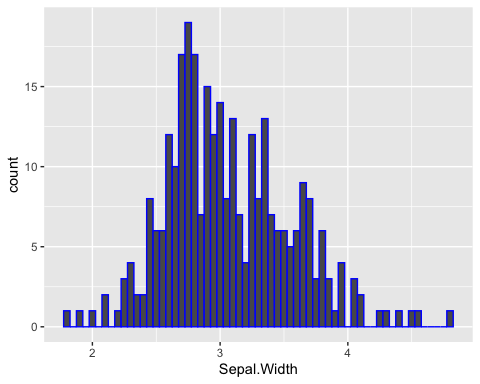
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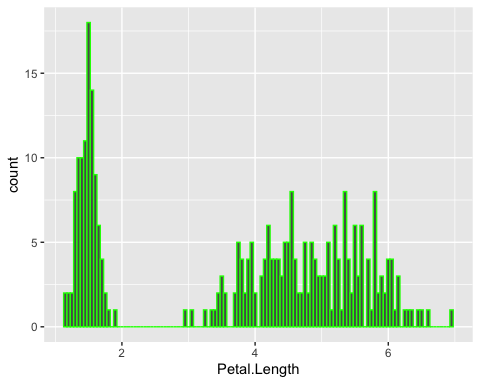
library('ggplot2')  
library('e1071')  
histSepalLength <- ggplot(data, aes(Sepal.Length))  
histSepalLength + geom\_histogram(binwidth = 0.05, color = 'pink') + labs(xlab = 'Sepal Length', ylab = 'Frequency')



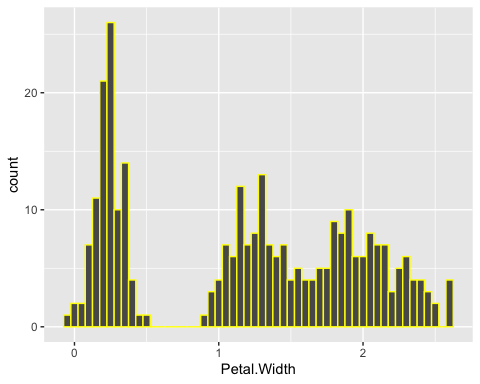
histSepalWidth <- ggplot(data, aes(Sepal.Width))  
histSepalWidth + geom\_histogram(binwidth = 0.05, color = 'blue') + labs(xlab = 'Sepal Width', ylab = 'Frequency')



histPetalLength <- ggplot(data, aes(Petal.Length))  
histPetalLength + geom\_histogram(binwidth = 0.05, color = 'green') + labs(xlab = 'Petal Length', ylab = 'Frequency')



histPetalWidth <- ggplot(data, aes(Petal.Width))  
histPetalWidth + geom\_histogram(binwidth = 0.05, color = 'yellow') + labs(xlab = 'Petal Width', ylab = 'Frequency')



sepallength = c(mean = mean(sepalLength), sd = sd(sepalLength), quartile = quantile(sepalLength), min=min(sepalLength), max = max(sepalLength), skewness = skewness(sepalLength), kurtosis = kurtosis(sepalLength))  
sepalwidth = c(mean = mean(sepalWidth), sd = sd(sepalWidth), quartile = quantile(sepalWidth), min=min(sepalWidth), max = max(sepalWidth), skewness = skewness(sepalWidth), kurtosis = kurtosis(sepalWidth))  
petallength = c(mean = mean(petalLength), sd = sd(petalLength), quartile = quantile(petalLength), min=min(petalLength), max = max(petalLength), skewness = skewness(petalLength), kurtosis = kurtosis(petalLength))  
petalwidth = c(mean = mean(petalWidth), sd = sd(petalWidth), quartile = quantile(petalWidth), min=min(petalWidth), max = max(petalWidth), skewness = skewness(petalWidth), kurtosis = kurtosis(petalWidth))  
summary\_stat = data.frame(sepallength, sepalwidth, petallength, petalwidth)  
summary\_stat

## sepallength sepalwidth petallength petalwidth  
## mean 5.8570905 3.0641959 3.7380225 1.19829888  
## sd 0.7687033 0.4885534 1.7351412 0.77545989  
## quartile.0% 4.4165896 1.7964782 1.1353057 -0.03370764  
## quartile.25% 5.2090390 2.7197215 1.5655100 0.30277782  
## quartile.50% 5.8435235 2.9921929 4.2275334 1.28775743  
## quartile.75% 6.4475353 3.3748063 5.2047437 1.87452270  
## quartile.100% 8.4776301 4.8100044 6.9548856 2.62487348  
## min 4.4165896 1.7964782 1.1353057 -0.03370764  
## max 8.4776301 4.8100044 6.9548856 2.62487348  
## skewness 0.3203956 0.5039654 -0.2728386 -0.06056470  
## kurtosis -0.5053802 0.2767881 -1.4515733 -1.35801127

Interpretation:  
When Sepal Length of all species considered it seems to have low skewness to the right from the statistics and histgram graph. Sepal Width of specises considered together it has the postive medium skewness, low standars deviation and also low positive kurtosis, which dirives that the data falls on the middle range. The Petal Length of all specis considered together, it has the negative skweness and data appears to have large peaks on the left which can be seen on the graph, whihc leads to high negative kurtosis. The Petal WIdth of all specices consisdered together having any neagative skewness and also from the graph it is seen that data has high negative values in the left whihc again leads to high negative kurtosis.