# Predictive Demand Model Strategy

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# Problem Statement

1) Building a Predictive Demand Model – Can be trend/time series based or causal

2) Basis n+2 month forecasted , planning the optimized supply need for month for the next 12 months

3) Based on the Associated costs constrains creating a simulation showing the Net Loss of business and/or net additional cost

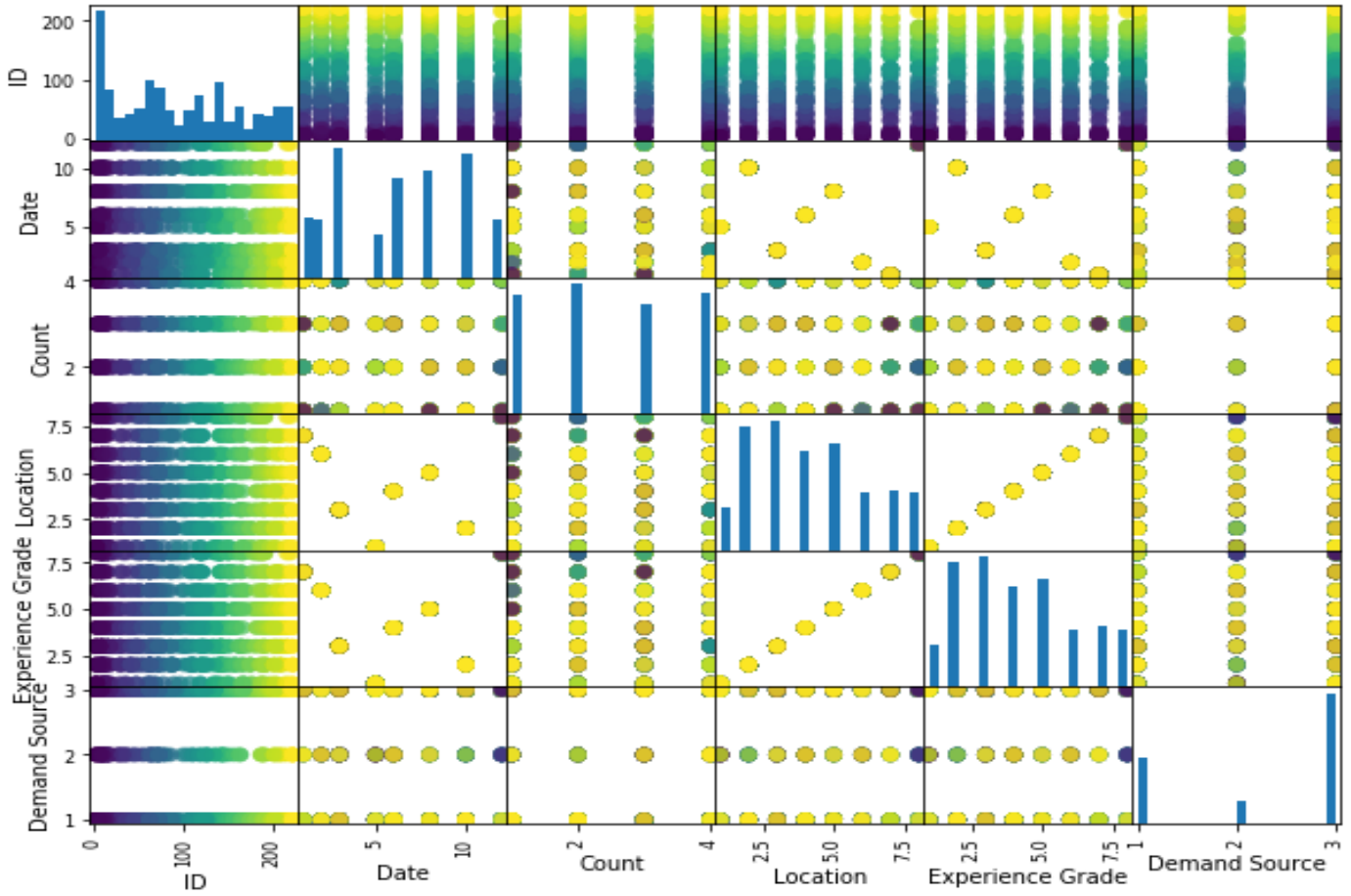
# THE DATA –Demand Trend Last Year

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | Month DD | No. of FTE Reque | SkillList | Location | Experience Grade | Practice | Skill Group | Demand Sou |
| 2 | May | 4 | Salesforce (Functional) | Bangalore | A4 | BANK | (F) IT Operations | Account |
| 3 | October | 2 | Amazon Web services - Build , Admini | Bhubaneswar | B2 | M&FT | (F) IT Operations | Account |
| 4 | March | 2 | Amazon Web services - Build , Admini | Pune | A3 | TEST | | Support |
| 5 | October | 1 | Test Automation | Bhubaneswar | B2 | M&FT | (F) IT Operations | Account |
| 6 | June | 2 | PMO (Account) | Noida | A5 | I&D | (D) Banking Sector | Proactive |
| 7 | August | 4 | Salesforce (Functional) | Gurgaon | B1 | GP | (T) Data Governance / Master Data Mana | Account |
| 8 | June | 1 | Testing Manual,Banking,Test Automat | Noida | A5 | I&D | | Support |
| 9 | August | 4 | Amazon Web services - Build , Admini | Gurgaon | B1 | INS | | Proactive |
| 10 | March | 3 | Angular.js | Pune | A3 | TEST | (F) IT Operations | Support |
| 11 | March | 2 | Angular.js | Pune | A3 | TEST | (F) IT Operations | Proactive |
| 12 | June | 2 | POSTGRESQL | Noida | A5 | ADM | | Support |
| 13 | February | 4 | Informatica MDM (formerly Syperian) | Hyderabad | A2 | CFS | (T) Card packages | Account |
| 14 | October | 2 | Informatica MDM (formerly Syperian) | Bhubaneswar | B2 | M&FT | (T) Office / Desktop Solutions | Proactive |
| 15 | June | 1 | Informatica MDM (formerly Syperian) | Noida | A5 | I&D | (F) Business Management / Managemer | Support |
| 16 | January | 2 | Angular.js | Chennai | A1 | DCX | (T) Enterprise Content Management (EC | Proactive |
| 17 | August | 3 | Angular.js | Gurgaon | B1 | INS | (D) Banking Sector | Proactive |
| 18 | March | 3 | Java | Pune | A3 | TEST | (T) Enterprise Content Management (EC | Support |
| 19 | August | 1 | Java | Gurgaon | B1 | GP | (T) Mainframe Development Technologi | Proactive |
| 20 | January | 1 | Java | Chennai | A1 | DCX | (T) Card packages | Account |
| 21 | March | 3 | Test Environment Management | Pune | A3 | TEST | (T) Operating systems and Virtualizatior | Account |

# THE DATA-Headcount

| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | Region | Employee Code | Last Name | Local Date of Joi | Designation | Status | Market Unit | SkillList | Location |
| 2 | US | 45149 | AALLURI | 31-10-2016 | CONSULTANT | Billable | BANK | Salesforce (Functional) | Bangalore |
| 3 | IN | 47875 | AARATTUKULAM | 20-11-2014 | SENIOR SOFTWARE | Billable | BANK | Amazon Web services - Build , A | Bhubaneswar |
| 4 | IN | 90386 | AASHIK | 15-12-2014 | ASSOCIATE CONSUL | Billable | BANK | Amazon Web services - Build , A | Pune |
| 5 | IN | 41161 | Aastha | 26-02-2015 | ASSOCIATE CONSUL | Billable | BANK | Test Automation | Bhubaneswar |
| 6 | IN | 92293 | ABBAN | 02-12-2013 | CONSULTANT | Billable | BANK | PMO (Account) | Noida |
| 7 | IN | 79912 | ABBANOLLA | 19-01-2012 | ASSOCIATE CONSUL | Billable | BANK | Salesforce (Functional) | Gurgaon |
| 8 | IN | 60970 | ABBARAJU | 01-10-2009 | MANAGER | Billable | BANK | Testing Manual,Banking,Test Au | Noida |
| 9 | IN | 92528 | ABBARAJU | 08-01-2015 | SENIOR MANAGER | Billable | BANK | Amazon Web services - Build , A | Gurgaon |
| 10 | IN | 77180 | ABBARAJUL | 12-08-2013 | SENIOR MANAGER | Billable | INS | Angular.js | Pune |
| 11 | IN | 21384 | ABBAS | 24-01-2013 | SENIOR CONSULTAI | Billable | INS | Angular.js | Pune |
| 12 | IN | 76211 | ABBI | 20-12-2012 | SENIOR CONSULTAI | Billable | INS | POSTGRESQL | Noida |
| 13 | IN | 47520 | ABBIREDDY | 22-09-2011 | SENIOR CONSULTAI | Billable | INS | Informatica MDM (formerly Sype | Hyderabad |
| 14 | IN | 58905 | ABBURI | 25-02-2013 | CONSULTANT | Billable | INS | Informatica MDM (formerly Sype | Bhubaneswar |
| 15 | IN | 28524 | ABBURI | 31-10-2013 | CONSULTANT | Billable | INS | Informatica MDM (formerly Sype | Noida |
| 16 | US | 76959 | ABDUL HAMEED | 24-11-2014 | SENIOR CONSULTAI | Billable | INS | Angular.js | Chennai |
| 17 | IN | 29787 | ABDUL NATHAR USS | 22-07-2013 | SENIOR CONSULTAI | Billable | INS | Angular.js | Gurgaon |
| 18 | US | 35192 | ABDULRASAD | 06-10-2014 | SENIOR CONSULTAI | Billable | INS | Java | Pune |
| 19 | IN | 49925 | ABHISHEK | 09-03-2015 | ASSOCIATE CONSUL | Billable | INS | Java | Gurgaon |
| 20 | IN | 67919 | ABHYANKAR | 30-12-2005 | MANAGER | Billable | INS | Java | Chennai |
| 21 | US | 66815 | ABHYANKAR | 16-09-2013 | MANAGER | Billable | INS | Test Environment Management | Pune |

# Analysing the data




From the plots, we can see that the classes are not well separated , Therefore it's difficult for a machine learning model to separate them using a classifier

# The Top Skills Required.....

Predicting becomes easy when we have the idea of the in demand skill for the resource……

| | SkillList | No. of FTE Request Raised | Counts |
|---|---|---|---|
| 0 | Java | 179 | 409 |
| 1 | Selenium | 120 | 270 |
| 2 | Ab Initio | 72 | 208 |
| 3 | Java (Multi Skilled),Java | 66 | 204 |
| 4 | Guidewire | 64 | 197 |
| 5 | Angular.js | 57 | 194 |
| 6 | Testing Manual | 55 | 129 |
| 7 | Mulesoft ESB | 53 | 129 |
| 8 | Pega | 47 | 118 |
| 9 | Functional Testing | 47 | 114 |
| 10 | Java (Multi Skilled) | 46 | 114 |

Count as per Demands

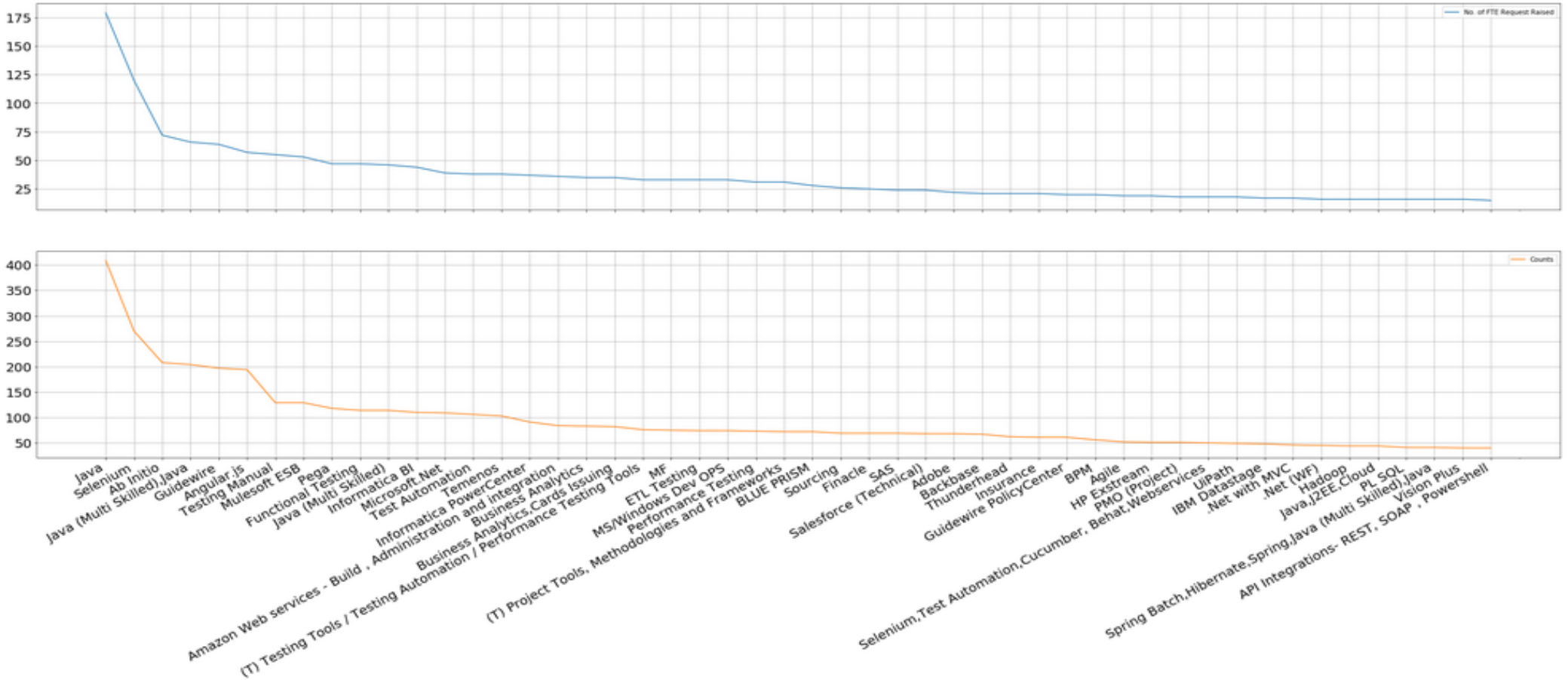
Skills possessed by the most Billed Person of the organisation

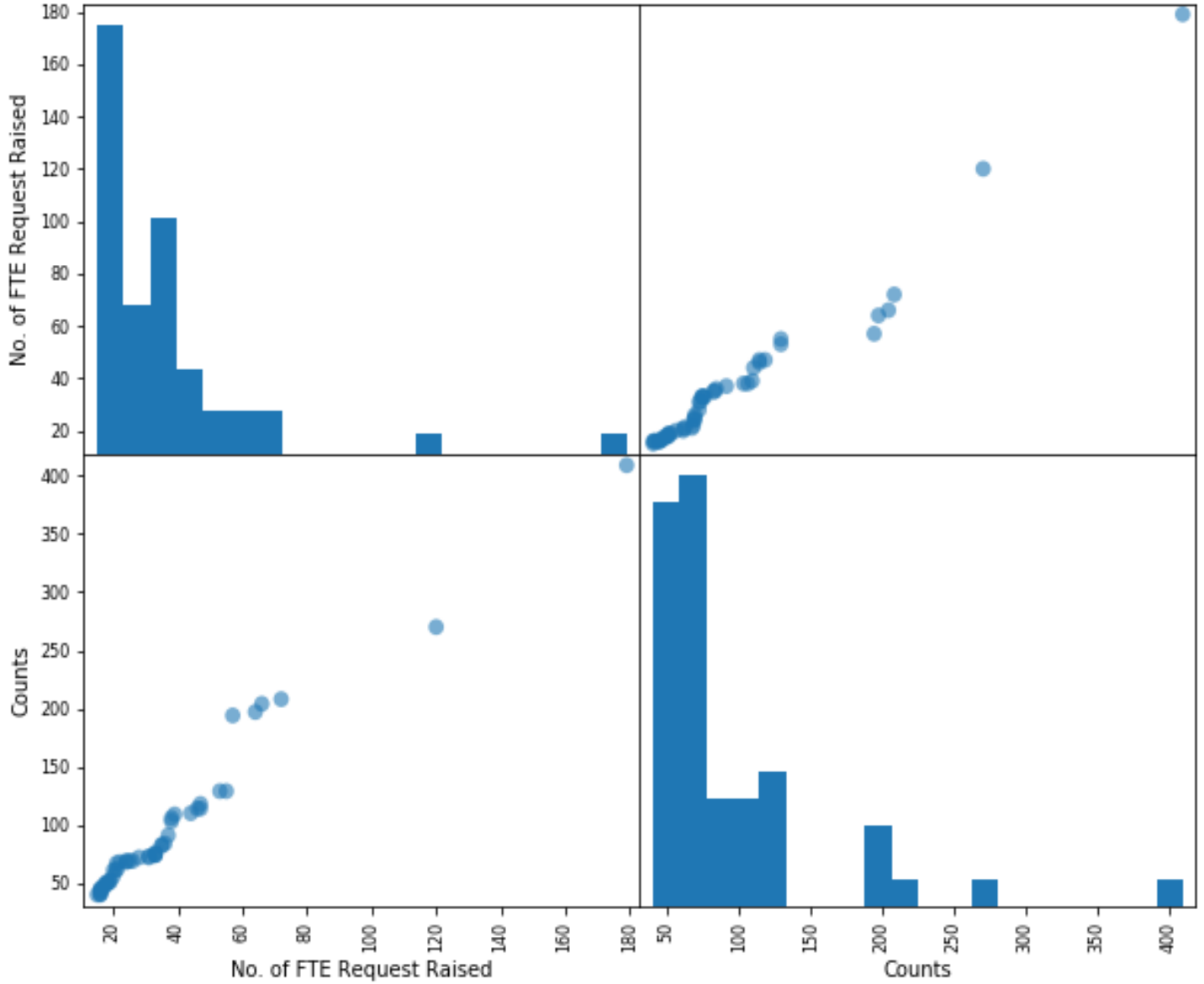
# Noticeable Facts

| Month DD Raised | Location | Experience Grade | Practice |
|---|---|---|---|
| August | Gurgaon | B1 | GP |
| | | | INS |
| December | Hartford | C1 | ERP |
| February | Hyderabad | A2 | CFS |
| January | Chennai | A1 | DCX |
| June | Noida | A5 | ADM |
| | | | I&D |
| March | Pune | A3 | TEST |
| May | Bangalore | A4 | BANK |
| October | Bhubaneswar | B2 | Cards |
| | | | M&FT |

- According to the data the demand of each month is directly mapped to a specific location & Experience Grade. For Instance : In August the demand location is Gurgaon Experience Grade is B1 & Practice can be either GP or INS. Similarly in December the location is Hartford experience Grade is C1 & practice required is ERP etc.

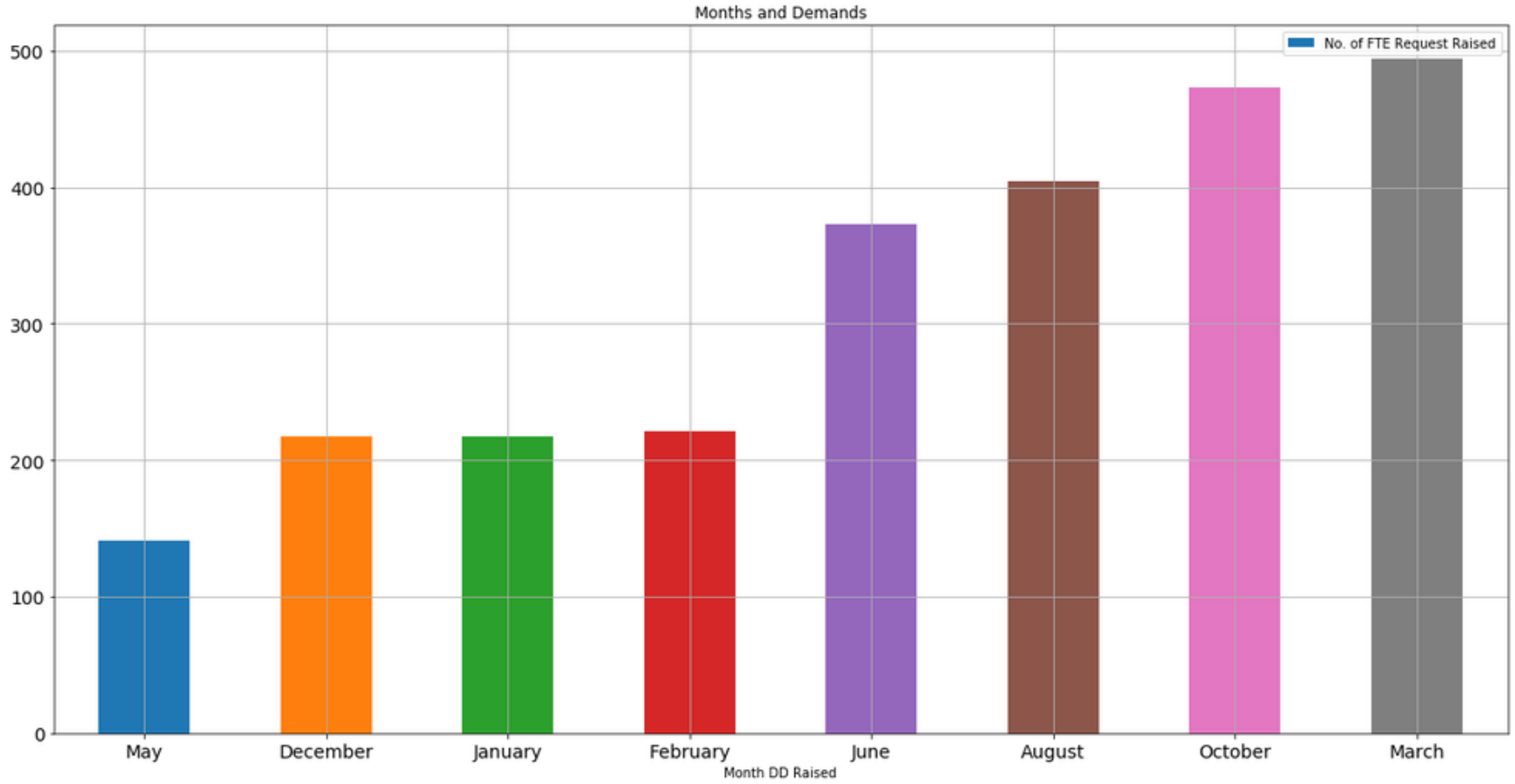
# Skills Demanded vs Skilled Possessed by Most Billed People



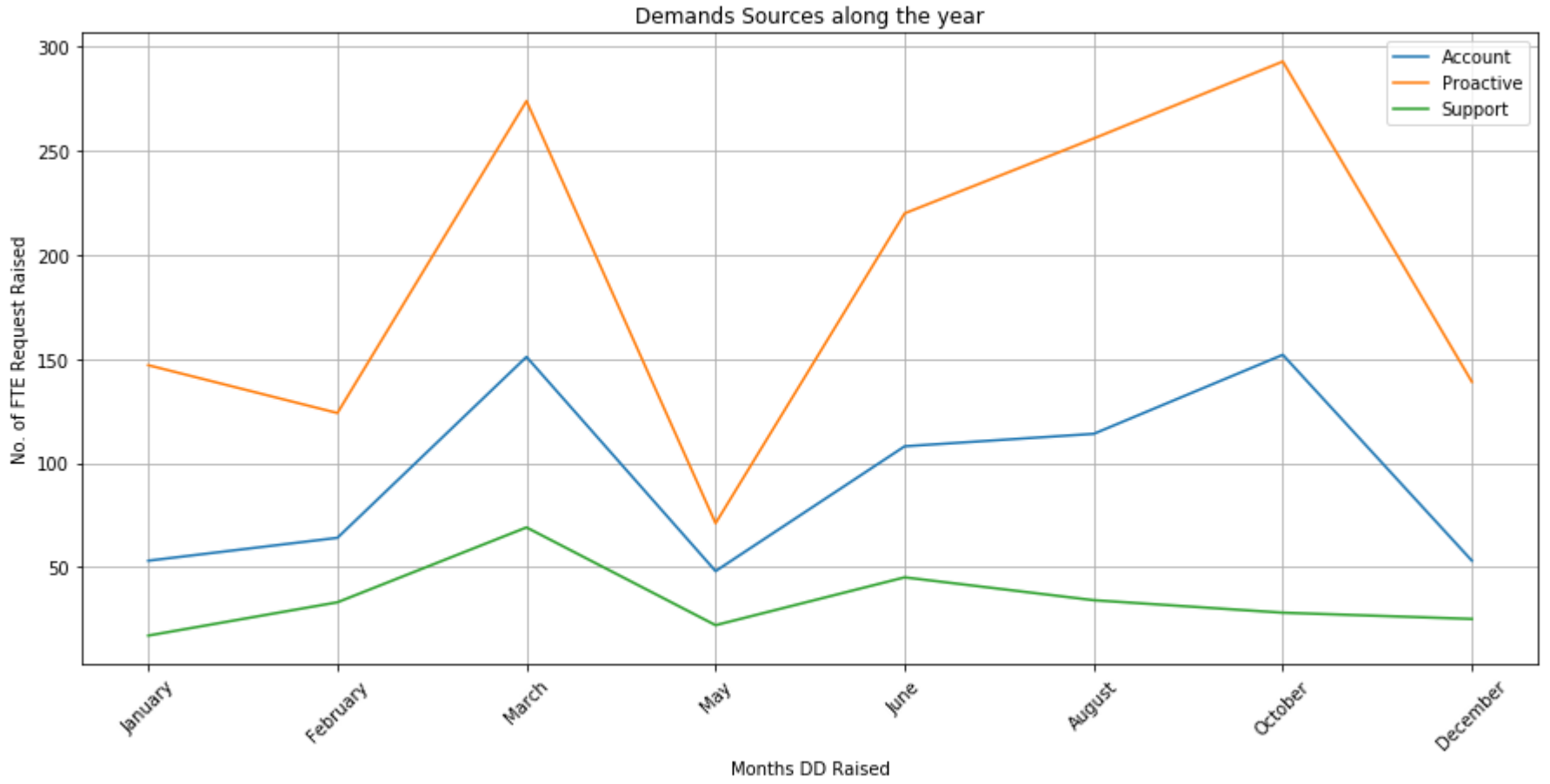



It is difficult to separate even the top skills…

# Demands during Months

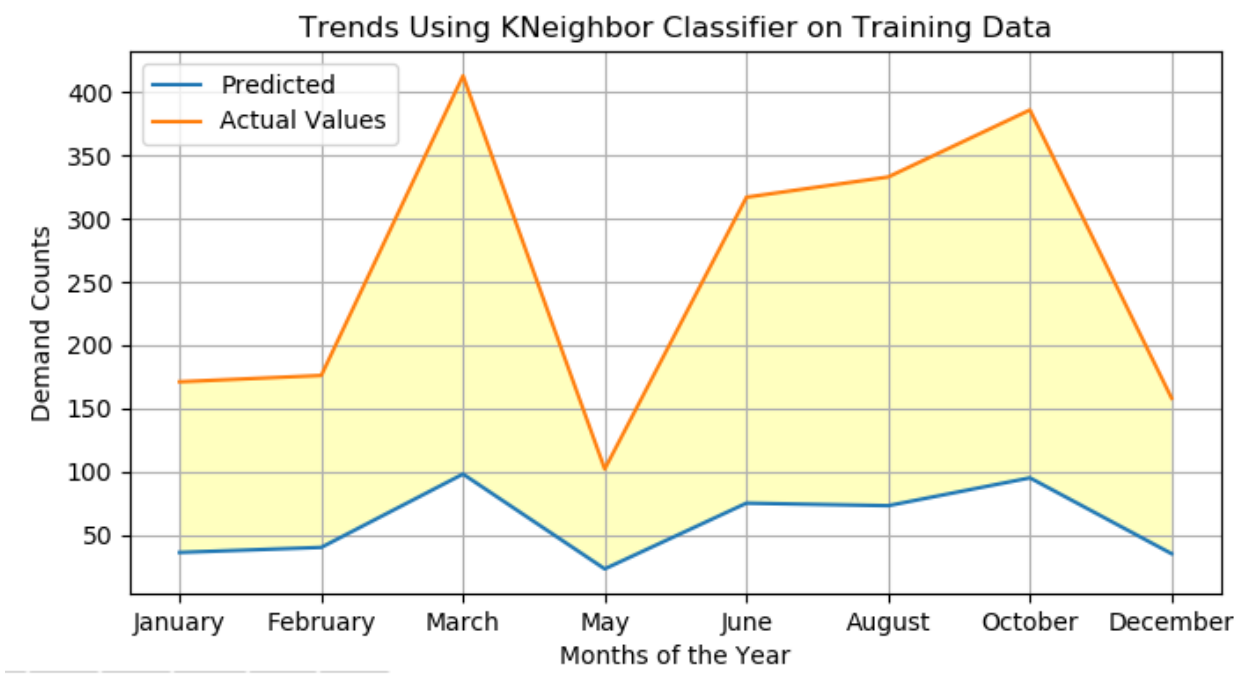


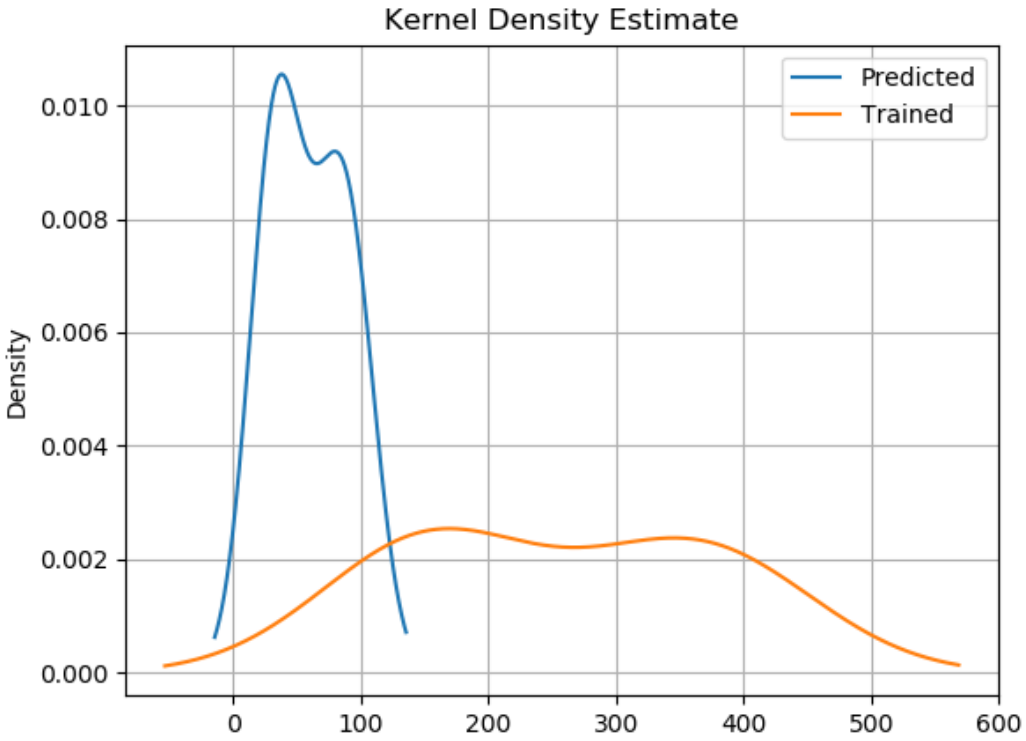
# Demand & Demand Source Along the Year



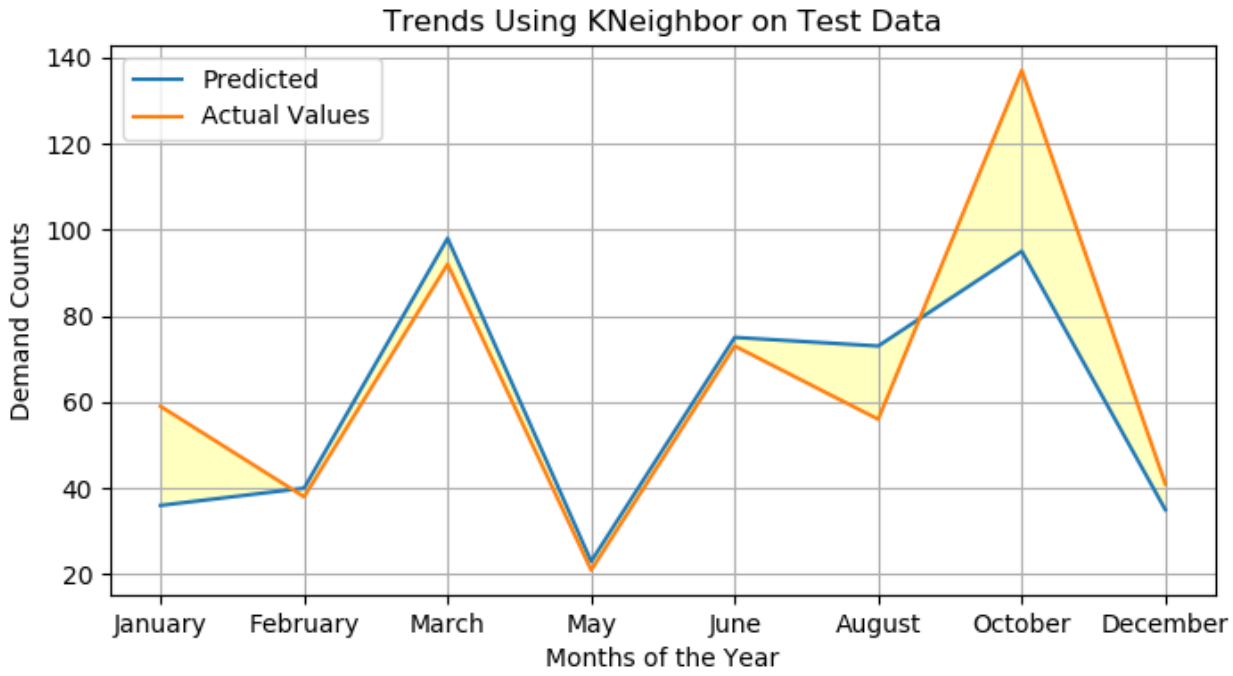
# MODELS AND PREDICTIONS

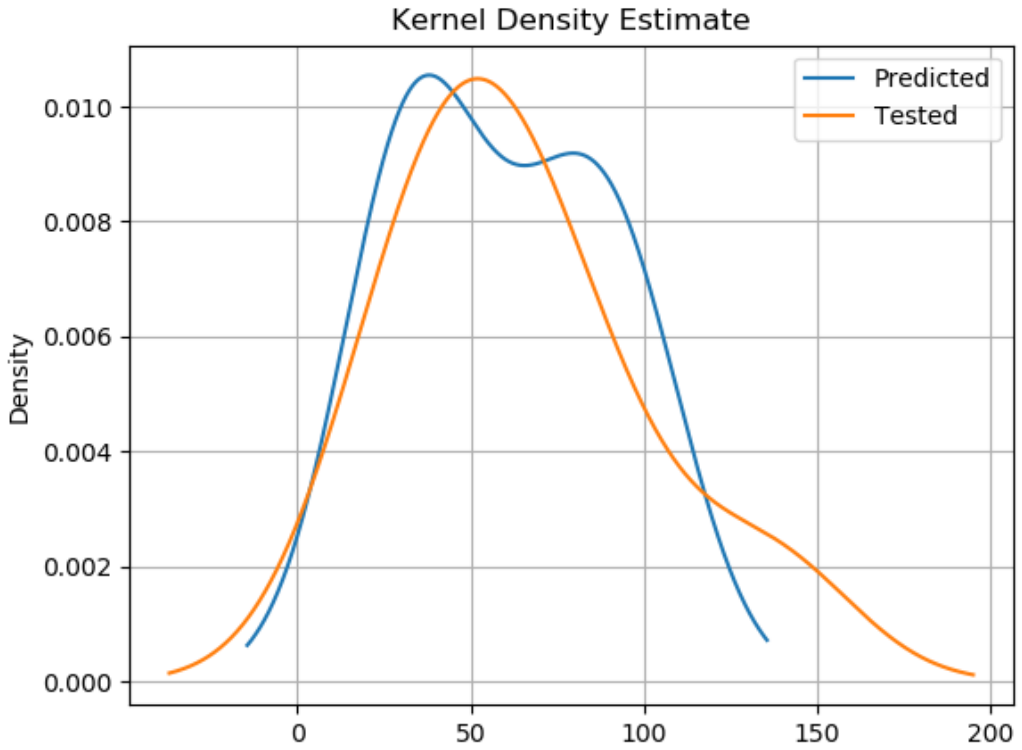
# Prediction Using KNeighbor Classifier on Training Data



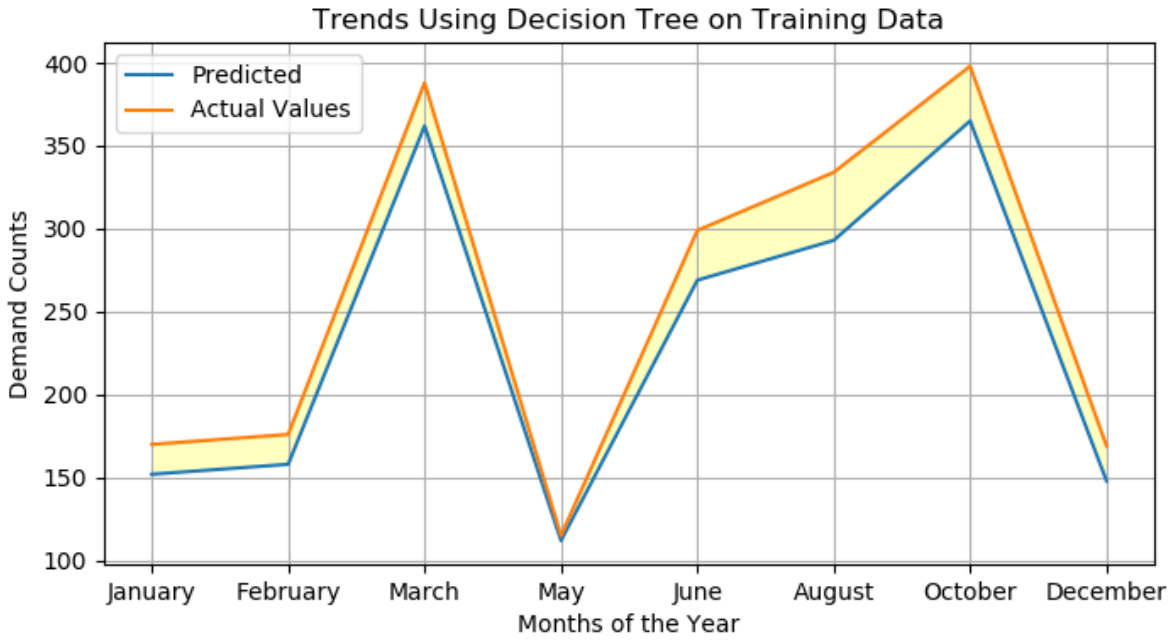



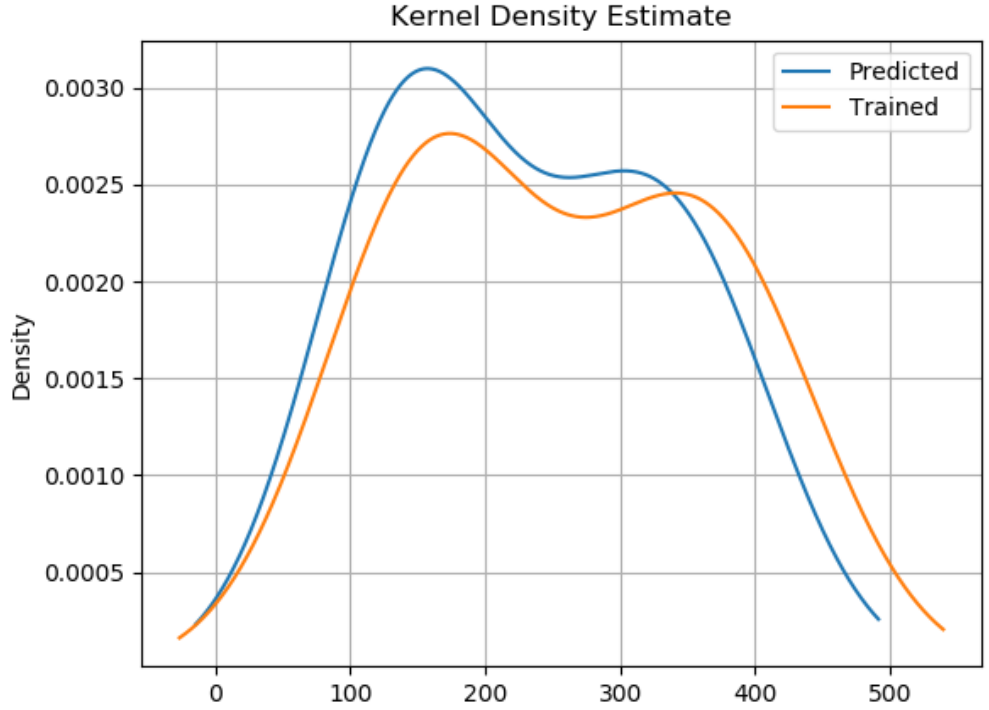
# Prediction Using KNeighbor Classifier on Test Data



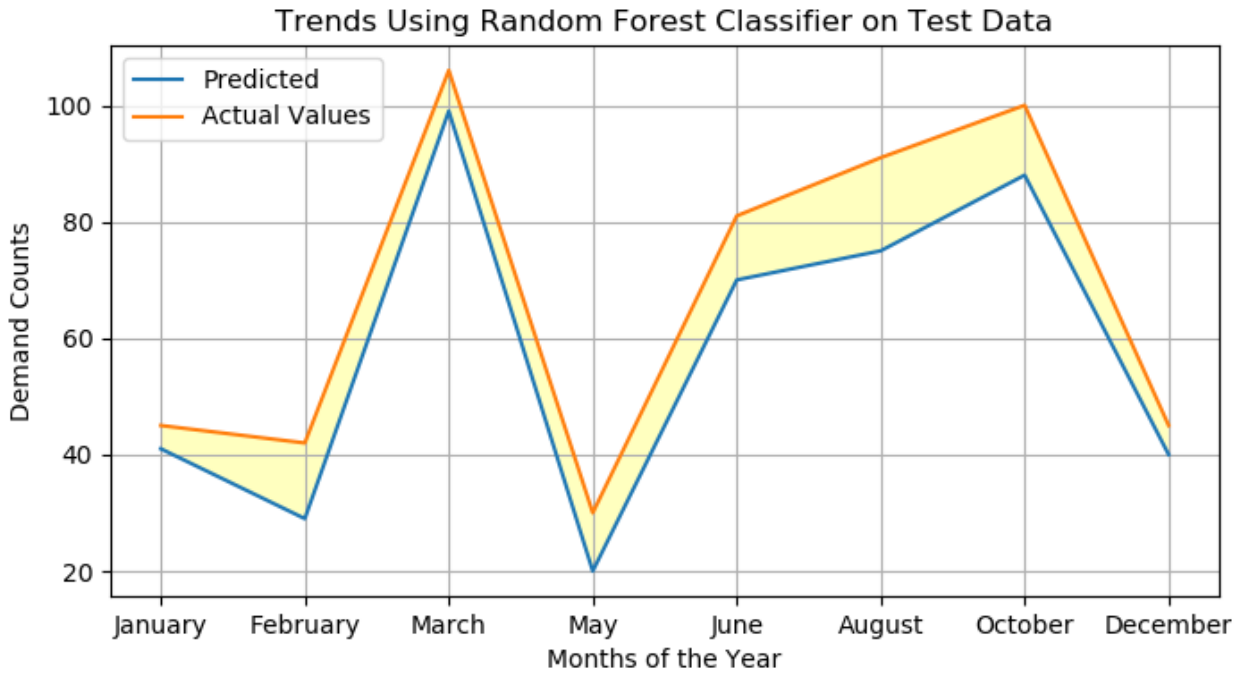



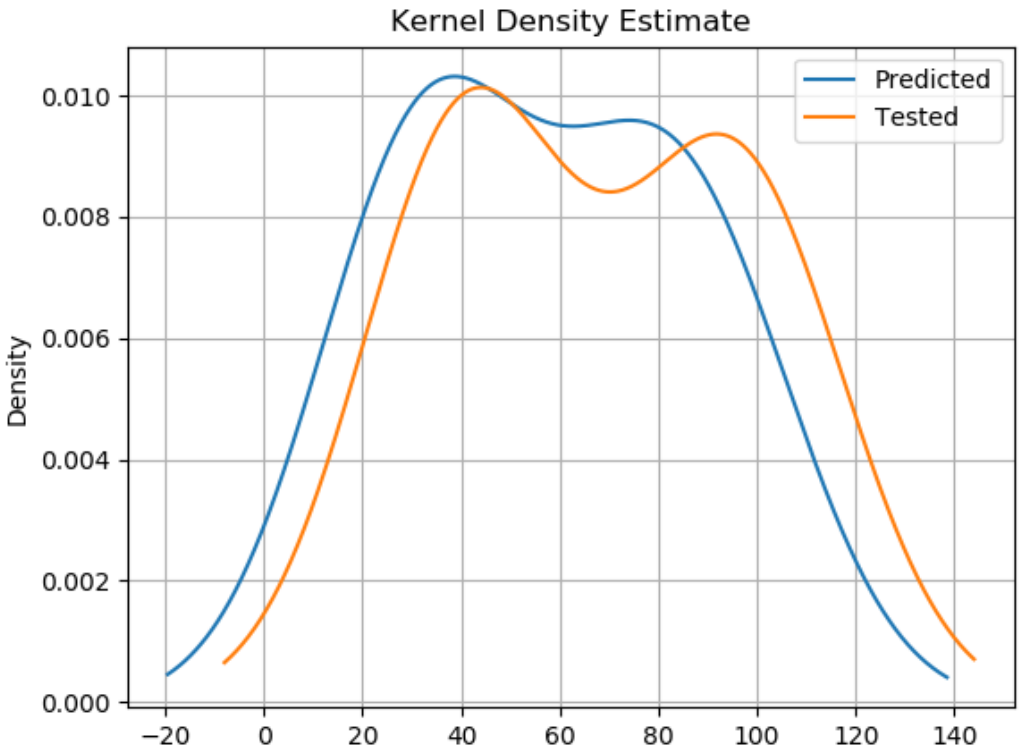
# Prediction Using Decision Tree Classifier on Training Data



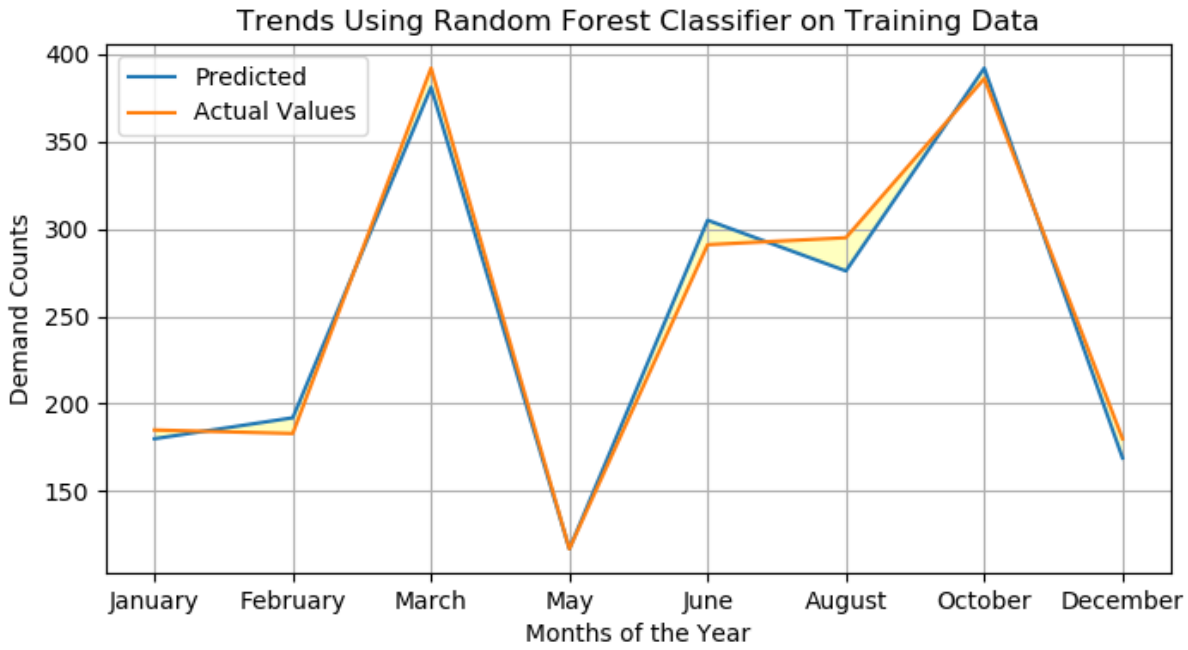



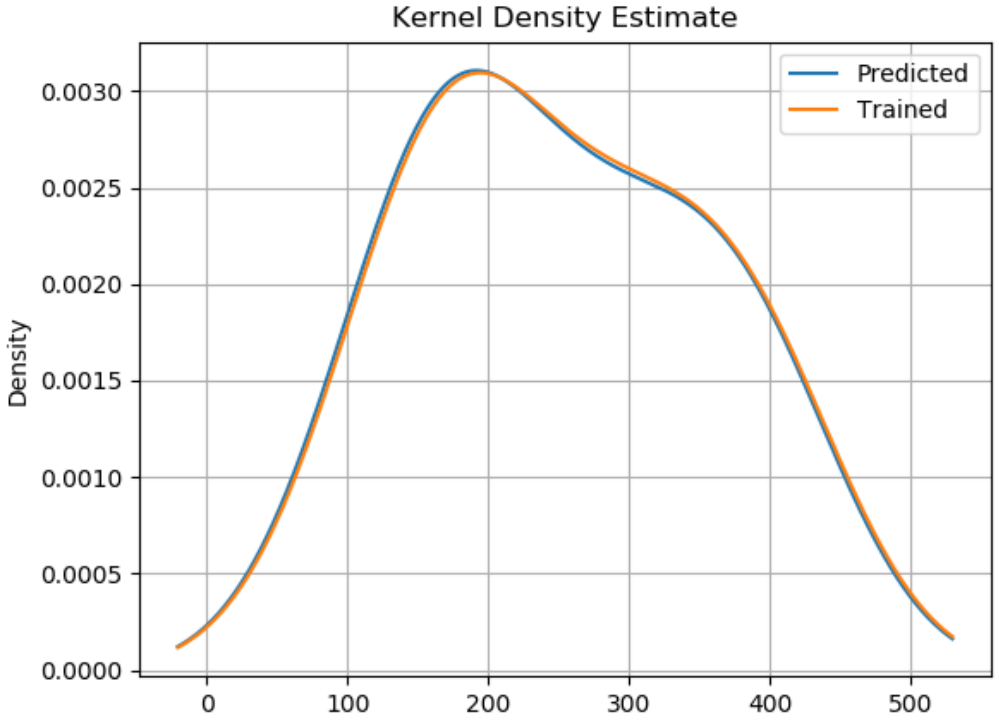
# Prediction Using Decision Tree Classifier on Test Data



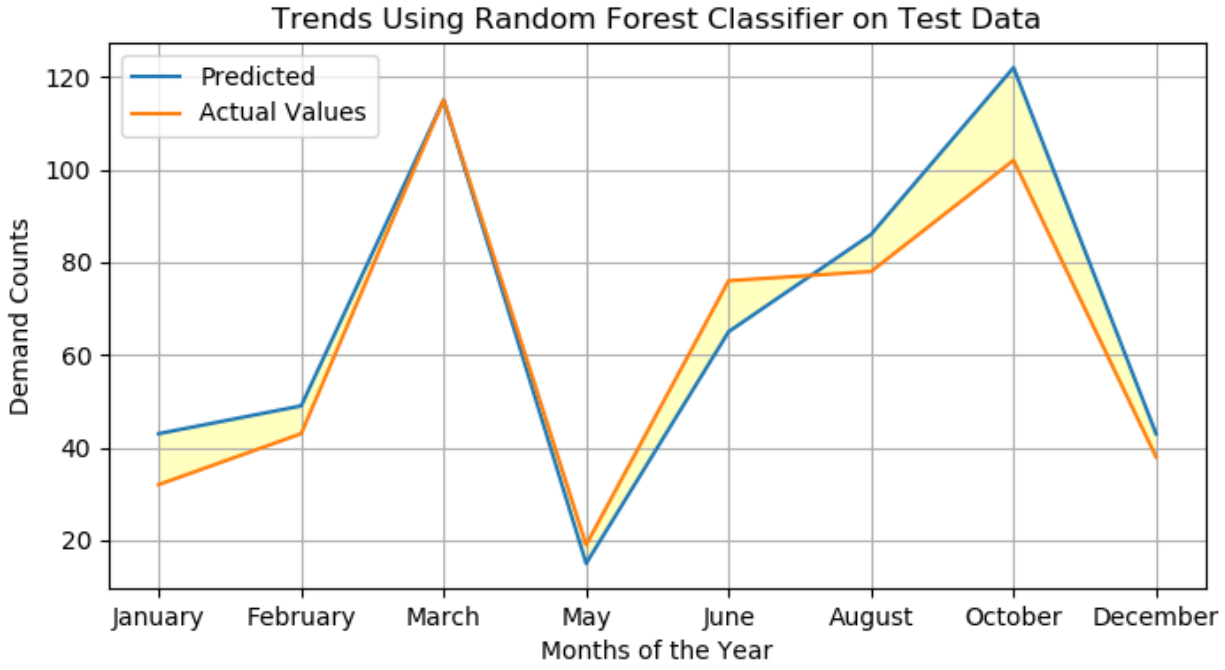



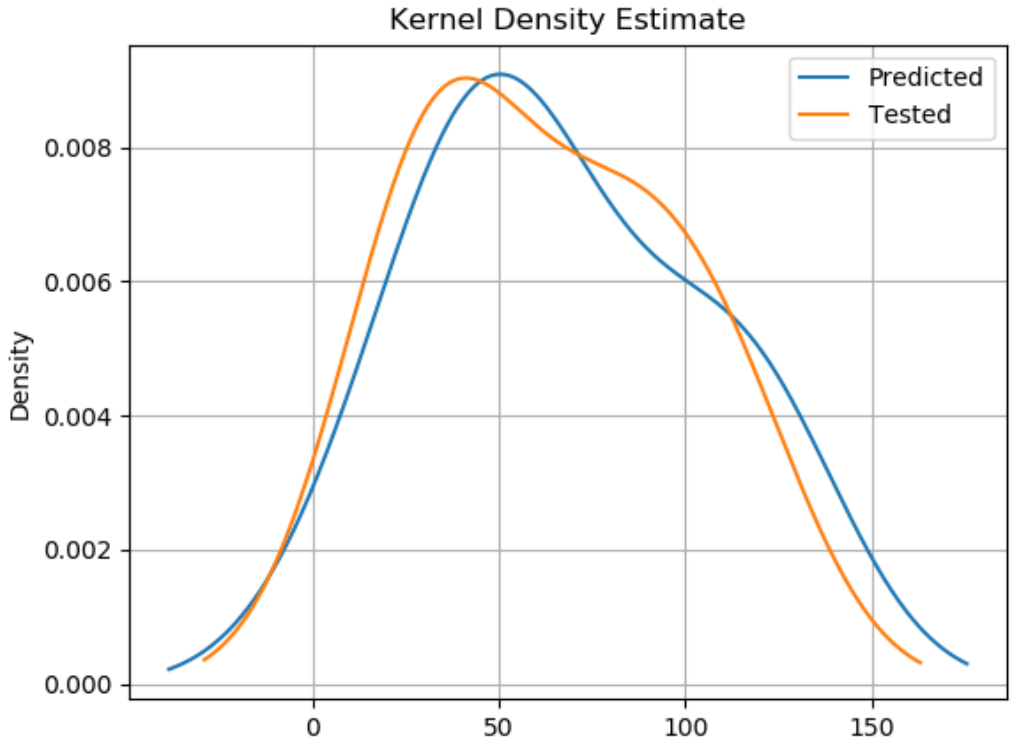
# Prediction Using Random Forest Classifier on Training Data



# Prediction Using Random Forest Classifier on Test Data



# Notes

- I have tried to use multi-output multi-label classifier for this problem .
- The maximum score attained for all the classifiers are 88% on the Training Set and 66% on the Test Set.
- I have tried classifications methods to discover the possibilities of these classifiers in a problem where it is difficult to classify the labels.
- The output of these classifiers are in the form of months and the count of each unique skill required, each skill has its individual id.
- The intention was to then map the required skills with the people in the bench in the Headcount file and then calculating the Profit/Loss.

# Thank You