DATA MINING MIDTERM PROJECT

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Programming language: Python

Amazon.csv

A Beginner’s Guide,Java: The Complete Reference,Java For Dummies,Android Programming: The Big Nerd Ranch,

A Beginner’s Guide,Java: The Complete Reference,Java For Dummies,,

A Beginner’s Guide,Java: The Complete Reference,Java For Dummies,Android Programming: The Big Nerd Ranch,Head First Java 2nd Edition

Android Programming: The Big Nerd Ranch,Head First Java 2nd Edition,Beginning Programming with Java,,

Android Programming: The Big Nerd Ranch,Beginning Programming with Java, Java 8 Pocket Guide,,

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Beginning Programming with Java,Java 8 Pocket Guide,C++ Programming in Easy Steps,,

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A Beginner’s Guide,Java: The Complete Reference,Java For Dummies,HTML and CSS: Design and Build Websites,

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Android Programming: The Big Nerd Ranch,Head First Java 2nd Edition,,,

A Beginner’s Guide,"Java: The Complete Reference, Java For Dummies",,,U

BESTBUY.CSV

Desk Top, Printer, Flash Drive, Microsoft Office, Speakers, Anti-Virus

Lab Top,Flash Drive,Microsoft Office,Lab Top Case,Anti-Virus,,,,,

Lab Top,Printer,Flash Drive,Microsoft Office,Anti-Virus,Lab Top Case,External Hard-Drive,,,

Lab Top,Printer,Flash Drive,Anti-Virus,External Hard-Drive,Lab Top Case,,,,

Lab Top,Flash Drive,Lab Top Case,Anti-Virus,,,,,,

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Lab Top,Desk Top,Lab Top Case,External Hard-Drive,Speakers,Anti-Virus,,,,

Digital Camera,Lab Top,Lab Top Case,External Hard-Drive,Anti-Virus,Speakers,,,,

Digital Camera,Speakers,,,,,,,,

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Digital Camera,Lab Top Case,Speakers,,,,,,,

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Digital Camera,Lab Top,Speakers,Anti-Virus,Lab Top Case,,,,

KMART.CSV

Decorative Pillows,"Quilts

",Embroidered Bedspread,,,,

Embroidered Bedspread,"Shams","Kids Bedding

",Bedding Collections,"Bed Skirts",Bedspreads,"Sheets"

Decorative Pillows,"Quilts

",Embroidered Bedspread,"Shams","Kids Bedding

",Bedding Collections,

Kids Bedding,Bedding Collections,"Sheets",Bedspreads,"Bed Skirts",,

Decorative Pillows,"Kids Bedding

",Bedding Collections,"Sheets[SEP]","Bed Skirts[SEP]",Bedspreads,

Bedding Collections,Bedspreads,"Bed Skirts[SEP]","Sheets[SEP]","Shams[SEP]","Kids Bedding

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Decorative Pillows,Quilts,,,,,

"Decorative Pillows,",Quilts,Embroidered Bedspread,,,,

Bedspreads,"Bed Skirts[SEP]","Shams[SEP]","Kids Bedding

","Sheets[SEP]",,

Quilts,Embroidered Bedspread,Bedding Collections,,,,

Bedding Collections,Bedspreads,"Bed Skirts[SEP]","Kids Bedding

","Shams[SEP]",Sheets,

Decorative Pillows,Quilts,,,,,

Embroidered Bedspread,"Shams[SEP]",,,,,

Sheets,"Shams[SEP]","Bed Skirts[SEP]","Kids Bedding

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Decorative Pillows,Quilts,,,,,

Decorative Pillows,"Kids Bedding

","Bed Skirts[SEP]","Shams[SEP]",,,

Decorative Pillows,"Shams[SEP]","Bed Skirts[SEP]",,,,

Quilts,Sheets,"Kids Bedding

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Shams,"Bed Skirts[SEP]","Kids Bedding

",Sheets,,,

Decorative Pillows,Bedspreads,"Shams[SEP]",Sheets,"Bed Skirts[SEP]","Kids Bedding

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NIKE.CSV

Running Shoe,Socks,Sweatshirts,Modern Pants,,,,,,

Running Shoe,Socks,Sweatshirts,,,,,,,

Running Shoe,Socks,Sweatshirts,Modern Pants,,,,,,

Running Shoe,Sweatshirts,Modern Pants,,,,,,,

Running Shoe,Socks,Sweatshirts,Modern Pants,Soccer Shoe,,,,,

Running Shoe,Socks,Sweatshirts,,,,,,,

Running Shoe,Socks,Sweatshirts,Modern Pants,Tech Pants,Rash Guard,Hoodies,,,

Swimming Shirt,Socks,Sweatshirts,,,,,,,

Swimming Shirt,Rash Guard,Dry Fit V-Nick,Hoodies,Tech Pants,,,,,

Swimming Shirt,Rash Guard,Dry Fit V-Nick,,,,,,,

Swimming Shirt,Rash Guard,Dry Fit V-Nick,,,,,,,

Running Shoe,Swimming Shirt,Socks,Sweatshirts,Modern Pants,Soccer Shoe,Rash Guard,Hoodies,Tech Pants,Dry Fit V-Nick

Running Shoe,Swimming Shirt,Socks,Sweatshirts,Modern Pants,Soccer Shoe,Rash Guard,Tech Pants,Dry Fit V-Nick,Hoodies

Running Shoe,Swimming Shirt,Rash Guard,Tech Pants,Hoodies,Dry Fit V-Nick,,,,

Running Shoe,Swimming Shirt,Socks,Sweatshirts,Modern Pants,Dry Fit V-Nick,Rash Guard,Tech Pants,,

Swimming Shirt,Soccer Shoe,Hoodies,Dry Fit V-Nick,Tech Pants,Rash Guard,,,,

Running Shoe,Socks,,,,,,,,

"Socks,",Sweatshirts,Modern Pants,Soccer Shoe,Hoodies,Rash Guard,Tech Pants,Dry Fit V-Nick,,

Running Shoe,Swimming Shirt,Rash Guard,,,,,,,

Running Shoe,Swimming Shirt,Socks,Sweatshirts,Modern Pants,Soccer Shoe,Hoodies,Tech Pants,Rash Guard,Dry Fit V-Nick

How to run the file: python project.py datasetname.csv minimum_support(in decimal) minimum_confidence(in decimal)

```python
from csv import reader
import pandas as pd

def load_data_set():
    """
    Load a sample data set
    Returns:
        A data set: A list of transactions. Each transaction contains several items.
    """
    print("Hello, Please enter which data set you need \n 1) Press 1 for Amazon \n 2) Press 2 for BestBuy \n 3) Press 3 for Nike \n 4) Press 4 for KMart")
    while True:
        choice_of_data = input()
        if (choice_of_data == '1'):
            data = 'amazon.csv'
            print('User chose amazon dataset')
            break
        elif(choice_of_data == '2'):
            data = 'bestbuy.csv'
            print('User chose bestbuy dataset')
            break
        elif (choice_of_data == '3'):
            data = 'Nike.csv'
            print('User chose Nike dataset')
            break
        elif (choice_of_data == '4'):
            data = 'kmart.csv'
            print('User chose KMart dataset')
            break
        else:
            print("Please enter the right one")
    with open(data, 'r') as read_obj:
        # pass the file object to reader() to get the reader object
        csv_reader = reader(read_obj)

        # Pass reader object to list() to get a list of lists
        data_set = list(csv_reader)
        for items in data_set:
            for j in range(0, len(items)):
                for items1 in items:

                    if items1 == "":
                        items.remove("")

    return data_set
```

```python
def create_C1(data_set):
    """
    Create frequent candidate 1-itemset C1 by scaning data set.
    Args:
        data_set: A list of transactions. Each transaction contains several items.
    Returns:
        C1: A set which contains all frequent candidate 1-itemsets
    """
    C1 = set()
    for t in data_set:
        for item in t:
            item_set = frozenset([item])
            C1.add(item_set)
    return C1


def is_apriori(Ck_item, Lksub1):
    """
    Judge whether a frequent candidate k-itemset satisfy Apriori property.
    Args:
        Ck_item: a frequent candidate k-itemset in Ck which contains all frequent
                 candidate k-itemsets.
        Lksub1: Lk-1, a set which contains all frequent candidate (k-1)-itemsets.
    Returns:
        True: satisfying Apriori property.
        False: Not satisfying Apriori property.
    """
    for item in Ck_item:
        sub_Ck = Ck_item - frozenset([item])
        if sub_Ck not in Lksub1:
            return False
    return True


def create_Ck(Lksub1, k):
    """
    Create Ck, a set which contains all all frequent candidate k-itemsets
    by Lk-1's own connection operation.
    Args:
        Lksub1: Lk-1, a set which contains all frequent candidate (k-1)-itemsets.
        k: the item number of a frequent itemset.
    Return:
        Ck: a set which contains all all frequent candidate k-itemsets.
```

```
    Ck = set()
    len_Lksub1 = len(Lksub1)
    list_Lksub1 = list(Lksub1)
    for i in range(len_Lksub1):
        for j in range(1, len_Lksub1):
            l1 = list(list_Lksub1[i])
            l2 = list(list_Lksub1[j])
            l1.sort()
            l2.sort()
            if l1[0:k-2] == l2[0:k-2]:
                Ck_item = list_Lksub1[i] | list_Lksub1[j]
                # pruning
                if is_apriori(Ck_item, Lksub1):
                    Ck.add(Ck_item)
    return Ck


def generate_Lk_by_Ck(data_set, Ck, min_support, support_data):
    """
    Generate Lk by executing a delete policy from Ck.
    Args:
        data_set: A list of transactions. Each transaction contains several items.
        Ck: A set which contains all all frequent candidate k-itemsets.
        min_support: The minimum support.
        support_data: A dictionary. The key is frequent itemset and the value is support.
    Returns:
        Lk: A set which contains all all frequent k-itemsets.
    """
    Lk = set()
    item_count = {}
    for t in data_set:
        for item in Ck:
            if item.issubset(t):
                if item not in item_count:
                    item_count[item] = 1
                else:
                    item_count[item] += 1
    t_num = float(len(data_set))
    for item in item_count:
        if (item_count[item] / t_num) >= min_support:
            Lk.add(item)
            support_data[item] = item_count[item] / t_num
    return Lk
```

```python
def generate_L(data_set, k, min_support):
    """
    Generate all frequent itemsets.
    Args:
        data_set: A list of transactions. Each transaction contains several items.
        k: Maximum number of items for all frequent itemsets.
        min_support: The minimum support.
    Returns:
        L: The list of Lk.
        support_data: A dictionary. The key is frequent itemset and the value is support.
    """
    support_data = {}
    C1 = create_C1(data_set)
    L1 = generate_Lk_by_Ck(data_set, C1, min_support, support_data)
    Lksub1 = L1.copy()
    L = []
    L.append(Lksub1)
    for i in range(2, k+1):
        Ci = create_Ck(Lksub1, i)
        Li = generate_Lk_by_Ck(data_set, Ci, min_support, support_data)
        Lksub1 = Li.copy()
        L.append(Lksub1)
    return L, support_data


def generate_big_rules(L, support_data, min_conf):
    """
    Generate big rules from frequent itemsets.
    Args:
        L: The list of Lk.
        support_data: A dictionary. The key is frequent itemset and the value is support.
        min_conf: Minimal confidence.
    Returns:
        big_rule_list: A list which contains all big rules. Each big rule is represented
                       as a 3-tuple.
    """
    big_rule_list = []
    sub_set_list = []
    for i in range(0, len(L)):
        for freq_set in L[i]:
            for sub_set in sub_set_list:
                if sub_set.issubset(freq_set):
                    conf = support_data[freq_set] / support_data[freq_set - sub_set]
                    big_rule = (freq_set - sub_set, sub_set, conf)
```

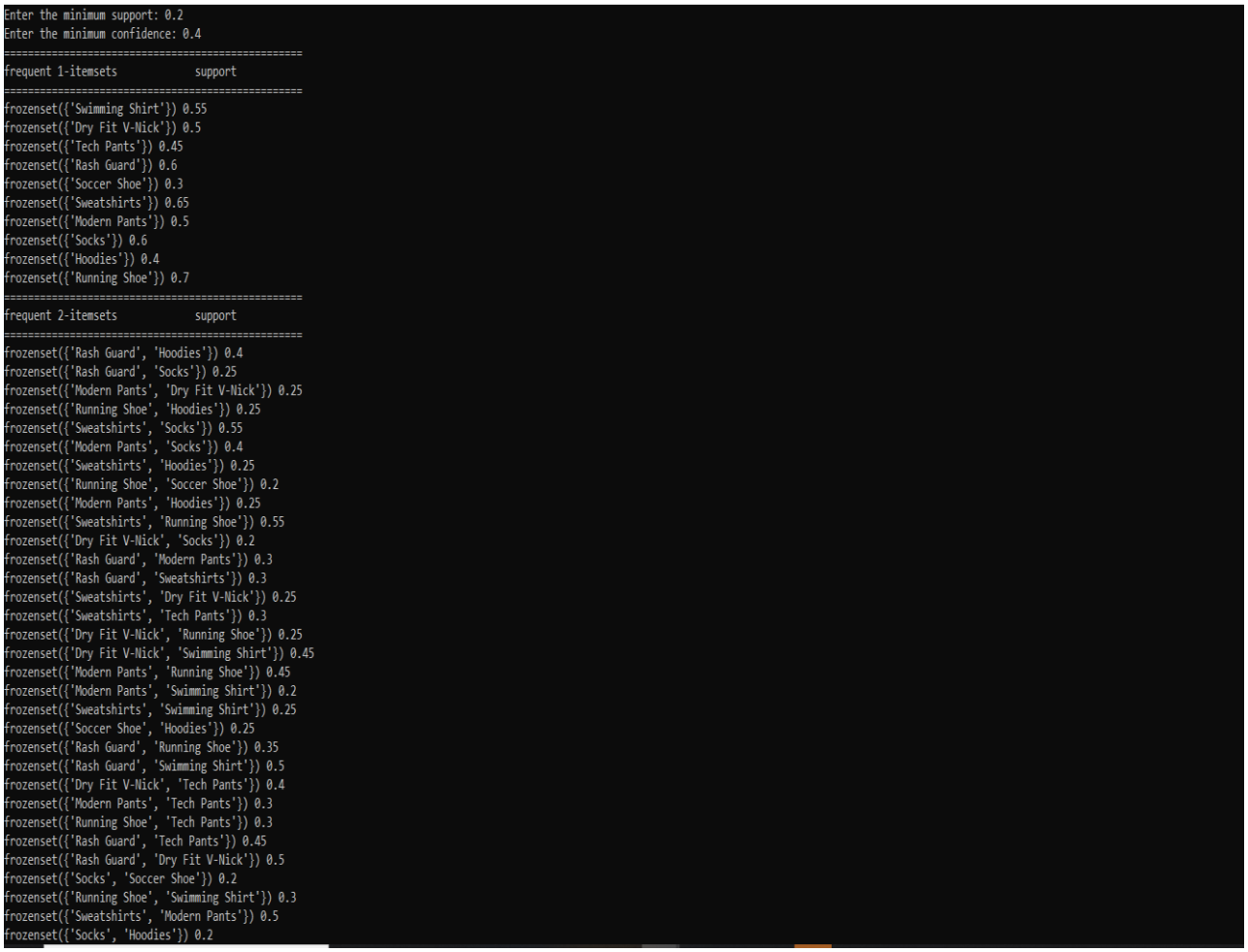
```
                    if conf >= min_conf and big_rule not in big_rule_list:
                        # print freq_set-sub_set, " => ", sub_set, "conf: ", conf
                        big_rule_list.append(big_rule)
            sub_set_list.append(freq_set)
    return big_rule_list


if __name__ == "__main__":
    """
    Test
    """
    data_set = load_data_set()
    L, support_data = generate_L(data_set, k=3, min_support = float(input("Enter the minimum support: ")))
    big_rules_list = generate_big_rules(L, support_data, min_conf= float(input("Enter the minimum confidence: ")))
    for Lk in L:
        print("="*50)
        print("frequent " + str(len(list(Lk)[0])) + "-itemsets\t\tsupport")
        print("="*50)
        for freq_set in Lk:
            print(freq_set, support_data[freq_set])
    print
    print("Big Rules")
    for item in big_rules_list:
        print(item[0], "=>", item[1], "conf: ", item[2])
```

INPUT

```
C:\Users\admin\Desktop\Mid_term_DATA_MINING>python apriori.py
Hello, Please enter which data set you need
 1) Press 1 for Amazon
 2) Press 2 for BestBuy
 3) Press 3 for Nike
 4) Press 4 for KMart
3
User chose Nike dataset
Enter the minimum support: 0.2
Enter the minimum confidence: 0.4
```

OUTPUT



```
Enter the minimum support: 0.2
Enter the minimum confidence: 0.4
================================================
frequent 1-itemsets            support
================================================
frozenset({'Swimming Shirt'}) 0.55
frozenset({'Dry Fit V-Nick'}) 0.5
frozenset({'Tech Pants'}) 0.45
frozenset({'Rash Guard'}) 0.6
frozenset({'Soccer Shoe'}) 0.3
frozenset({'Sweatshirts'}) 0.65
frozenset({'Modern Pants'}) 0.5
frozenset({'Socks'}) 0.6
frozenset({'Hoodies'}) 0.4
frozenset({'Running Shoe'}) 0.7
================================================
frequent 2-itemsets            support
================================================
frozenset({'Rash Guard', 'Hoodies'}) 0.4
frozenset({'Rash Guard', 'Socks'}) 0.25
frozenset({'Modern Pants', 'Dry Fit V-Nick'}) 0.25
frozenset({'Running Shoe', 'Hoodies'}) 0.25
frozenset({'Sweatshirts', 'Socks'}) 0.55
frozenset({'Modern Pants', 'Socks'}) 0.4
frozenset({'Sweatshirts', 'Hoodies'}) 0.25
frozenset({'Running Shoe', 'Soccer Shoe'}) 0.2
frozenset({'Modern Pants', 'Hoodies'}) 0.25
frozenset({'Sweatshirts', 'Running Shoe'}) 0.55
frozenset({'Dry Fit V-Nick', 'Socks'}) 0.2
frozenset({'Rash Guard', 'Modern Pants'}) 0.3
frozenset({'Rash Guard', 'Sweatshirts'}) 0.3
frozenset({'Sweatshirts', 'Dry Fit V-Nick'}) 0.25
frozenset({'Sweatshirts', 'Tech Pants'}) 0.3
frozenset({'Dry Fit V-Nick', 'Running Shoe'}) 0.25
frozenset({'Dry Fit V-Nick', 'Swimming Shirt'}) 0.45
frozenset({'Modern Pants', 'Running Shoe'}) 0.45
frozenset({'Modern Pants', 'Swimming Shirt'}) 0.2
frozenset({'Sweatshirts', 'Swimming Shirt'}) 0.25
frozenset({'Soccer Shoe', 'Hoodies'}) 0.25
frozenset({'Rash Guard', 'Running Shoe'}) 0.35
frozenset({'Rash Guard', 'Swimming Shirt'}) 0.5
frozenset({'Dry Fit V-Nick', 'Tech Pants'}) 0.4
frozenset({'Modern Pants', 'Tech Pants'}) 0.3
frozenset({'Running Shoe', 'Tech Pants'}) 0.3
frozenset({'Rash Guard', 'Tech Pants'}) 0.45
frozenset({'Rash Guard', 'Dry Fit V-Nick'}) 0.5
frozenset({'Socks', 'Soccer Shoe'}) 0.2
frozenset({'Running Shoe', 'Swimming Shirt'}) 0.3
frozenset({'Sweatshirts', 'Modern Pants'}) 0.5
frozenset({'Socks', 'Hoodies'}) 0.2
```

```
================================================
frequent 3-itemsets             support
================================================
frozenset({'Socks', 'Swimming Shirt', 'Tech Pants'}) 0.2
frozenset({'Rash Guard', 'Running Shoe', 'Modern Pants'}) 0.25
frozenset({'Rash Guard', 'Dry Fit V-Nick', 'Hoodies'}) 0.35
frozenset({'Sweatshirts', 'Running Shoe', 'Soccer Shoe'}) 0.2
frozenset({'Modern Pants', 'Soccer Shoe', 'Hoodies'}) 0.2
frozenset({'Rash Guard', 'Soccer Shoe', 'Hoodies'}) 0.25
frozenset({'Sweatshirts', 'Soccer Shoe', 'Tech Pants'}) 0.2
frozenset({'Modern Pants', 'Sweatshirts', 'Tech Pants'}) 0.3
frozenset({'Dry Fit V-Nick', 'Soccer Shoe', 'Tech Pants'}) 0.25
frozenset({'Dry Fit V-Nick', 'Soccer Shoe', 'Hoodies'}) 0.25
frozenset({'Soccer Shoe', 'Rash Guard', 'Modern Pants'}) 0.2
frozenset({'Sweatshirts', 'Soccer Shoe', 'Hoodies'}) 0.2
frozenset({'Modern Pants', 'Sweatshirts', 'Swimming Shirt'}) 0.2
frozenset({'Socks', 'Running Shoe', 'Hoodies'}) 0.2
frozenset({'Swimming Shirt', 'Soccer Shoe', 'Hoodies'}) 0.2
frozenset({'Sweatshirts', 'Dry Fit V-Nick', 'Soccer Shoe'}) 0.2
frozenset({'Tech Pants', 'Soccer Shoe', 'Hoodies'}) 0.25
frozenset({'Modern Pants', 'Dry Fit V-Nick', 'Rash Guard'}) 0.25
frozenset({'Rash Guard', 'Sweatshirts', 'Soccer Shoe'}) 0.2
frozenset({'Rash Guard', 'Sweatshirts', 'Modern Pants'}) 0.3
frozenset({'Sweatshirts', 'Dry Fit V-Nick', 'Socks'}) 0.2
frozenset({'Dry Fit V-Nick', 'Running Shoe', 'Tech Pants'}) 0.25
frozenset({'Sweatshirts', 'Socks', 'Hoodies'}) 0.2
frozenset({'Socks', 'Running Shoe', 'Soccer Shoe'}) 0.2
frozenset({'Modern Pants', 'Running Shoe', 'Socks'}) 0.4
frozenset({'Rash Guard', 'Swimming Shirt', 'Tech Pants'}) 0.35
frozenset({'Rash Guard', 'Modern Pants', 'Hoodies'}) 0.25
frozenset({'Modern Pants', 'Socks', 'Rash Guard'}) 0.25
frozenset({'Sweatshirts', 'Dry Fit V-Nick', 'Rash Guard'}) 0.25
frozenset({'Modern Pants', 'Dry Fit V-Nick', 'Swimming Shirt'}) 0.2
frozenset({'Modern Pants', 'Running Shoe', 'Tech Pants'}) 0.25
frozenset({'Modern Pants', 'Dry Fit V-Nick', 'Socks'}) 0.2
frozenset({'Sweatshirts', 'Tech Pants', 'Hoodies'}) 0.25
frozenset({'Running Shoe', 'Dry Fit V-Nick', 'Socks'}) 0.2
frozenset({'Dry Fit V-Nick', 'Running Shoe', 'Hoodies'}) 0.2
frozenset({'Sweatshirts', 'Dry Fit V-Nick', 'Tech Pants'}) 0.25
frozenset({'Rash Guard', 'Sweatshirts', 'Swimming Shirt'}) 0.2
frozenset({'Sweatshirts', 'Socks', 'Running Shoe'}) 0.5
frozenset({'Modern Pants', 'Socks', 'Swimming Shirt'}) 0.2
frozenset({'Rash Guard', 'Running Shoe', 'Hoodies'}) 0.25
frozenset({'Sweatshirts', 'Dry Fit V-Nick', 'Swimming Shirt'}) 0.2
frozenset({'Modern Pants', 'Dry Fit V-Nick', 'Running Shoe'}) 0.2
frozenset({'Modern Pants', 'Tech Pants', 'Hoodies'}) 0.25
frozenset({'Rash Guard', 'Dry Fit V-Nick', 'Soccer Shoe'}) 0.25
frozenset({'Soccer Shoe', 'Swimming Shirt', 'Tech Pants'}) 0.2
frozenset({'Tech Pants', 'Running Shoe', 'Hoodies'}) 0.25
frozenset({'Socks', 'Running Shoe', 'Tech Pants'}) 0.25
```

```
frozenset({'Sweatshirts', 'Dry Fit V-Nick', 'Running Shoe'}) 0.2
frozenset({'Sweatshirts', 'Socks', 'Tech Pants'}) 0.25
Big Rules
frozenset({'Hoodies'}) => frozenset({'Rash Guard'}) conf:  1.0
frozenset({'Rash Guard'}) => frozenset({'Hoodies'}) conf:  0.6666666666666667
frozenset({'Socks'}) => frozenset({'Rash Guard'}) conf:  0.4166666666666667
frozenset({'Rash Guard'}) => frozenset({'Socks'}) conf:  0.4166666666666667
frozenset({'Modern Pants'}) => frozenset({'Dry Fit V-Nick'}) conf:  0.5
frozenset({'Dry Fit V-Nick'}) => frozenset({'Modern Pants'}) conf:  0.5
frozenset({'Hoodies'}) => frozenset({'Running Shoe'}) conf:  0.625
frozenset({'Socks'}) => frozenset({'Sweatshirts'}) conf:  0.9166666666666667
frozenset({'Sweatshirts'}) => frozenset({'Socks'}) conf:  0.8461538461538461
frozenset({'Socks'}) => frozenset({'Modern Pants'}) conf:  0.6666666666666667
frozenset({'Modern Pants'}) => frozenset({'Socks'}) conf:  0.8
frozenset({'Hoodies'}) => frozenset({'Sweatshirts'}) conf:  0.625
frozenset({'Soccer Shoe'}) => frozenset({'Running Shoe'}) conf:  0.6666666666666667
frozenset({'Hoodies'}) => frozenset({'Modern Pants'}) conf:  0.625
frozenset({'Modern Pants'}) => frozenset({'Hoodies'}) conf:  0.5
frozenset({'Running Shoe'}) => frozenset({'Sweatshirts'}) conf:  0.7857142857142858
frozenset({'Sweatshirts'}) => frozenset({'Running Shoe'}) conf:  0.8461538461538461
frozenset({'Dry Fit V-Nick'}) => frozenset({'Socks'}) conf:  0.4
frozenset({'Modern Pants'}) => frozenset({'Rash Guard'}) conf:  0.6
frozenset({'Rash Guard'}) => frozenset({'Modern Pants'}) conf:  0.5
frozenset({'Sweatshirts'}) => frozenset({'Rash Guard'}) conf:  0.4615384615384615
frozenset({'Rash Guard'}) => frozenset({'Sweatshirts'}) conf:  0.5
frozenset({'Dry Fit V-Nick'}) => frozenset({'Sweatshirts'}) conf:  0.5
frozenset({'Sweatshirts'}) => frozenset({'Tech Pants'}) conf:  0.4615384615384615
frozenset({'Tech Pants'}) => frozenset({'Sweatshirts'}) conf:  0.6666666666666666
frozenset({'Dry Fit V-Nick'}) => frozenset({'Running Shoe'}) conf:  0.5
frozenset({'Dry Fit V-Nick'}) => frozenset({'Swimming Shirt'}) conf:  0.9
frozenset({'Swimming Shirt'}) => frozenset({'Dry Fit V-Nick'}) conf:  0.8181818181818181
frozenset({'Running Shoe'}) => frozenset({'Modern Pants'}) conf:  0.6428571428571429
frozenset({'Modern Pants'}) => frozenset({'Running Shoe'}) conf:  0.9
frozenset({'Modern Pants'}) => frozenset({'Swimming Shirt'}) conf:  0.4
frozenset({'Swimming Shirt'}) => frozenset({'Sweatshirts'}) conf:  0.45454545454545453
frozenset({'Hoodies'}) => frozenset({'Soccer Shoe'}) conf:  0.625
frozenset({'Soccer Shoe'}) => frozenset({'Hoodies'}) conf:  0.8333333333333334
frozenset({'Running Shoe'}) => frozenset({'Rash Guard'}) conf:  0.5
frozenset({'Rash Guard'}) => frozenset({'Running Shoe'}) conf:  0.5833333333333334
frozenset({'Rash Guard'}) => frozenset({'Swimming Shirt'}) conf:  0.8333333333333334
frozenset({'Swimming Shirt'}) => frozenset({'Rash Guard'}) conf:  0.9090909090909091
frozenset({'Tech Pants'}) => frozenset({'Dry Fit V-Nick'}) conf:  0.8888888888888889
frozenset({'Dry Fit V-Nick'}) => frozenset({'Tech Pants'}) conf:  0.8
frozenset({'Modern Pants'}) => frozenset({'Tech Pants'}) conf:  0.6
frozenset({'Tech Pants'}) => frozenset({'Modern Pants'}) conf:  0.6666666666666666
frozenset({'Running Shoe'}) => frozenset({'Tech Pants'}) conf:  0.4285714285714286
frozenset({'Tech Pants'}) => frozenset({'Running Shoe'}) conf:  0.6666666666666666
frozenset({'Rash Guard'}) => frozenset({'Tech Pants'}) conf:  0.75
frozenset({'Tech Pants'}) => frozenset({'Rash Guard'}) conf:  1.0
frozenset({'Rash Guard'}) => frozenset({'Dry Fit V-Nick'}) conf:  0.8333333333333334
```