**Homework 4** Nasir Khan (0075244) In [1]: import pandas as pd from sklearn.model selection import train test split from sklearn.feature\_extraction.text import TfidfVectorizer from sklearn.feature\_extraction.text import CountVectorizer from sklearn.svm import SVR from sklearn.metrics import accuracy score In [2]: | df = pd.read\_csv('immSurvey.csv') print(df) In [105]: data= df.iloc[:,0] sentiment=df.iloc[:,1] sentiment=df.iloc[:,1] sentiment=sentiment.to numpy() print(data) problems caused by the influx of illegal immig... if you mean illegal immigration, i'm afraid of... 2 that they should enter the same way my grandpa... 3 legally entering the usa meeting the requireme... terror bombings killing us robbing america those people that are here illegally should be... 335 336 racism & xenophobia make me worried! also, co... 337 that immigrants are the heart and soul and the... 338 job security for our citizens public safety, effect on the economy, whether  $\dots$ 339 Name: text, Length: 340, dtype: object In [104]: vectorizer = CountVectorizer() matrix = vectorizer.fit\_transform(data) matrix=matrix.toarray() print(vectorizer.get\_feature\_names()) ['11', '12', '125', '18', '1b', '600', '95', 'able', 'abolition', 'aboration', 'about', 'abroad', 'ab use', 'abused', 'abuses', 'access', 'accidents', 'accomodated', 'accomodating', 'accomplish', 'accoun tability', 'accross', 'across', 'act', 'actively', 'activities', 'activity', 'actually', 'adapting', 'adjust', 'advantage', 'affects', 'afford', 'afraid', 'after', 'again', 'against', 'agents', 'ago', 'agree', 'agreed', 'aid', 'alcohol', 'alien', 'aliens', 'alilens', 'all', 'allegiance', 'allour', 'al low', 'allowed', 'allowing', 'almost', 'along', 'already', 'also', 'alter', 'alternative', 'althoug h', 'altime', 'always', 'am', 'amercia', 'america', 'american', 'americanized', 'americans', 'america s', 'amnesty', 'among', 'amongst', 'amoung', 'amount', 'amounts', 'an', 'ancestors', 'ancious', 'an d', 'andy', 'annoying', 'another', 'answer', 'anxious', 'any', 'anymore', 'anyone', 'anything', 'anyw ay', 'apart', 'apply', 'are', 'aren', 'arent', 'arizona', 'arms', 'around', 'artificially', 'as', 'as ians', 'asked', 'assilum', 'assimilate', 'assimilated', 'assistance', 'association', 'assumption', 'a sylum', 'at', 'attack', 'attention', 'attitude', 'auto', 'availability', 'available', 'avalability', 'average', 'away', 'babies', 'back', 'backgrounds', 'bad', 'balls', 'bank', 'bankrupt', 'bar', 'barri er', 'barriers', 'base', 'based', 'basic', 'basis', 'bc', 'be', 'beauacrats', 'became', 'because', 'b ecom', 'become', 'becoming', 'been', 'before', 'began', 'beginnings', 'behoove', 'being', 'beleive', 'believe', 'belong', 'belongings', 'bending', 'benefits', 'benifits', 'bennefit', 'benrfits', 'beside s', 'better', 'between', 'bible', 'big', 'bigger', 'bigotry', 'bills', 'birth', 'bit', 'blending', 'b lood', 'boarder', 'boarders', 'bombings', 'books', 'border', 'borders', 'born', 'both', 'bother', 'bo ut', 'bowl', 'break', 'breakers', 'breaks', 'breed', 'bring', 'bringing', 'brings', 'brought', 'buil d', 'building', 'built', 'bums', 'bungling', 'burden', 'business', 'businesses', 'but', 'buttons', 'b uy', 'by', 'ca', 'california', 'came', 'can', 'cannot', 'cant', 'capitalist', 'car', 'card', 'cards', 'care', 'careless', 'cash', 'cater', 'catholic', 'cause', 'caused', 'causes', 'causing', 'centers', 'central', 'certain', 'challenge', 'chance', 'change', 'changes', 'changing', 'character', 'cheap', 'cheaper', 'cheaply', 'cheep', 'child', 'children', 'china', 'chinese', 'cities', 'citizen', 'citizen 'citizenship', 'citizenships', 'city', 'class', 'close', 'cockroaches', 'collect', 'college', me', 'comes', 'comfortable', 'coming', 'comming', 'common', 'communally', 'communities', 'community', 'companies', 'competition', 'complain', 'complaining', 'completely', 'complex', 'complicat ed', 'compromise', 'conception', 'concern', 'concerned', 'concerns', 'conditions', 'conflicts', 'conf used', 'confusion', 'congress', 'consider', 'consideration', 'construction', 'consumerism', 'contibut ion', 'continue', 'contractor', 'contribute', 'contries', 'control', 'controlled', 'controversy', 'co rporations', 'corporisation', 'correct', 'correctness', 'corruption', 'cost', 'costs', 'could', 'coun tries', 'country', 'countrys', 'counyry', 'course', 'cover', 'coverage', 'covering', 'crack', 'create d', 'creating', 'creative', 'crime', 'crimes', 'criminal', 'criminals', 'cross', 'crossing', 'crowde d', 'crowding', 'crutial', 'cultural', 'culture', 'cultures', 'current', 'custody', 'customs', 'cut', 'daily', 'damn', 'date', 'day', 'days', 'dead', 'deal', 'dealing', 'dearth', 'death', 'deaths', 'deba te', 'debating', 'debt', 'debtrement', 'decent', 'decreasing', 'deficits', 'definitely', 'degree', 'd emocracy', 'denied', 'denieded', 'deny', 'depending', 'depored', 'deported', 'depressed', 'desert', 'deserve', 'desirable', 'desire', 'desperate', 'desperation', 'developing', 'devolved', 'devotes', 'd id', 'didn', 'die', 'difference', 'different', 'differentiate', 'difficult', 'diminished', 'dirty', 'disagreement', 'discount', 'discrimination', 'disease', 'diseases', 'displacement', 'disproportional ly', 'disrespectful', 'distance', 'distinctiveness', 'division', 'do', 'dobbs', 'doctor', 'document', 'does', 'doesn', 'doing', 'dollars', 'dominant', 'don', 'done', 'donot', 'dont', 'door', 'double', 'd own', 'draft', 'drain', 'draining', 'dramatically', 'dream', 'dreams', 'dregrade', 'drinking', 'driv e', 'driven', 'driver', 'driving', 'droves', 'drug', 'drugs', 'drwaing', 'ducation', 'due', 'duffs', 'dumping', 'each', 'early', 'earned', 'earner', 'earnings', 'easier', 'easily', 'east', 'easy', 'econ any', 'economic', 'economical', 'economically', 'economy', 'edged', 'educate', 'educating', 'educatio n', 'educational', 'effect', 'effectively', 'effects', 'efforts', 'either', 'electronic', 'eliminat e', 'ellis', 'else', 'employ', 'employers', 'end', 'enemies', 'energy', 'enforce', 'enforcing', 'engl ish', 'enough', 'enought', 'ensuing', 'enter', 'entering', 'enthusiastic', 'entitlements', 'entranc e', 'entrants', 'entry', 'equal', 'equality', 'equally', 'erecting', 'esl', 'especially', 'establishe d', 'etc', 'ethinic', 'ethnic', 'europe', 'europeans', 'even', 'eventually', 'ever', 'every', 'everyb ody', 'everyone', 'everything', 'except', 'exception', 'exceptions', 'excess', 'expect', 'expense', 'expenses', 'experince', 'extent', 'extra', 'extremely', 'facing', 'fact', 'failure', 'fair', 'fairl y', 'false', 'families', 'family', 'far', 'fat', 'fathers', 'favor', 'fear', 'fears', 'feed', 'feel', 'fees', 'fence', 'fences', 'fighting', 'file', 'filed', 'fill', 'filled', 'financial', 'find', 'findi ng', 'fine', 'fined', 'finincal', 'firmly', 'first', 'fix', 'fixing', 'flag', 'flat', 'flood', 'flyin g', 'focus', 'following', 'food', 'for', 'force', 'forcing', 'foreign', 'foreigner', 'foreigners', 'foresee', 'forget', 'form', 'former', 'forms', 'forth', 'fortune', 'fought', 'found', 'founded', ' ding', 'framed', 'free', 'freebies', 'freedom', 'freedoms', 'freezing', 'from', 'frustrated', 'frustr ation', 'fueled', 'full', 'fullest', 'function', 'fund', 'fundamental', 'future', 'gang', 'gangs', 'g et', 'gets', 'getting', 'giant', 'give', 'given', 'giving', 'go', 'gods', 'going', 'gone', 'good', 'g ov', 'government', 'government', 'governs', 'govt', 'grad', 'grande', 'grandmother', 'grandparents', 'granted', 'great', 'greater', 'green', 'grew', 'groceries', 'groups', 'growth', 'guidelines', 'had', 'hand', 'handing', 'hands', 'happen', 'happened', 'hard', 'harder', 'has', 'hated', 'have', 'having', 'heads', 'health', 'healthcare', 'hear', 'heart', 'heavy', 'hell', 'help', 'helped', 'here', 'heritag e', 'high', 'higher', 'hiking', 'hire', 'hiring', 'his', 'hispanic', 'hispanics', 'history', 'hold', 'home', 'homes', 'honest', 'honor', 'hospital', 'hospitality', 'hospitals', 'house', 'houses', 'housi ng', 'how', 'however', 'huachuca', 'human', 'humane', 'humanitarian', 'hundreds', 'hungry', 'husban d', 'hyped', 'hypocrisy', 'idea', 'if', 'ifea', 'ignorance', 'ileaglely', 'ileagles', 'ilegal', 'il k', 'illeagal', 'illeagally', 'illegally', 'illegally', 'illegals', 'illegaly', 'illegals', 'im', 'imigerants', 'imigration', 'immagrants', 'immagrates', 'immagration', 'immagrtants', 'immediat ely', 'immigrant', 'immigrants', 'immigrate', 'immigrated', 'immigratens', 'immigrates', 'immigratio n', 'immigrats', 'immigrents', 'immingration', 'impact', 'improperly', 'ims', 'in', 'incarceration', 'incentive', 'including', 'income', 'increased', 'increased', 'increases', 'increases' 'incredible', 'indians', 'individualism', 'individuals', 'inexpensive', 'infest', 'inflation', 'influ x', 'info', 'inforce', 'informed', 'infrastructure', 'insist', 'inspanish', 'instead', 'institution', 'insurance', 'insurances', 'interest', 'inthe', 'into', 'intolerance', 'invitation', 'involved', 'ire land', 'irish', 'is', 'island', 'isn', 'isnt', 'issue', 'issues', 'it', 'its', 'itself', 'jailed', 'j ails', 'jerks', 'jingoism', 'job', 'jobs', 'jobsite', 'joke', 'just', 'justice', 'keep', 'keeping', 'kept', 'kicked', 'kids', 'kill', 'killed', 'killing', 'kind', 'king', 'kneejerk', 'know', 'labor', 'laborers', 'lack', 'lacking', 'land', 'lands', 'landscape', 'languages', 'languages', 'languages', 'la rge', 'largely', 'larger', 'largest', 'last', 'later', 'latinos', 'law', 'laws', 'lawyer', 'lazy', 'l eaching', 'lead', 'learn', 'learning', 'leave', 'leaves', 'leaving', 'legal', 'legality', 'legalize', 'legally', 'legals', 'legimate', 'les', 'less', 'let', 'letting', 'level', 'liberty', 'license', 'lic enses', 'lie', 'life', 'like', 'likely', 'lingual', 'little', 'live', 'lived', 'lives', 'living', 'lo aders', 'lobbyists', 'long', 'looking', 'lose', 'losing', 'loss', 'losses', 'lost', 'lot', 'lou', 'lo w', 'lower', 'lowered', 'lowering', 'lurk', 'made', 'mainly', 'major', 'make', 'makes', 'makeup', 'ma king', 'manage', 'manifest', 'manners', 'many', 'marginalizes', 'married', 'matter', 'may', 'maybe', 'me', 'mean', 'means', 'meanwhile', 'media', 'medical', 'meeting', 'melting', 'members', 'men', 'meni al', 'mess', 'met', 'mex', 'mexican', 'mexicans', 'mexico', 'mid', 'might', 'migrant', 'miles', 'milk ed', 'million', 'minimum', 'minor', 'minority', 'mistreatment', 'modern', 'money', 'month', 'more', 'most', 'mostly', 'motel', 'moving', 'mtns', 'much', 'multi', 'murder', 'muslems', 'must', 'my', 'nat ion', 'national', 'nationalities', 'nations', 'native', 'natural', 'naturalization', 'naturalized', 'nazi', 'necessary', 'need', 'needed', 'needing', 'needs', 'negotiable', 'negotiate', 'neoliberal', 'never', 'new', 'newer', 'news', 'no', 'non', 'nor', 'normal', 'north', 'not', 'nothing', 'now', 'num ber', 'numbers', 'obey', 'obtain', 'obtaining', 'occur', 'of', 'off', 'often', 'ok', 'on', 'once', 'o ne', 'ones', 'only', 'open', 'opportunities', 'opportunity', 'options', 'or', 'order', 'organizatio n', 'other', 'others', 'otherwise', 'our', 'ours', 'out', 'outsourcing', 'over', 'overall', 'overcrow ded', 'overpopulation', 'overwhelmed', 'overwhelming', 'owe', 'own', 'owners', 'paid', 'painting', 'p aper', 'papers', 'paperwork', 'par', 'parents', 'part', 'parties', 'party', 'passports', 'past', 'pat rol', 'pay', 'payer', 'payers', 'payin', 'paying', 'payments', 'pennies', 'people', 'per', 'period', 'permit', 'perpetuate', 'persecution', 'person', 'personally', 'persons', 'persued', 'phone', 'physic ally', 'picked', 'pigs', 'place', 'places', 'pledge', 'point', 'police', 'policy', 'political', 'poli ticians', 'poor', 'poore', 'poorer', 'poorly', 'populated', 'population', 'portion', 'positive', 'pos sibility', 'possible', 'possibly', 'pot', 'potential', 'poverty', 'pox', 'practices', 'prejudice', 'p rescriptions', 'prices', 'primarily', 'primary', 'printing', 'prison', 'prisons', 'probably', 'proble m', 'problembs', 'problems', 'process', 'procured', 'production', 'productive', 'profits', 'program s', 'proper', 'property', 'protect', 'protected', 'provide', 'provides', 'providing', 'public', 'punc h', 'pur', 'push', 'put', 'putting', 'quality', 'question', 'questions', 'quite', 'quotas', 'races', 'racism', 'railroad', 'raise', 'raised', 'rate', 'rates', 'rather', 're', 'real', 'really', 'reason', 'reasonable', 'reasons', 'receive', 'receptive', 'recieve', 'recieving', 'recipients', 'record', 'red uce', 'refugees', 'refusal', 'refuse', 'regard', 'registered', 'regulations', 'relation', 'relativel y', 'religious', 'remain', 'remove', 'removed', 'rent', 'repair', 'replace', 'reproducing', 'republic an', 'require', 'required', 'requirements', 'requires', 'requiring', 'resent', 'residency', 'residen t', 'residents', 'resources', 'resouses', 'respect', 'responsibly', 'rest', 'restrict', 'retired', 'r eturns', 'revenue', 'rich', 'richer', 'riches', 'ride', 'ridiculous', 'right', 'rights', 'rio', 'rise s', 'rising', 'risk', 'roads', 'rob', 'robbery', 'robbing', 'romans', 'rome', 'rooney', 'rules', 'ru n', 'sacrificed', 'safe', 'safely', 'safer', 'safety', 'said', 'salary', 'same', 'saying', 'school', 'schooling', 'schools', 'screening', 'se', 'seal', 'sealing', 'seas', 'season', 'second', 'secure', 'secured', 'security', 'see', 'seeking', 'seem', 'seems', 'self', 'selves', 'send', 'seniors', 'sensi ble', 'sent', 'sentiment', 'service', 'services', 'set', 'share', 'sheer', 'shopping', 'shortage', 's houd', 'should', 'shouldn', 'sick', 'side', 'silliness', 'simply', 'since', 'sink', 'sitting', 'situa tion', 'skilled', 'skills', 'slave', 'slavery', 'slip', 'slobs', 'small', 'smuggled', 'sneack', 'snea k', 'sneaking', 'so', 'social', 'socialistic', 'society', 'solution', 'some', 'someone', 'something', 'sometimes', 'somewhere', 'soon', 'sooner', 'soul', 'source', 'sources', 'south', 'southern', 'sovere ignty', 'sp', 'spanish', 'speak', 'speakers', 'speaking', 'speaknglish', 'speaks', 'special', 'spen
d', 'spends', 'spoken', 'spouses', 'spread', 'ssa', 'ssi', 'ssn', 'stamps', 'stand', 'standards', 'st art', 'starving', 'state', 'states', 'statue', 'stay', 'staying', 'steal', 'stealing', 'still', 'stir red', 'stolen', 'stop', 'strain', 'strengths', 'stretching', 'strict', 'strife', 'stringent', 'stron g', 'structure', 'student', 'students', 'stuff', 'stupid', 'stupidity', 'style', 'subject', 'subsidiz e', 'substantial', 'subversive', 'such', 'suffering', 'summer', 'support', 'supported', 'supporting', 'sure', 'sweat', 'sword', 'syst', 'system', 'systems', 'table', 'take', 'taken', 'takes', 'taking', 'talk', 'tarriff', 'tax', 'taxed', 'taxes', 'taxing', 'taxpayer', 'taxpayers', 'teachers', 'technical ly', 'technology', 'tend', 'tererism', 'term', 'terms', 'terorists', 'terrism', 'terroist', 'terror', 'terrorism', 'terrorist', 'terrorists', 'texas', 'than', 'that', 'their, 'theirs', 'them', 't hemselves', 'themsleves', 'then', 'there', 'thereafter', 'therefore', 'these', 'they', 'thier', 'thie ves', 'thing', 'think', 'thinking', 'third', 'this', 'those', 'though', 'thoughts', 'threa t', 'through', 'time', 'tired', 'to', 'toaccomidate', 'tobe', 'today', 'told', 'tolerated', 'too', 't orn', 'total', 'totally', 'tough', 'tourist', 'toward', 'towards', 'town', 'trade', 'traditions', 'tr afficing', 'trafic', 'tramatized', 'transfer', 'translates', 'treat', 'treated', 'treating', 'treatme nt', 'tremendous', 'tried', 'trouble', 'truckers', 'trucks', 'try', 'tryin', 'trying', 'turn', 'ulima tely', 'unable', 'unattainable', 'unconstitutional', 'under', 'undercut', 'undereducated', 'undergrou nd', 'underpaid', 'understand', 'undocumented', 'undocummented', 'undue', 'unemployment', 'unfair', 'unfortunate', 'unfortunately', 'unfulfilled', 'unified', 'united', 'unkempt', 'unknown', 'unless', 'unpaid', 'unsecured', 'until', 'unventilated', 'unwanteds', 'up', 'upkeep', 'upper', 'upsetting', 'u s', 'usa', 'use', 'used', 'using', 'value', 'values', 've', 'verse', 'versed', 'very', 'vigilantes', 'violates', 'violence', 'violent', 'virtual', 'visa', 'visas', 'visit', 'vote', 'vs', 'wage', 'wage s', 'waiting', 'walk', 'wall', 'walls', 'want', 'wanting', 'war', 'was', 'washington', 'waste', 'wa y', 'ways', 'we', 'weak', 'weaking', 'wealth', 'wealthy', 'weighing', 'welfare', 'well', 'were', 'wes terns', 'what', 'when', 'where', 'which', 'while', 'white', 'who', 'whom', 'whose', 'why', 'wide', 'widowed', 'will', 'willing', 'wise', 'with', 'within', 'withno', 'without', 'woman', 'wome n', 'won', 'wonder', 'wont', 'work', 'worked', 'worker', 'workers', 'workforce', 'working', 'works', 'world', 'worried', 'worries', 'worrty', 'worry', 'would', 'wouldn', 'wreckless', 'wrong', 'wrongly', 'xenophobia', 'years', 'yet', 'you', 'young', 'your', 'yrars'] In [ ]: In [66]: counts = pd.DataFrame(matrix.toarray(), columns=vectorizer.get\_feature\_names()) ## Words with frequency in ascending orde counts Out[66]: 11 12 125 18 1b 600 95 able abolition aboration ... wreckless wrong wrongly xenophobia years yet you young you 0 ... 1 0 335 0 0 0 0 0 0 0 0 ... 0 0 0 0 0 0 0 336 0 0 0 0 0 0 0 0 0 0 0 0 337 0 0 0 2 0 0 ... 338 0 0 0 0 0 0 0 0 0 0 0 0 339 0 0 340 rows × 1475 columns counts.T.sort\_values(by=0, ascending=False).head(20) In [67]: Out[67]: 3 4 5 6 7 8 9 ... 330 331 332 333 335 337 338 334 336 0 of 3 1 2 1 0 0 0 0 0 1 ... 0 4 0 0 0 1 3 0 0 and 2 0 2 2 0 0 2 1 1 1 0 2 2 hospitals 2 0 schools caused 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 illegal 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 problems 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 ducation 1 0 0 0 0 0 0 0 0 0 0 0 influx 0 3 0 immigrants 1 0 0 0 0 0 0 2 0 0 0 0 4 0 0 1 0 3 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 **by** 1 0 0 1 0 0 0 0 0 0 0 care 1 0 0 0 0 0 0 0 0 1 ... 0 20 rows × 340 columns tfidf=TfidfVectorizer(max\_df=0.90, min\_df=2, max\_features=1000, stop\_words='english') In [68]: tfidf matrix=tfidf.fit transform(data) df tfidf = pd.DataFrame(tfidf\_matrix.todense()) df\_tfidf Out[68]: 5 448 449 450 451 452 453 454 0.000000 0.0 0.000000 0.000000 0.0 0.000000 0.0 0.0 0.0 0.00000 0.000000 0.000000 0.000000 0.0 0.0 0.0 0.0 0.0 0.0 0.000000 0.000000 0.0 0.0 0.0 0.000 0.000000 0.0000000 0.00000 0.000 ... 0.198143 0.000000 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.000000 0.0 0.000000 0.000000 0.000 0.000000 0.0 0.0 0.0 0.0 0.0 0.597039 0.00000 0.0 0.0 0.0 0.000000 0.000000 0.000000 0.000 0.000000 0.0 0.000000 335 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 ... 0.000000 0.00000 0.0 0.0 0.0 0.000000 0.000000 0.000 0.0 0.000000 0.000 0.000000 0.000000 0.510325 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.00000 0.0 0.0 0.0 0.232198 0.0 0.0 0.142128 0.0 0.0 0.0 0.0 0.0 0.0 0.111366 0.000000 0.09229 0.0 0.0 0.0 0.000000 0.000000 0.272 337 338 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.000000 0.000000 0.00000 0.0 0.0 0.0 0.000000 0.000000 0.000000 0.000 339 0.0 0.0 0.0 0.0 0.0 0.000000 0.000000 0.00000 0.000 340 rows × 456 columns Splitting the data Using word frequency as the feature matrix\_words = pd.DataFrame(matrix.todense()) x\_train, x\_valid, y\_train, y\_valid = train\_test\_split(matrix\_words, sentiment, test\_size=0.5, random\_state **Using Support Vector Regressor SVR** In [121]: from sklearn.svm import SVR from sklearn.metrics import accuracy score model = SVR(kernel='rbf') model.fit(x\_train, y\_train) # make predictions yhat = model.predict(x\_valid) evaluate predictions In [100]: import numpy as np import matplotlib.pyplot as plt plt.plot(x\_valid, yhat, color = 'blue') plt.ylabel("Sentiment") plt.xlabel("word\_count") plt.show() 0.75 0.50 0.25 0.00 -0.25 -0.50-0.75-1.0012 word\_count Using Random forest Regressor RFR In [120]: Fitting Random Forest Regression to the dataset # import the regressor from sklearn.ensemble import RandomForestRegressor # create regressor object regressor = RandomForestRegressor(n\_estimators = 100, random state = 0) # fit the regressor with x and y data regressor.fit(x\_train, y\_train) #Y pred = regressor.predict(np.array([6.5]).reshape(1, 1)) <math># test the output by changing valuesY\_pred=regressor.predict(x\_valid) # evaluate predictions In [117]: X grid = np.arange(min(x valid), max(x valid), 0.01) # reshape for reshaping the data into a len(X\_grid)\*1 array, # i.e. to make a column out of the X grid value X\_grid = X\_grid.reshape((len(X\_grid), 1)) plt.plot(x valid, Y pred , color = 'green') plt.title('Random Forest Regression') plt.ylabel("Sentiment") plt.xlabel("word\_count") plt.show() Random Forest Regression 1.0 0.5 0.0 -0.5-1.0-1.512 word\_count In [ ]: Splitting the data Using TF-IDF as the feature In [31]: x train tfidf, x valid tfidf, y train tfidf, y valid tfidf = train test split(df tfidf, sentiment, test s ize=0.5, random state=17) Using Support Vector Regressor SVR In [102]: model = SVR(kernel='rbf') model.fit(x\_train\_tfidf, y\_train\_tfidf) # make predictions yhat = model.predict(x valid tfidf) # evaluate predictions In [103]: plt.plot(x valid tfidf, yhat, color = 'red') plt.ylabel("Sentiment") plt.xlabel("TF-IDF values") plt.show() 0.5 0.0 Sentiment -0.5 -1.0-1.50.2 0.4 0.6 0.8 1.0 TF-IDF values **Using Random forest Regressor RFR** In [ ]: # create regressor object regressor = RandomForestRegressor(n estimators = 100, random state = 0) # fit the regressor with x and y data regressor.fit(x\_train\_tfidf,y\_train\_tfidf) #Y pred = regressor.predict(np.array([6.5]).reshape(1, 1)) # test the output by changing values Y\_pred=regressor.predict(x\_valid\_tfidf) # evaluate predictions print(Y\_pred) In [118]: plt.plot(x\_valid,Y\_pred , color = 'blue') plt.title('Random Forest Regression') plt.ylabel("Sentiment") plt.xlabel("TF-IDF values") plt.show() Random Forest Regression 1.0 0.5 Sentiment 0.0 -0.5-1.0-1.5TF-IDF values **Conclusion:** Since the data for sentiment analysis is a continuous data and not discrete so, we need to perform one hot encoding for the label(sentiment) as accuracy is a poor performance metric for continuous trpe data. However, we see that both support vector regressor and random forest regresson perfomr well and fit the data well. In [ ]: