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## Explanation:

Based on ACL2018 paper of word embeddings (uploaded to this folder):

Word embeddings -> review embeddings (four combined way) -> MLP classifier

-Trained on the whole amazon review dataset, finetuned by half of the generated needs data

-Test on the other half of generated needs text

-Use Glove 300d word embeddings

## The basic experiment results

|  |  |
| --- | --- |
|  | MLP |
| Pointwise average of word embedding  (ave) | cur\_exp\_setting: cpu,ave  ndcg:  0.2876712328767123  0.48336594911937375  0.5544760923504379  0.5597645507252158  0.5841029340489874  0.5760756320470867  0.5579476528524699  0.5623645564423853  0.5623781954767445  0.5552779482724632  precision:  0.2876712328767123  0.2700587084148728  0.25048923679060664  0.23336594911937378  0.22935420743639923  0.22765818656229614  0.22588761532010065  0.22211350293542073  0.22113502935420742  0.2162426614481409  recall:  0.07191780821917808  0.1350293542074364  0.18786692759295498  0.23336594911937378  0.28669275929549903  0.34148727984344424  0.3953033268101761  0.44422700587084146  0.49755381604696675  0.5406066536203522 |
| cur\_exp\_setting: ram,ave  ndcg:  0.6778398510242085  0.7653631284916201  0.8311584100558697  0.8832999370577319  0.8937259989850208  precision:  0.6778398510242085  0.38268156424581007  0.28988206083178153  0.24348230912476723  0.19962756052141528  recall:  0.6778398510242085  0.7653631284916201  0.8696461824953445  0.9739292364990689  0.9981378026070763 |
| cur\_exp\_setting: hd,ave  ndcg:  0.3761638733705773  0.7430167597765364  0.7982377996608173  0.8252396618582102  0.8412797571309625  precision:  0.3761638733705773  0.3715083798882682  0.27684667908131594  0.22113594040968343  0.18435754189944134  recall:  0.3761638733705773  0.7430167597765364  0.8305400372439479  0.8845437616387337  0.9217877094972067 |
| cur\_exp\_setting: gpu,ave  ndcg:  0.5847299813780261  0.8175046554934823  0.8879996000266069  0.9028971791699962  0.9149272506245604  precision:  0.5847299813780261  0.40875232774674114  0.3097454996896338  0.23975791433891994  0.1973929236499069  recall:  0.5847299813780261  0.8175046554934823  0.9292364990689013  0.9590316573556797  0.9869646182495344 |
| cur\_exp\_setting: screen,ave  ndcg:  0.7672253258845437  0.8659217877094972  0.9281923220470906  0.9337789142258616  0.943402971389513  precision:  0.7672253258845437  0.4329608938547486  0.32153941651148354  0.24394785847299813  0.19962756052141528  recall:  0.7672253258845437  0.8659217877094972  0.9646182495344506  0.9757914338919925  0.9981378026070763 |
| Pointwise maximum of word embedding  (max) | cur\_exp\_setting: cpu,max  ndcg:  0.29549902152641877  0.4598825831702544  0.5319489214460474  0.5358628157709008  0.5386363673943594  0.5260882466899816  0.5229906860297102  0.5087918935448446  0.51131641689046  0.5235763150841394  precision:  0.29549902152641877  0.2299412915851272  0.1989562948467058  0.18199608610567514  0.18003913894324852  0.20515329419439007  0.2054794520547945  0.21135029354207435  0.22722330941509022  0.22661448140900195  recall:  0.07387475538160469  0.1149706457925636  0.14921722113502936  0.18199608610567514  0.22504892367906065  0.30772994129158515  0.3595890410958904  0.4227005870841487  0.511252446183953  0.5665362035225049 |
| cur\_exp\_setting: ram,max  ndcg:  0.6945996275605214  0.819366852886406  0.8640136510907183  0.9142929806996568  0.9183030045178449  precision:  0.6945996275605214  0.409683426443203  0.29671011793916824  0.24767225325884543  0.2  recall:  0.6945996275605214  0.819366852886406  0.8901303538175046  0.9906890130353817  1.0 |
| cur\_exp\_setting: hd,max  ndcg:  0.42830540037243947  0.707635009310987  0.8063279316573613  0.8249499055865979  0.8281579246411485  precision:  0.42830540037243947  0.3538175046554935  0.2880198634388578  0.22532588454376165  0.18175046554934823  recall:  0.42830540037243947  0.707635009310987  0.8640595903165735  0.9013035381750466  0.9087523277467412 |
| cur\_exp\_setting: gpu,max  ndcg:  0.6256983240223464  0.8305400372439479  0.8975102345504165  0.9086834189079583  0.9102874284352336  precision:  0.6256983240223464  0.41527001862197394  0.3122284295468653  0.23975791433891994  0.1925512104283054  recall:  0.6256983240223464  0.8305400372439479  0.9366852886405959  0.9590316573556797  0.962756052141527 |
| cur\_exp\_setting: screen,max  ndcg:  0.770949720670391  0.8733705772811918  0.926241785681035  0.9420704635208861  0.9468824921027118  precision:  0.770949720670391  0.4366852886405959  0.319056486654252  0.24720670391061453  0.2  recall:  0.770949720670391  0.8733705772811918  0.957169459962756  0.9888268156424581  1.0 |
| The concatenation of the pointwise average and maximum of word embedding  (concat) | cur\_exp\_setting: cpu,concat  ndcg:  0.324853228962818  0.50293542074364  0.5325542003809102  0.5367007558417723  0.5465671012617715  0.5703639107322943  0.5637651868637549  0.5441310040823754  0.5463755857398627  0.5459325465462539  precision:  0.324853228962818  0.2710371819960861  0.25244618395303325  0.24119373776908024  0.21996086105675147  0.21037181996086105  0.2096729102599944  0.2226027397260274  0.22809306370950205  0.22367906066536203  recall:  0.0812133072407045  0.13551859099804306  0.18933463796477495  0.24119373776908024  0.27495107632093935  0.3155577299412916  0.3669275929549902  0.4452054794520548  0.5132093933463796  0.5591976516634051 |
| cur\_exp\_setting: ram,concat  ndcg:  0.6945996275605214  0.8249534450651769  0.8731249904961453  0.9178177279263131  0.9218277517445012  precision:  0.6945996275605214  0.41247672253258844  0.30043451272501553  0.24767225325884543  0.2  recall:  0.6945996275605214  0.8249534450651769  0.9013035381750466  0.9906890130353817  1.0 |
| cur\_exp\_setting: hd,concat  ndcg:  0.4134078212290503  0.7635009310986964  0.8034480663341338  0.8378987181032213  0.8483247800305104  precision:  0.4134078212290503  0.3817504655493482  0.2756052141527002  0.2239292364990689  0.1839851024208566  recall:  0.4134078212290503  0.7635009310986964  0.8268156424581006  0.8957169459962756  0.9199255121042831 |
| cur\_exp\_setting: gpu,concat  ndcg:  0.6256983240223464  0.8268156424581006  0.8914360082801315  0.9063335874235207  0.9183636588780849  precision:  0.6256983240223464  0.4134078212290503  0.3097454996896338  0.23975791433891994  0.1973929236499069  recall:  0.6256983240223464  0.8268156424581006  0.9292364990689013  0.9590316573556797  0.9869646182495344 |
| cur\_exp\_setting: screen,concat  ndcg:  0.770949720670391  0.8677839851024208  0.9253548564711392  0.9365280408286811  0.9445480884650573  precision:  0.770949720670391  0.4338919925512104  0.3196772191185599  0.24534450651769088  0.2  recall:  0.770949720670391  0.8677839851024208  0.9590316573556797  0.9813780260707635  1.0 |
| Hierarchical pooling  (hier) | cur\_exp\_setting: cpu,hier  ndcg:  0.25244618395303325  0.41682974559686886  0.4938107303152128  0.5277605444673067  0.5462829756538589  0.5525276877816551  0.5543273077127939  0.560222116288542  0.5580768935132211  0.5530120353647988  precision:  0.25244618395303325  0.22798434442270057  0.22113502935420742  0.21330724070450097  0.20430528375733856  0.19765166340508805  0.19569471624266144  0.19373776908023482  0.1902587519025875  0.18767123287671234  recall:  0.06311154598825831  0.11399217221135029  0.16585127201565558  0.21330724070450097  0.2553816046966732  0.2964774951076321  0.3424657534246575  0.38747553816046965  0.4280821917808219  0.4691780821917808 |
| cur\_exp\_setting: ram,hier  ndcg:  0.6145251396648045  0.7579143389199255  0.8072608000931125  0.8361248596834292  0.8537689644834566  precision:  0.6145251396648045  0.3789571694599628  0.2787088764742396  0.22346368715083798  0.18696461824953445  recall:  0.6145251396648045  0.7579143389199255  0.8361266294227188  0.8938547486033519  0.9348230912476723 |
| cur\_exp\_setting: hd,hier  ndcg:  0.40409683426443205  0.633147113594041  0.6977674794160715  0.7238382429170027  0.7495023953534062  precision:  0.40409683426443205  0.3165735567970205  0.2451893234016139  0.19692737430167598  0.16945996275605213  recall:  0.40409683426443205  0.633147113594041  0.7355679702048417  0.7877094972067039  0.8472998137802608 |
| cur\_exp\_setting: gpu,hier  ndcg:  0.5661080074487895  0.8007448789571695  0.8395170984503881  0.866518960647781  0.8793510368659828  precision:  0.5661080074487895  0.40037243947858475  0.28739913097454994  0.22905027932960895  0.18919925512104283  recall:  0.5661080074487895  0.8007448789571695  0.8621973929236499  0.9162011173184358  0.9459962756052142 |
| cur\_exp\_setting: screen,hier  ndcg:  0.6610800744878957  0.819366852886406  0.8757628085129057  0.8915914863527568  0.905225567334596  precision:  0.6610800744878957  0.409683426443203  0.30291744258224707  0.2351024208566108  0.19441340782122904  recall:  0.6610800744878957  0.819366852886406  0.9087523277467412  0.9404096834264432  0.9720670391061452 |

## The effect of test text length

2. The effect of test text length on the performance. R@k, F1

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| --- | --- |
|  | MLP |
| Pointwise average of word embedding  (ave) | cur\_exp\_setting: cpu, long,ave  recall:  0.07107843137254902  0.14705882352941177  0.18872549019607843  0.24754901960784315  0.2916666666666667  0.3284313725490196  0.4117647058823529  0.4583333333333333  0.5073529411764706  0.5661764705882353  f1 score:  0.056862745098039215  0.09803921568627452  0.10784313725490197  0.12377450980392157  0.12962962962962965  0.13137254901960785  0.14973262032085563  0.15277777777777776  0.15610859728506787  0.16176470588235292  cur\_exp\_setting: cpu, short,ave  recall:  0.07212713936430318  0.13202933985330073  0.1876528117359413  0.22982885085574573  0.28545232273838633  0.34474327628361856  0.39119804400978  0.4407090464547677  0.49511002444987773  0.5342298288508558  f1 score:  0.05770171149144255  0.08801955990220049  0.1072301781348236  0.11491442542787286  0.12686769899483835  0.13789731051344745  0.14225383418537452  0.14690301548492254  0.15234154598457775  0.15263709395738737 |
| cur\_exp\_setting: ram, long,ave  recall:  0.6542056074766355  0.7850467289719626  0.897196261682243  0.9906542056074766  0.9906542056074766  f1 score:  0.32710280373831774  0.2616822429906542  0.22429906542056074  0.19813084112149532  0.16510903426791276  cur\_exp\_setting: ram, short,ave  recall:  0.6837209302325581  0.7604651162790698  0.8627906976744186  0.9697674418604652  1.0  f1 score:  0.34186046511627904  0.2534883720930233  0.21569767441860466  0.19395348837209303  0.16666666666666669 |
| cur\_exp\_setting: hd, long,ave  recall:  0.42990654205607476  0.7102803738317757  0.8130841121495327  0.8598130841121495  0.8878504672897196  f1 score:  0.21495327102803738  0.2367601246105919  0.20327102803738317  0.17196261682242991  0.14797507788161993  cur\_exp\_setting: hd, short,ave  recall:  0.3627906976744186  0.7511627906976744  0.8348837209302326  0.8906976744186047  0.9302325581395349  f1 score:  0.1813953488372093  0.2503875968992248  0.20872093023255814  0.17813953488372095  0.15503875968992248 |
| cur\_exp\_setting: gpu, long,ave  recall:  0.42990654205607476  0.7663551401869159  0.9439252336448598  0.9813084112149533  0.9813084112149533  f1 score:  0.21495327102803738  0.2554517133956386  0.23598130841121498  0.19626168224299068  0.16355140186915887  cur\_exp\_setting: gpu, short,ave  recall:  0.6232558139534884  0.8302325581395349  0.9255813953488372  0.9534883720930233  0.9883720930232558  f1 score:  0.3116279069767442  0.2767441860465117  0.2313953488372093  0.19069767441860463  0.16472868217054262 |
| cur\_exp\_setting: screen, long,ave  recall:  0.7009345794392523  0.8130841121495327  0.9532710280373832  0.9626168224299065  0.9906542056074766  f1 score:  0.35046728971962615  0.2710280373831776  0.23831775700934582  0.1925233644859813  0.16510903426791276  cur\_exp\_setting: screen, short,ave  recall:  0.7837209302325582  0.8790697674418605  0.9674418604651163  0.9790697674418605  1.0  f1 score:  0.39186046511627914  0.29302325581395355  0.24186046511627904  0.1958139534883721  0.16666666666666669 |
| Pointwise maximum of word embedding  (max) | cur\_exp\_setting: cpu, long,max  recall:  0.08823529411764706  0.12745098039215685  0.15441176470588236  0.18382352941176472  0.24019607843137256  0.3333333333333333  0.42401960784313725  0.5024509803921569  0.5563725490196079  0.6102941176470589  f1 score:  0.07058823529411765  0.0849673202614379  0.08823529411764706  0.09191176470588237  0.10675381263616557  0.13333333333333333  0.15418894830659538  0.16748366013071897  0.17119155354449475  0.17436974789915966  cur\_exp\_setting: cpu, short,max  recall:  0.07029339853300734  0.11185819070904646  0.14792176039119803  0.1815403422982885  0.22127139364303178  0.30134474327628363  0.343520782396088  0.4028117359413203  0.5  0.5556234718826406  f1 score:  0.05623471882640588  0.0745721271393643  0.08452672022354174  0.09077017114914424  0.09834284161912522  0.12053789731051347  0.124916648144032  0.1342705786471068  0.15384615384615383  0.15874956339504018 |
| cur\_exp\_setting: ram, long,max  recall:  0.7476635514018691  0.897196261682243  0.9626168224299065  0.9906542056074766  1.0  f1 score:  0.37383177570093457  0.29906542056074764  0.24065420560747663  0.19813084112149532  0.16666666666666669  cur\_exp\_setting: ram, short,max  recall:  0.6813953488372093  0.8  0.872093023255814  0.9906976744186047  1.0  f1 score:  0.34069767441860466  0.26666666666666666  0.21802325581395351  0.19813953488372096  0.16666666666666669 |
| cur\_exp\_setting: hd, long,max  recall:  0.5046728971962616  0.6635514018691588  0.8598130841121495  0.8785046728971962  0.8878504672897196  f1 score:  0.2523364485981308  0.22118380062305296  0.21495327102803738  0.17570093457943922  0.14797507788161993  cur\_exp\_setting: hd, short,max  recall:  0.40930232558139534  0.7186046511627907  0.8651162790697674  0.9069767441860465  0.913953488372093  f1 score:  0.2046511627906977  0.23953488372093024  0.21627906976744185  0.18139534883720929  0.15232558139534882 |
| cur\_exp\_setting: gpu, long,max  recall:  0.6074766355140186  0.794392523364486  0.9719626168224299  0.9719626168224299  0.9906542056074766  f1 score:  0.3037383177570093  0.264797507788162  0.2429906542056075  0.194392523364486  0.16510903426791276  cur\_exp\_setting: gpu, short,max  recall:  0.6302325581395349  0.8395348837209302  0.9279069767441861  0.9558139534883721  0.9558139534883721  f1 score:  0.31511627906976747  0.27984496124031005  0.23197674418604652  0.19116279069767442  0.15930232558139532 |
| cur\_exp\_setting: screen, long,max  recall:  0.719626168224299  0.822429906542056  0.9252336448598131  0.9906542056074766  1.0  f1 score:  0.35981308411214946  0.2741433021806854  0.23130841121495327  0.19813084112149532  0.16666666666666669  cur\_exp\_setting: screen, short,max  recall:  0.7837209302325582  0.8860465116279069  0.9651162790697675  0.9883720930232558  1.0  f1 score:  0.39186046511627914  0.29534883720930233  0.24127906976744184  0.19767441860465115  0.16666666666666669 |
| The concatenation of the pointwise average and maximum of word embedding  (concat) | cur\_exp\_setting: cpu, long,concat  recall:  0.08333333333333333  0.13480392156862744  0.19852941176470587  0.2769607843137255  0.3235294117647059  0.3602941176470588  0.4264705882352941  0.49019607843137253  0.553921568627451  0.5931372549019608  f1 score:  0.06666666666666667  0.08986928104575163  0.1134453781512605  0.13848039215686275  0.1437908496732026  0.14411764705882354  0.15508021390374332  0.16339869281045752  0.17043740573152338  0.16946778711484595  cur\_exp\_setting: cpu, short,concat  recall:  0.08068459657701711  0.1356968215158924  0.18704156479217604  0.23227383863080683  0.2628361858190709  0.30440097799511  0.35207823960880197  0.4339853300733496  0.5030562347188264  0.5507334963325183  f1 score:  0.06454767726161369  0.09046454767726161  0.10688089416695773  0.11613691931540342  0.11681608258625373  0.12176039119804401  0.12802845076683708  0.14466177669111654  0.1547865337596389  0.15735242752357667 |
| cur\_exp\_setting: ram, long,concat  recall:  0.7476635514018691  0.9065420560747663  0.9626168224299065  0.9906542056074766  1.0  f1 score:  0.37383177570093457  0.30218068535825543  0.24065420560747663  0.19813084112149532  0.16666666666666669  cur\_exp\_setting: ram, short,concat  recall:  0.6813953488372093  0.8046511627906977  0.8860465116279069  0.9906976744186047  1.0  f1 score:  0.34069767441860466  0.2682170542635659  0.22151162790697673  0.19813953488372096  0.16666666666666669 |
| cur\_exp\_setting: hd, long,concat  recall:  0.4953271028037383  0.7289719626168224  0.794392523364486  0.8691588785046729  0.8878504672897196  f1 score:  0.24766355140186916  0.24299065420560742  0.1985981308411215  0.17383177570093455  0.14797507788161993  cur\_exp\_setting: hd, short,concat  recall:  0.3930232558139535  0.772093023255814  0.8348837209302326  0.9023255813953488  0.9279069767441861  f1 score:  0.19651162790697674  0.25736434108527134  0.20872093023255814  0.18046511627906975  0.15465116279069768 |
| cur\_exp\_setting: gpu, long,concat  recall:  0.6074766355140186  0.794392523364486  0.9345794392523364  0.9719626168224299  0.9906542056074766  f1 score:  0.3037383177570093  0.264797507788162  0.2336448598130841  0.194392523364486  0.16510903426791276  cur\_exp\_setting: gpu, short,concat  recall:  0.6302325581395349  0.8348837209302326  0.9279069767441861  0.9558139534883721  0.986046511627907  f1 score:  0.31511627906976747  0.27829457364341087  0.23197674418604652  0.19116279069767442  0.16434108527131785 |
| cur\_exp\_setting: screen, long,concat  recall:  0.719626168224299  0.822429906542056  0.9252336448598131  0.9906542056074766  1.0  f1 score:  0.35981308411214946  0.2741433021806854  0.23130841121495327  0.19813084112149532  0.16666666666666669  cur\_exp\_setting: screen, short,concat  recall:  0.7837209302325582  0.8790697674418605  0.9674418604651163  0.9790697674418605  1.0  f1 score:  0.39186046511627914  0.29302325581395355  0.24186046511627904  0.1958139534883721  0.16666666666666669 |
| Hierarchical pooling  (hier) | cur\_exp\_setting: cpu, long,hier  recall:  0.08088235294117647  0.12990196078431374  0.20098039215686275  0.24754901960784315  0.28921568627450983  0.3284313725490196  0.37254901960784315  0.4068627450980392  0.4534313725490196  0.5049019607843137  f1 score:  0.06470588235294118  0.0866013071895425  0.11484593837535013  0.12377450980392157  0.12854030501089325  0.13137254901960785  0.1354723707664884  0.13562091503267973  0.13951734539969832  0.1442577030812325  cur\_exp\_setting: cpu, short,hier  recall:  0.05867970660146699  0.1100244498777506  0.15709046454767725  0.2047677261613692  0.2469437652811736  0.2885085574572127  0.33496332518337407  0.38264058679706603  0.421760391198044  0.46026894865525675  f1 score:  0.04694376528117359  0.07334963325183375  0.08976597974152986  0.1023838630806846  0.1097527845694105  0.11540342298288508  0.12180484552122692  0.12754686226568868  0.12977242806093664  0.13150541390150192 |
| cur\_exp\_setting: ram, long,hier  recall:  0.6915887850467289  0.794392523364486  0.822429906542056  0.9158878504672897  0.9532710280373832  f1 score:  0.34579439252336447  0.264797507788162  0.205607476635514  0.18317757009345795  0.15887850467289721  cur\_exp\_setting: ram, short,hier  recall:  0.5953488372093023  0.7488372093023256  0.8395348837209302  0.8883720930232558  0.9302325581395349  f1 score:  0.29767441860465116  0.2496124031007752  0.20988372093023255  0.17767441860465116  0.15503875968992248 |
| cur\_exp\_setting: hd, long,hier  recall:  0.37383177570093457  0.5327102803738317  0.7102803738317757  0.794392523364486  0.8598130841121495  f1 score:  0.18691588785046728  0.17757009345794392  0.17757009345794394  0.1588785046728972  0.14330218068535827  cur\_exp\_setting: hd, short,hier  recall:  0.4116279069767442  0.6581395348837209  0.7418604651162791  0.786046511627907  0.8441860465116279  f1 score:  0.2058139534883721  0.2193798449612403  0.18546511627906978  0.1572093023255814  0.14069767441860465 |
| cur\_exp\_setting: gpu, long,hier  recall:  0.5700934579439252  0.8037383177570093  0.8598130841121495  0.9158878504672897  0.9532710280373832  f1 score:  0.2850467289719626  0.26791277258566976  0.21495327102803738  0.18317757009345795  0.15887850467289721  cur\_exp\_setting: gpu, short,hier  recall:  0.5651162790697675  0.8  0.8627906976744186  0.9162790697674419  0.9441860465116279  f1 score:  0.28255813953488373  0.26666666666666666  0.21569767441860466  0.1832558139534884  0.1573643410852713 |
| cur\_exp\_setting: screen, long,hier  recall:  0.6355140186915887  0.794392523364486  0.8317757009345794  0.8691588785046729  0.9439252336448598  f1 score:  0.3177570093457944  0.264797507788162  0.20794392523364486  0.17383177570093455  0.1573208722741433  cur\_exp\_setting: screen, short,hier  recall:  0.6674418604651163  0.8255813953488372  0.9279069767441861  0.958139534883721  0.9790697674418605  f1 score:  0.33372093023255817  0.27519379844961245  0.23197674418604652  0.1916279069767442  0.1631782945736434 |

## The effect of label quantity

3. The effect of label quantity on the performance (balance of testing set label) R@k and F1

--generalization capability

|  |  |
| --- | --- |
|  | MLP |
| Pointwise average of word embedding  (ave) | cur exp setting: cpu, ave  Split into 5 groups  recalls:  0.5902888539329496  0.3969540799100809  0.4953846153846154  0.4145833333333334  0.3125  f1:  0.16865395826655705  0.11341545140288024  0.14153846153846156  0.11845238095238095  0.08928571428571429 |
| cur exp setting: ram, ave  Split into 6 groups  recalls:  1.0  1.0  1.0  1.0  0.0  1.0  f1:  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  nan  0.16666666666666669 |
| cur exp setting: hd, ave  Split into 3 groups  recalls:  0.77937734082397  0.7573099415204677  0.16666666666666666  f1:  0.12989622347066165  0.12621832358674462  0.027777777777777776 |
| cur exp setting: gpu, ave  Split into 6 groups  recalls:  1.0  0.6666666666666666  1.0  1.0  0.9285714285714286  0.7142857142857143  f1:  0.16666666666666669  0.1111111111111111  0.16666666666666669  0.16666666666666669  0.15476190476190477  0.11904761904761904 |
| cur exp setting: screen, ave  Split into 5 groups  recalls:  1.0  1.0  1.0  0.8333333333333334  1.0  f1:  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.1388888888888889  0.16666666666666669 |
| Pointwise maximum of word embedding  (max) | cur exp setting: cpu, max  Split into 5 groups  recalls:  0.6079656862745098  0.37446463600697466  0.5654700854700855  0.3  0.375  f1:  0.1737044817927171  0.10698989600199277  0.16156288156288157  0.08571428571428572  0.10714285714285715 |
| cur exp setting: ram, max  Split into 6 groups  recalls:  1.0  1.0  1.0  1.0  1.0  1.0  f1:  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669 |
| cur exp setting: hd, max  Split into 3 groups  recalls:  0.6666666666666666  0.6666666666666666  0.3333333333333333  f1:  0.1111111111111111  0.1111111111111111  0.05555555555555555 |
| cur exp setting: gpu, max  Split into 6 groups  recalls:  1.0  0.0  1.0  1.0  0.0  1.0  f1:  0.16666666666666669  nan  0.16666666666666669  0.16666666666666669  nan  0.16666666666666669 |
| cur exp setting: screen, max  Split into 5 groups  recalls:  1.0  1.0  1.0  1.0  1.0  f1:  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669 |
| The concatenation of the pointwise average and maximum of word embedding  (concat) | cur exp setting: cpu, concat  Split into 5 groups  recalls:  0.6458459337300426  0.3422660510368053  0.5498290598290598  0.28125  0.34375  f1:  0.18452740963715497  0.09779030029623008  0.1570940170940171  0.08035714285714285  0.09821428571428573 |
| cur exp setting: ram, concat  Split into 6 groups  recalls:  1.0  1.0  1.0  1.0  1.0  1.0  f1:  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669 |
| cur exp setting: hd, concat  Split into 3 groups  recalls:  0.7291666666666666  0.6907894736842105  0.16666666666666666  f1:  0.12152777777777778  0.11513157894736842  0.027777777777777776 |
| cur exp setting: gpu, concat  Split into 6 groups  recalls:  1.0  0.0  1.0  1.0  0.9285714285714286  1.0  f1:  0.16666666666666669  nan  0.16666666666666669  0.16666666666666669  0.15476190476190477  0.16666666666666669 |
| cur exp setting: screen, concat  Split into 5 groups  recalls:  1.0  1.0  1.0  1.0  1.0  f1:  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669  0.16666666666666669 |
| Hierarchical pooling  (hier) | cur exp setting: cpu, hier  Split into 5 groups  recalls:  0.46051655529541835  0.47090767475255146  0.465491452991453  0.3627083333333333  0.25  f1:  0.1315761586558338  0.1345450499293004  0.132997557997558  0.10363095238095238  0.07142857142857144 |
| cur exp setting: ram, hier  Split into 6 groups  recalls:  0.7777777777777778  0.9919571045576407  0.835820895522388  0.7894736842105263  1.0  0.75  f1:  0.12962962962962962  0.16532618409294014  0.13930348258706468  0.13157894736842105  0.16666666666666669  0.12499999999999999 |
| cur exp setting: hd, hier  Split into 3 groups  recalls:  0.8885177495521903  0.5701754385964911  0.5  f1:  0.14808629159203168  0.09502923976608187  0.08333333333333336 |
| cur exp setting: gpu, hier  Split into 6 groups  recalls:  1.0  0.8333333333333334  0.7894736842105263  0.9090909090909091  0.8571428571428571  0.7142857142857143  f1:  0.16666666666666669  0.1388888888888889  0.13157894736842105  0.15151515151515152  0.14285714285714285  0.11904761904761904 |
| cur exp setting: screen, hier  Split into 5 groups  recalls:  0.9975845410628019  1.0  0.9111111111111111  0.5  0.5882352941176471  f1:  0.16626409017713367  0.16666666666666669  0.15185185185185188  0.08333333333333334  0.09803921568627451 |

## Appendix:

**####** **CPU** using **MLP**

|  |  |  |
| --- | --- | --- |
| CPU | K, number of recommendation | 20% difference |
| Pointwise average of word embedding | 5 | precision:  0.6916395222584147  0.42643865363735073  0.3090843286283026  0.23891603329714078  0.19543973941368079  recall:  0.6916395222584147  0.8528773072747015  0.9272529858849077  0.9556641331885631  0.9771986970684039 |

**####** **Screen Size** using MLP

|  |  |  |
| --- | --- | --- |
| **Screen Size - MLP** | K, number of recommendation | 20% difference |
| word embedding | 5 | precision:  0.35142960550126673  0.46326456749909517  0.35939196525515743  0.35658704306912775  0.2964893231994209  recall:  0.35142960550126673  0.6102062975027145  0.7526239594643503  0.8300760043431054  0.8496199782844734 |

**####** **RAM** using **MLP5**

|  |  |  |
| --- | --- | --- |
| **RAM - MLP** | K, number of recommendation | 20% difference |
| word embedding | 5 | precision:  0.6143684401013392  0.4834419109663409  0.37953914826879  0.34496018820123053  0.3922547955121245  recall:  0.6143684401013392  0.9668838219326819  0.9869706840390879  1.0  1.0 |

**####** **hard drive** using **MLP**

|  |  |  |
| --- | --- | --- |
| **hard drive - MLP** | K, number of recommendation | 20% difference |
| word embedding | 5 | precision:  0.6865725660513934  0.6849439015562794  0.498914223669924  0.4074828085414405  0.3360839667028592  recall:  0.6865725660513934  0.6865725660513934  0.8134274339486066  0.9466159971045964  0.9971045964531307 |

**####** **Graphics Card** using **MLP**

|  |  |  |
| --- | --- | --- |
| **Graphics Card - SVM** | K, number of recommendation | 20% difference |
| word embedding | 5 | precision:  0.6916395222584147  0.4372059355772711  0.31638315840270237  0.41730003619254435  0.34162142598624684  recall:  0.6916395222584147  0.8744118711545422  0.9491494752081071  0.9775606225117626  0.9864277958740499 |