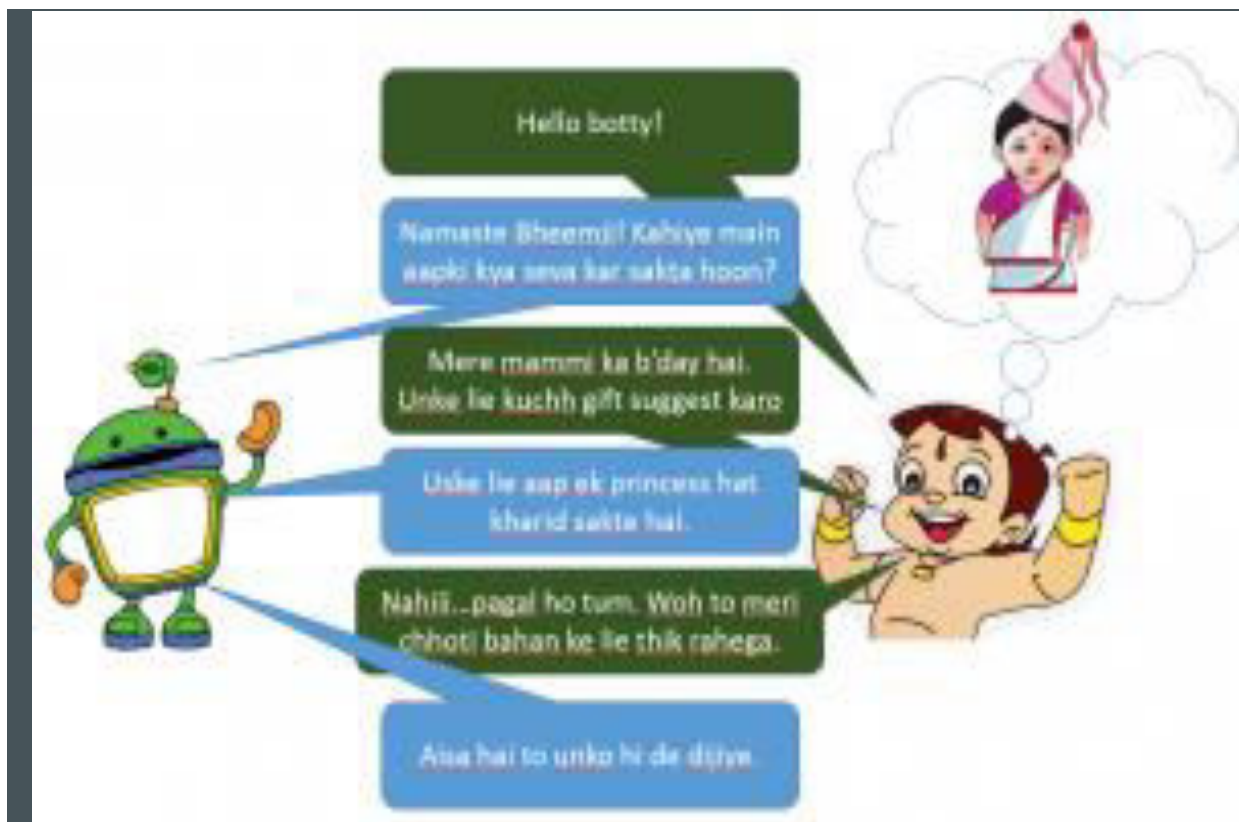


MULTILINGUAL USING DEEP LEARNING



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1611MCI2

Mathematics and Computing

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Problem Statement

- In this project deep learning is used to get corresponding Hindi word for given English word.
- Concept of Auto encoder neural network with explicitly maximizing correlation between two languages word vector in common subspace is used.
- L1 and L2 are represented as two view i.e word vector of two different language.

Problem Statement

- Once the neural network is trained it is able to regenerate the given word vector of L1 or L2 and also for given L1 or L2 word vector corresponding L2 or L1 word vector
- Here L1 is for English language and L2 is for Hindi language.

Data Description

- For Hindi mono corpus hindmonocorp05.plaintext is used.
- This corpora is converted to word vector of dimension 300.
- For English word vector Pre-trained word on part of Google News data set is used.
- For constructing word vector of English and Hindi corresponding to each other many Dictionaries are used.

Data Description

- In total around 32,000 Hindi words vectors correspond to English word vector.
- From 32,000 word vector 25,000 are training set, 5000 are testing set and 2000 is validation set.
- This parallel word vector are used to train the neural network.

Hindi Word Vector (Mono corpus)

पहुँचा 0.2626 -0.18841 0.33489 -0.0095281 0.35322 0.41392 0.027639 0.35423 -0.58995 -0.25791 -0.016474 0.099524 0.11609 0.12281 -0.17337 -0.25222 -0.29497 -0.24316 0.37528 -0.44891 0.062932 -0.21852 0.2884
फौरम 0.13059 -0.48497 0.18057 -0.33465 -0.23725 0.24915 0.090784 0.12177 -0.14342 -0.22818 0.035409 0.31901 -0.20823 -0.034523 0.42472 -0.30213 -0.21441 0.2514 -0.17798 -0.080345 0.25232 0.2603 -0.093982 0.
एथेंस 0.20495 0.63328 -0.38512 -0.54494 -0.65315 0.24865 0.18066 0.027469 -0.48774 0.16433 0.44502 0.15804 -0.33418 0.18668 0.14832 0.03565 0.28562 0.049754 -0.31171 0.082417 0.32075 -0.0093085 0.11695 0.1
सम्पादित -0.21932 0.05015 -0.18928 0.32642 0.32222 0.50533 0.21576 -0.19238 -0.17763 -0.034485 -0.053687 -0.1589 0.32099 -0.18499 0.21412 -0.097213 -0.57561 -0.0024381 -0.33027 -0.049344 0.053129 0.07040
पूँछ -0.37837 0.042074 -0.39118 0.11363 0.5467 0.053025 -0.28827 0.65129 0.50299 0.69841 0.47602 -0.16329 -0.11143 -0.030813 -0.19711 0.1438 -0.43414 0.38734 0.29226 0.23191 0.40833 0.50488 -0.0074825 0.2591
धीमा -0.27981 0.15403 -0.33844 -0.18132 -0.34005 0.46061 0.17248 -0.39704 0.50693 -0.042917 -0.07455 0.094849 -0.40663 -0.38765 0.11755 -0.31978 -0.18869 -0.15711 0.021011 0.1082 -0.27636 -0.32233 0.28559
चिन -0.31021 0.37261 -0.4511 0.0098426 0.58684 -0.16747 0.04726 0.21639 0.069167 0.20993 0.33741 0.24443 -0.47201 0.3821 -0.53249 -0.1092 -0.031429 0.48034 0.40285 -0.21541 0.034901 0.55754 0.46246 0.13453
राज्याभिषेक 0.24636 0.066752 -0.67403 0.15517 -0.3051 0.60088 0.050796 -0.1149 -0.53104 0.24235 0.40258 -0.0029511 0.03179 -0.30484 0.030782 -0.33545 0.060395 -0.23259 -0.37171 -0.36868 0.5885 0.34917 0.
uefa 0.45638 0.20209 0.1589 -0.95623 -0.50678 0.48045 0.43475 -0.36008 -0.17203 -0.59062 0.22658 -0.0074915 -0.47616 0.5145 0.18393 0.28285 -0.085883 -0.47739 -0.31783 -0.656 -0.054617
पुष्ट 0.35872 0.28219 -0.58796 -0.18102 0.38556 -0.010694 0.45791 0.10287 0.09991 0.57854 -0.074531 0.28343 0.153 -0.18892 -0.15263 -0.27584 0.023319 0.18463 -0.079584 0.13362 0.21023 0.020275 0.27435 0.209
लड़का 0.21306 0.51926 -0.64491 -0.16254 0.098884 0.50024 0.14961 0.18463 0.62492 0.72682 0.38572 0.05122 -0.57422 -0.013195 -0.25271 -0.2643 -0.27389 0.0094461 0.029533 0.43771 0.3138 0.2121 0.069755 0.2207
मनोनीत 0.11337 -0.001446 0.53305 0.061269 0.20786 0.080014 0.059342 0.02872 -0.4498 0.49984 -0.34637 0.11751 -0.44112 -0.10041 -0.092231 -0.38665 -0.29811 0.092442 0.073671 -0.28557 0.031916 0.037235 0.04
बॉडी -0.32862 -0.0055375 -0.6733 -0.60644 0.37556 0.063563 -0.30154 -0.53944 0.29988 0.20243 -0.16351 0.10281 -0.084159 0.31925 -0.054774 -0.39159 -0.25197 -0.019078 -0.11984 -0.034539 0.35481 -0.04041 0.2
संकोच -0.13221 0.0065181 -0.50279 -0.35329 -0.5019 0.16983 0.52266 -0.30012 0.637 0.33784 -0.43466 0.55166 0.33374 -0.63456 0.23836 -0.78913 -0.15727 0.39214 -0.30116 -0.35373 -0.11788 -0.19306 -0.048173
पीतल 0.1611 0.24481 -0.45409 -0.34231 0.56478 -0.0324 0.21714 -0.055448 0.23812 0.67984 0.84108 0.31081 -0.097026 -0.033723 -0.29935 0.29307 0.12757 -0.36712 0.25471 -0.088303 0.2835 0.28616 0.1423 0.31733
महानतम -0.17308 0.13875 -0.58197 -0.48001 0.68177 0.2926 0.0011926 -0.069946 -0.22206 -0.87404 0.171 -0.12369 0.11861 0.3787 0.065827 -0.22172 0.13533 -0.29113 0.15334 -0.3949 0.10137 -0.051697 -0.16305 0.
विशेषतः -0.061322 0.16518 -0.043034 -0.058353 0.32997 0.21065 -0.019704 -0.030094 0.068828 -0.090851 0.11687 -0.032243 -0.26947 -0.046892 -0.045898 0.0065727 -0.11499 0.027025 -0.079229 -0.014724 -0.11815
मुक्केबाजी 0.50715 0.23429 -0.06549 -0.41544 -0.31584 0.20516 -0.10691 0.55999 0.27577 0.067699 0.12461 -0.17936 -0.64189 0.45715 0.29107 -0.0028026 -0.021486 -0.57115 -0.020738 -0.045274 0.55426 0.48659 -
१५० -0.21023 -0.13833 -0.4966 0.062262 0.65278 0.19694 -0.19645 0.33083 -0.11167 -0.37519 0.57907 -0.022934 0.22327 -0.17579 0.050473 -0.8226 0.41822 -0.18549 -0.16829 0.080189 0.32438
गुजर -0.25258 -0.24616 -0.23946 0.30237 0.25582 0.58818 0.16965 -0.60471 0.081006 0.4045 0.083183 -0.18186 0.027614 -0.022866 -0.22679 -0.02761 -0.26538 -0.43673 -0.049675 -0.14922 -0.10265 -0.35387 -0.1658
उभरा 0.22916 0.079266 -0.26314 -0.16239 0.22352 0.176 0.21204 0.028528 0.040304 -0.40101 0.08968 -0.28549 -0.20299 -0.2176 0.13261 -0.11391 0.48092 -0.13525 0.52313 -0.16522 -0.016922 0.40306 0.16239 0.6295
बढ़ाना -0.11757 0.050225 0.45485 -0.37972 -0.15006 0.64196 0.13928 0.052668 0.15448 0.26232 -0.054085 0.36101 0.32534 -0.38974 0.28608 -0.22297 -0.15446 -0.39755 0.21155 -0.4869 0.042372 0.31239 0.42217 0.5

English Word Vector (Mono corpus)

first 0.052164 0.075332 -0.20714 -0.047763 0.11835 0.048345 0.13173 -0.2027 0.066395 0.21448 -0.10078 -0.036556 -0.27522 0.046089 0.162 -0.14543 0.13387 -0.0017492 0.061434 0.0070965 0.
on 0.17312 0.067038 -0.19883 -0.10544 0.14341 0.0036455 -0.0037212 0.034452 -0.047173 -0.10198 0.2782 0.22345 -0.41829 -0.015178 0.084553 -0.13427 -0.087325 0.046866 0.02376 0.20727 0.1
class 0.041806 -0.11648 -0.17552 0.58436 0.025659 0.056447 -0.013416 -0.20203 -0.67582 -0.18974 0.13381 0.45112 -0.79577 0.16609 0.1875 -0.19315 -0.12797 0.25336 0.071929 0.071285 0.448
here -0.051674 0.039975 -0.30126 -0.13291 0.091733 -0.026457 -0.074349 -0.19029 -0.012594 0.30556 0.40569 0.2157 -0.1878 0.35238 0.10253 -0.06127 0.15277 0.2966 0.004211 0.058792 0.3321
for 0.017135 0.061953 -0.088845 -0.3088 0.12368 0.12653 0.13958 -0.078325 0.19048 0.17867 -0.039934 0.13345 -0.36523 0.041536 0.16653 -0.23937 0.10203 -0.048185 0.15743 -0.12951 0.15638
this -0.18151 -0.0089756 -0.28952 0.021884 0.015536 0.21433 0.071938 -0.10997 0.044911 0.060106 0.2247 0.15956 -0.23101 0.037417 0.070765 -0.29339 0.2287 0.12687 0.076539 0.19023 0.1244
has -0.039479 0.152 -0.099876 0.022456 0.33175 0.23682 0.42217 0.41767 -0.063148 -0.050048 -0.045502 0.10616 -0.043981 -0.13785 -0.0196 -0.18619 0.040145 0.058628 0.26323 0.069533 0.122
done 0.0071737 0.15405 -0.13089 -0.062826 -0.024951 0.27517 0.005527 0.19383 0.087383 -0.025267 -0.007047 -0.17145 -0.34515 -0.066654 0.10455 -0.21947 0.067945 -0.01205 0.28022 0.080377
these-0.16104 -0.02248 -0.35671 -0.041266 0.034364 0.05236 -0.15625 -0.00010991 0.056513 0.061026 0.17004 0.022177 -0.29047 -0.13751 0.043627 -0.31776 0.1449 0.16105 0.066529 0.19171 0.
path -0.082271 0.037401 -0.38923 -0.10569 0.082428 -0.0047275 -0.089573 -0.27114 0.10269 0.22656 0.18894 0.20051 0.018579 0.16575 0.10289 -0.17792 0.12021 0.24139 -0.05111 0.037556 0.26
way -0.16876 0.015755 -0.35086 0.010093 -0.013391 0.11642 0.26591 -0.30767 -0.054417 0.044992 0.22905 0.1618 -0.20538 0.036484 0.072075 -0.29377 0.084427 0.23288 0.05041 0.3333 0.24502
India-0.1529 0.43344 -0.22381 -0.13019 -0.10068 -0.071293 -0.020666 0.1612 -0.35601 -0.09005 -0.27247 -0.15414 -0.4011 -0.01391 -0.23563 0.30116 0.11077 -0.31371 0.25219 -0.16627 0.1566
formerly -0.13337 0.14836 -0.18966 -0.2397 0.10609 0.31516 0.052784 -0.30416 -0.0093203 0.25785 -0.090144 0.41455 -0.34327 -0.1762 -0.53113 0.2452 -0.060114 -0.41546 -0.1003 -0.34673 -0
compition -0.16538 0.28351 -0.30799 -0.3783 -0.38624 0.1052 -0.35757 0.11599 -0.11527 0.15536 0.29343 -0.052364 -0.62303 0.030713 0.18102 0.63705 0.3008 -0.076741 -0.42908 -0.17944 0.29
save -0.52358 -0.16808 -0.42488 -0.4273 0.12141 0.83526 0.76614 -0.40956 -0.21998 -0.34929 0.0068538 0.1902 -0.52069 0.14349 0.26026 0.04439 -0.18343 0.17143 -0.064864 0.43077 0.61835 0
terminator -0.21326 -0.078535 -0.66043 -0.24209 0.22545 0.07845 0.3734 -0.35406 0.5001 -0.098251 -0.095811 -0.14485 -0.70877 0.051469 0.12899 0.16417 -0.41598 -0.20663 0.10218 0.56998 0
law 0.19744 -0.038118 -0.32321 -0.26591 0.08002 0.68775 0.10208 -0.17165 -0.079311 0.22232 -0.21071 -0.078876 -0.39648 0.071981 0.28028 -0.52099 -0.27824 0.23547 0.099953 -0.072453 0.03
love 0.14476 -0.13472 -0.23284 -0.24322 0.18656 0.062 -0.33111 0.093091 -0.084629 0.052713 0.12689 -0.23542 -0.077648 -0.41728 0.4529 -0.25469 -0.34485 -0.27318 -0.097239 -0.19548 0.183
communication -0.18622 0.11522 0.12979 -0.18186 -0.37098 0.73348 0.089423 -0.38362 0.14383 -0.12731 -0.34402 0.89908 -0.42855 -0.76797 -0.14085 -0.013303 -0.16584 -0.24812 -0.32179 0.16
thef 0.22002 -0.14158 -0.49386 -0.28852 0.14374 0.41121 -0.16198 0.47578 0.03944 0.2856 -0.22879 0.35898 -0.60678 0.10247 0.049381 -0.053749 -0.1792 0.27237 0.075064 0.13818 -0.1313 0.1
together 0.11734 0.13603 -0.32362 -0.37882 0.86754 0.19891 0.035073 0.60723 0.17436 0.36273 0.4135 0.13337 -0.058861 -0.3973 -0.059225 0.045588 -0.004801 0.10013 0.15841 0.51772 0.16276

Two view of parallel corpus

English view LI

prosperous 0.11312 0.027156 -0.44495 -0.44393 -0.00093862 0.36753 0.24686 0.05288 0.24792 0.13653 0.38818 -0.045687 -0.24096 -0.34361 0.28673 -0.04835 -0.18852 0.13137 0.2001 -0.1207 0.1
showoff 0.038809 -0.18745 0.20588 -0.30579 -0.073845 0.19831 -0.26871 0.47164 -0.11331 0.31924 -0.10509 -0.010334 -0.043212 -0.2731 -0.032757 0.35112 -0.11926 0.22242 0.15519 0.084914 0.
supportsupport -0.11473 0.2161 -0.45937 0.2492 -0.07011 0.1677 0.22349 0.16965 -0.38903 0.069522 -0.31431 0.16382 -0.16666 -0.21731 0.064996 0.17789 0.11776 0.24361 0.63014 -0.13668 -0.21
sacrifice -0.19703 0.36903 -0.405 -0.10175 -0.06742 0.20776 -0.19491 0.040541 -0.3114 0.079931 0.23874 0.26963 -0.4375 -0.28406 0.013581 -0.0052711 -0.36417 0.042027 0.082058 -0.077931 0.
sky -0.27161 -0.060644 -0.057701 0.13825 0.33187 0.35533 0.30462 -0.30826 -0.020616 -0.10077 -0.20116 0.14237 -0.42164 -0.43041 -0.14201 0.024719 -0.13801 0.098209 0.04423 -0.076463 0.76
last -0.053589 0.49127 -0.17265 0.25475 0.41783 -0.03502 0.25754 0.36842 0.18115 0.26484 0.45788 -0.1289 0.039737 0.61328 -0.25164 0.031497 0.24026 -0.23479 0.11994 0.093426 0.78771 -0.0
laziness 0.30538 0.33194 -0.68667 0.19003 -0.11559 -0.050826 0.21412 -0.32471 -0.053073 0.44182 0.25044 0.10149 -0.46697 0.36615 0.29164 -0.096916 0.26378 -0.74193 -0.059722 -0.2396 0.36
income -0.16289 -0.17149 -0.93049 -0.36972 0.23343 0.068791 0.04435 -0.28733 -0.16592 0.34125 -0.19369 0.10208 -0.56327 0.23102 0.091892 0.14434 -0.37884 -0.78475 0.10934 0.13997 0.64376
calamity -0.23768 0.061295 -0.2722 -0.42194 -0.095857 -0.016223 0.23955 -0.10691 0.40204 0.18224 0.22153 0.33753 -0.1404 -0.45085 -0.16999 -0.39945 0.072066 -0.070919 0.21629 0.05437 0.5
begin -0.27491 0.28601 -0.078511 -0.0018484 -0.12125 0.1137 -0.14861 -0.04093 -0.00035664 -0.20917 0.10717 0.20361 -0.083275 0.091414 0.3502 -0.023477 0.36442 0.096044 0.071835 0.10182 0.
dependency 0.52088 0.18675 -0.68393 -0.7044 -0.10429 0.40577 0.26388 -0.052096 -0.13088 0.94713 0.17663 0.23585 -0.40013 -0.007091 0.45462 -0.56698 -0.27961 0.0053169 -0.17313 0.029694 0.
throne 0.055745 0.30096 -0.19137 0.079066 -0.022253 0.032714 0.10105 -0.021539 0.15781 0.30712 0.073404 0.10835 -0.24858 0.10501 0.033196 -0.066725 0.15941 -0.070479 -0.044607 0.2776 0.4
hope-0.17827 0.18459 -0.47346 -0.11023 -0.18501 0.0182 -0.047056 0.1881 0.32796 0.34831 0.19294 0.2617 -0.40343 0.015476 -0.034145 -0.29044 -0.11857 0.37423 -0.16137 0.036322 0.34165 0.0
Blessing 0.13447 -0.21143 -0.52313 0.060043 0.32974 -0.009025 -0.050319 -0.1165 -0.012583 0.16596 0.091282 0.19026 0.1484 -0.33796 -0.25084 0.085513 0.20694 0.075602 -0.096228 0.35057 0.
sky -0.27161 -0.060644 -0.057701 0.13825 0.33187 0.35533 0.30462 -0.30826 -0.020616 -0.10077 -0.20116 0.14237 -0.42164 -0.43041 -0.14201 0.024719 -0.13801 0.098209 0.04423 -0.076463 0.76

Hindi view L2

आबाद -0.10103 0.3902 -0.17789 -0.25175 -0.22589 0.017663 -0.14402 -0.21272 0.030187 -0.1076 -0.23025 0.067073 -0.31636 -0.030679 0.12191 -0.0082951 -0.02859 -0.14012 0.25345 0.29586 -0.14614 0.39428 -0.146
आडम्बर -0.27443 0.095916 -0.07231 0.35409 0.17863 0.13674 0.1199 -0.24448 -0.32695 -0.23492 0.087855 0.18638 -0.086812 0.43869 0.10289 0.068804 0.0054165 0.093606 0.12185 0.17864 0.20434 -0.05213 0.12187 0
आधार -0.23525 -0.32306 -0.27378 -0.12803 0.19031 0.38648 -0.35761 0.36137 -0.44936 -0.32736 0.046145 -0.22389 -0.2765 0.044289 0.23896 0.49903 -0.026186 -0.23807 -0.21978 0.58329 0.56521 0.067904 0.46666 0
आहुति 0.27569 0.55112 -0.52764 0.16831 -0.47422 0.44146 0.21951 -0.075756 -0.19545 -0.0034959 -0.49273 -0.046694 -0.67376 -0.42966 -0.45817 -0.24951 0.42801 0.33447 -0.42827 -0.37355 -0.021902 -0.24007 0.2
आकाश -0.2107 -0.052936 0.099754 -0.019541 0.056182 0.21235 -0.16969 -0.12404 -0.17056 0.12852 0.30918 -0.12876 -0.097267 -0.18977 -0.061736 -0.041646 -0.21748 0.027784 -0.1568 0.19964 0.11216 0.23313 0.204
आखिर 0.11826 -0.29024 -0.39503 0.057183 -0.030483 0.40134 0.14986 0.052765 -0.027292 -0.19244 0.14536 -0.48488 -0.34809 -0.0032712 -0.24589 0.18632 0.097596 0.32383 -0.30544 0.0040069 0.13842 0.17106 -0.24
आलस्य -0.20256 0.020253 0.52804 -0.15329 -0.025387 0.075314 -0.2433 0.24609 0.073362 0.44599 0.077972 -0.57759 -0.15247 -0.12399 -0.19925 0.21877 0.74306 0.14607 0.49109 0.33097 0.0040615 0.056032 0.18247
आमदनी 0.26934 -0.16607 0.22889 -0.31887 0.2913 0.14579 0.22834 -0.38817 0.18156 -0.23965 0.24896 -0.011308 -0.14005 0.058837 0.1942 -0.4851 0.02419 0.13714 0.0037268 0.066867 0.44815 -0.24379 0.16843 0.1
आपदा 0.017398 0.12764 -0.016688 -0.34607 -0.27428 0.81713 0.56864 0.08037 -0.35405 0.49763 -0.06167 -0.011278 0.11687 0.022934 0.048 -0.062667 0.42406 -0.70552 -0.093271 -0.37855 -0.048969 -0.54461 0.25653 (C
आरम्भ -0.2777 -0.084139 -0.29412 0.011816 0.29264 0.33986 0.14783 0.28214 -0.28853 0.16368 0.44318 0.35576 -0.3619 -0.011217 0.15651 -0.007912 0.062056 0.17148 -0.046348 0.014603 0.23142 -0.18632 0.63693 0
आसक्ति 0.30735 -0.15212 -0.3122 -0.30732 0.0023831 0.12026 0.43479 -0.034615 0.23486 -0.11858 -0.36484 -0.27583 0.17901 -0.11393 0.018402 0.010625 -0.16809 0.10625 0.22286 -0.06677 0.043227 -0.036784 0.092
आसान 0.24792 0.23412 -0.1572 -0.33018 0.26233 0.25091 0.13394 0.38006 -0.15657 -0.013248 0.52177 0.36099 -0.64252 -0.26467 0.0019918 -0.094987 -0.25859 -0.24614 -0.19102 -0.046339 0.029566 0.22477 0.019323
आशा -0.34305 0.40683 0.21132 -0.30396 -0.12369 0.40894 0.59442 0.69254 -0.12185 1.228 -0.030526 0.42707 -0.86839 0.18091 -0.31944 -0.80717 0.26795 -0.41151 -0.085419 0.07795 -0.69284 0.13818 -0.21008 0.6290
आशीर्वाद 0.11312 0.027156 -0.44495 -0.44393 -0.00093862 0.36753 0.24686 0.05288 0.24792 0.13653 0.38818 -0.045687 -0.24096 -0.34361 0.28673 -0.04835 -0.18852 0.13137 0.2001 -0.1207 0.17355 -0.12669 -0.0068
आसमान 0.038809 -0.18745 0.20588 -0.30579 -0.073845 0.19831 -0.26871 0.47164 -0.11331 0.31924 -0.10509 -0.010334 -0.043212 -0.2731 -0.032757 0.35112 -0.11926 0.22242 0.15519 0.084914 0.36303 0.23296 -0.284

Neural Network Architecture

- The network takes the monolingual word vector of two language English and Hindi as input.
- It consists of input layer , output layer and hidden layer
- The output is reconstruction vector of given word input vector.
- For initial stage only one hidden layer is used.

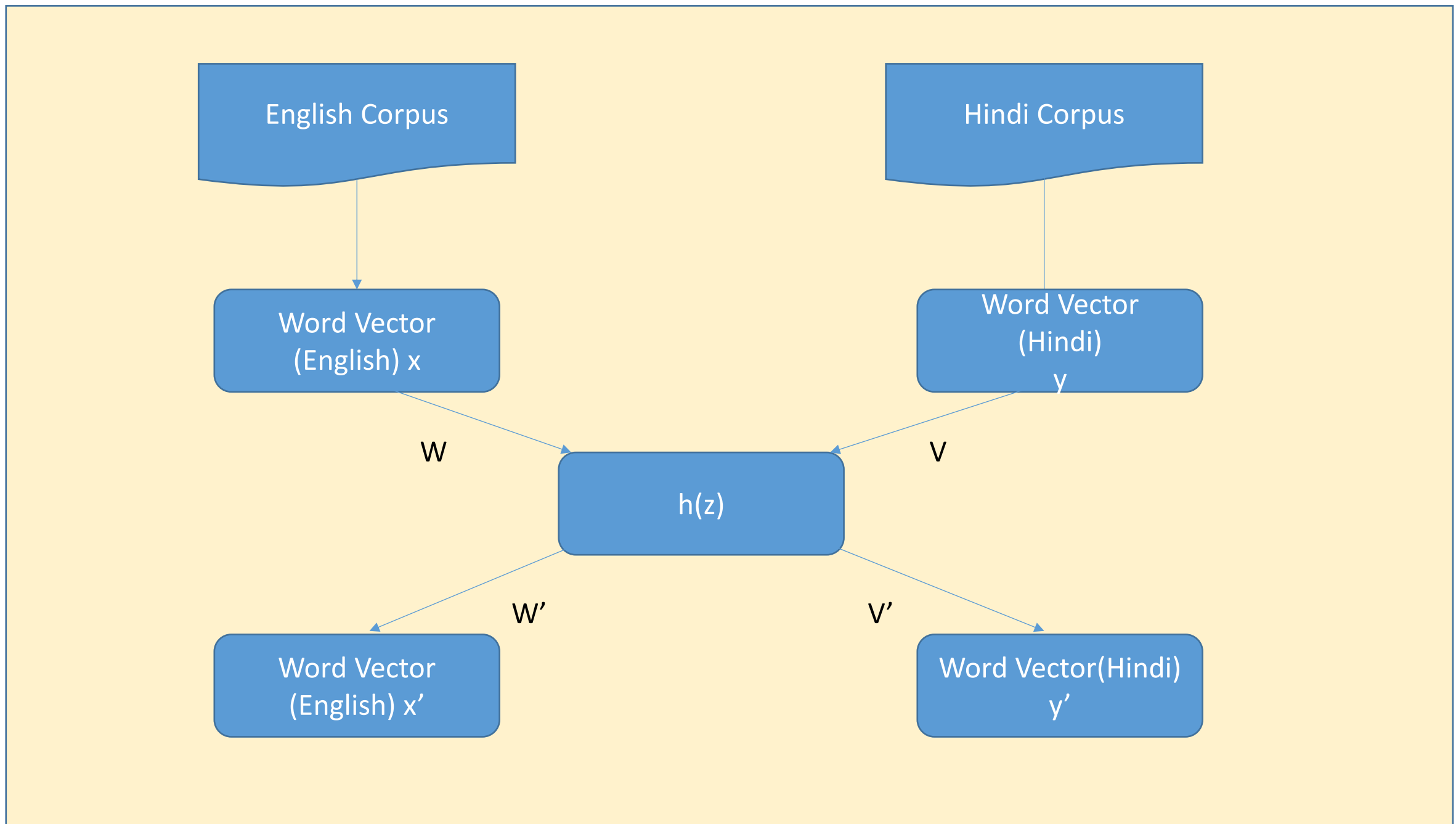


Fig. Architecture of single hidden layer neural network

Neural Network Architecture

- Here input is z where $z = (x, y)$.
- Hidden layer computes an encoded representation .

$$h(z) = f(Wx + Vy + b)$$

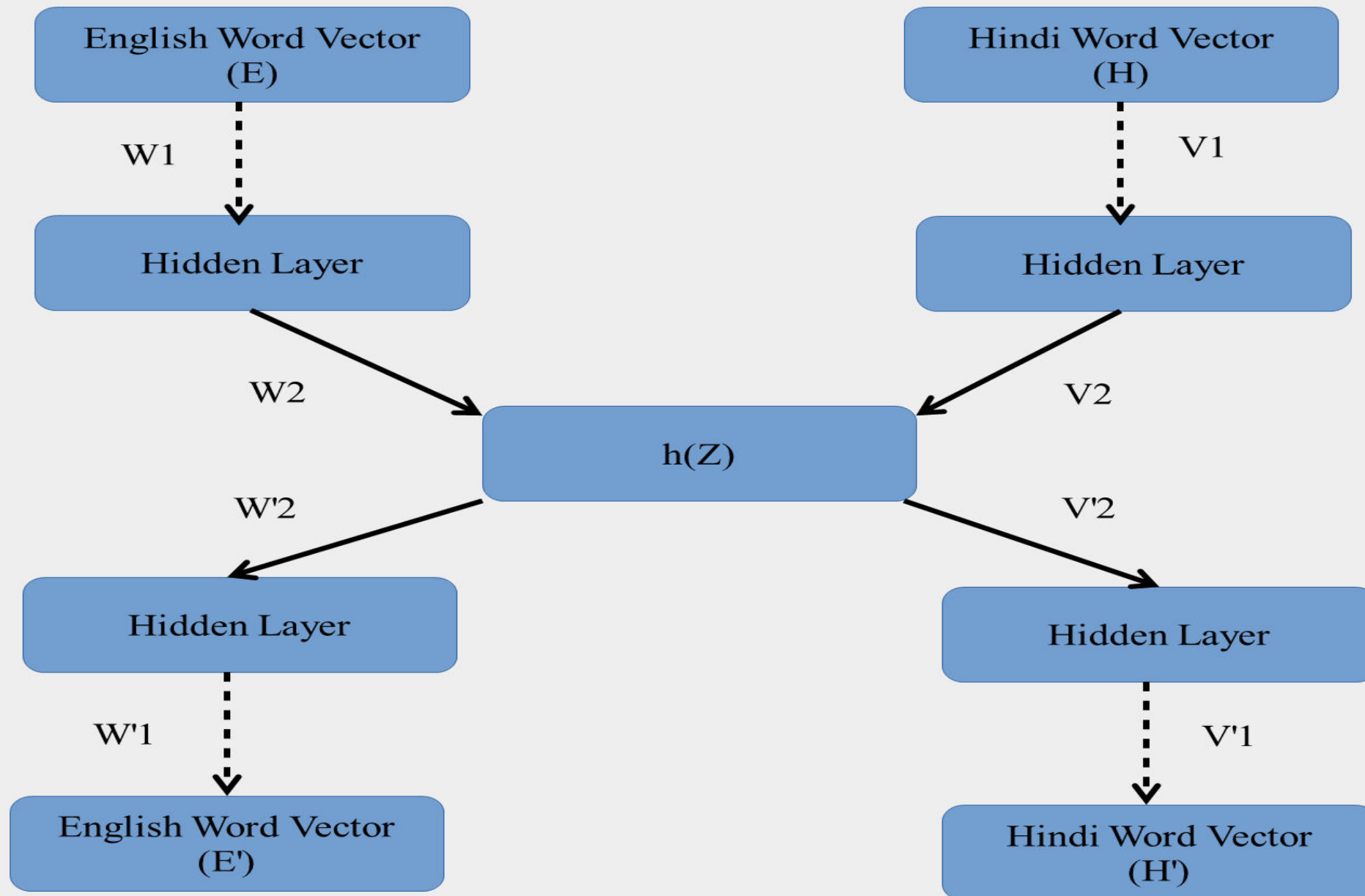
- The output reconstruct the vector of given word input vector.

$$Z' = g([W'h(z), V'h(z)] + b')$$

- Activation function is sigmoid function, Optimizer is rmsprop and loss function is mean square error

Neural Network Architecture

- Once the weight and bias parameter are set decoupled the layer and add new common hidden layer.
- Repeat this step for multiple hidden layer. There are 150 hidden layers.
- Activation function is sigmoid function, Optimizer is rmsprop and loss function is mean square error.



Analysis of Neural Network

By changing Hidden Layers change in accuracy is small.

Number Of Hidden Layer	Accuracy for L1 to L2 (%)	Accuracy for L1 to L2 (%)
50	76.19	78.46
100	79.19	80.14
150	78.74	80.83
200	79.19	80.14

Analysis of Neural Network

```
surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
50 hidden layers  
11 to 12  
0.7619  
12 to 11  
0.7846  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
100 hidden layers  
11 to 12  
0.7919  
12 to 11  
0.8014  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
200 hidden layers  
11 to 12  
0.7919  
12 to 11  
0.8014
```

Analysis of Neural Network

By changing Optimization Technique change in accuracy.

Optimization Technique	Accuracy for L1 to L2 (%)	Accuracy for L1 to L2 (%)
Rmsprop	78.74	80.83
SGD	75.83	76.13
CM	77.68	79.30
NAG	78.44	79.31
Adagrad	74.6	77.62
Adadelta	75.89	77.79

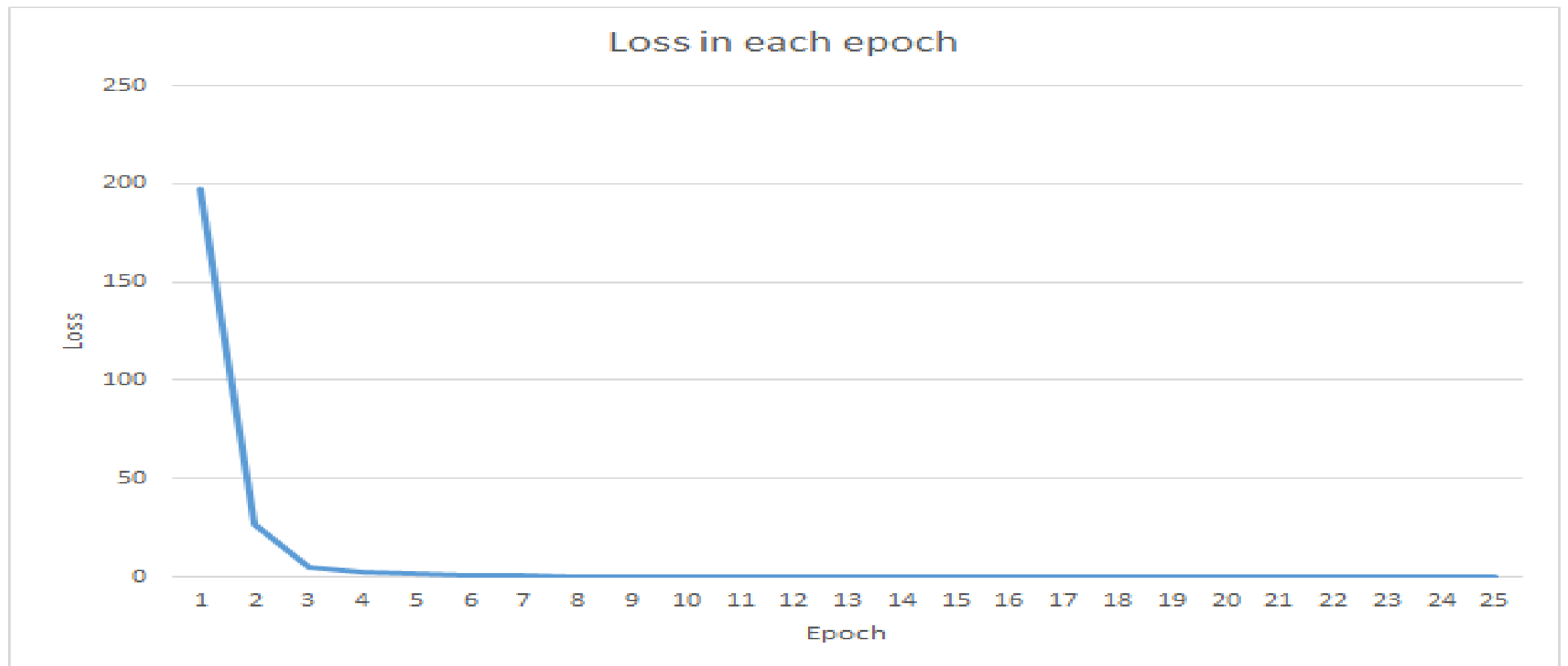
Analysis of Neural Network

```
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
Sgd  
11 to 12  
0.7583  
12 to 11  
0.7613  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
rmsprop  
11 to 12  
0.7874  
12 to 11  
0.8083  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
cm  
11 to 12  
0.7768  
12 to 11  
0.793  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
nag  
11 to 12  
0.7844  
12 to 11  
0.7931  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
Adagrad  
11 to 12  
0.746  
12 to 11  
0.7762  
surabhi@surabhi:~/project/Multilingual/wordvec$ python evaluate.py t1 Target_lang/  
adelta  
11 to 12  
0.7589  
12 to 11  
0.7779
```

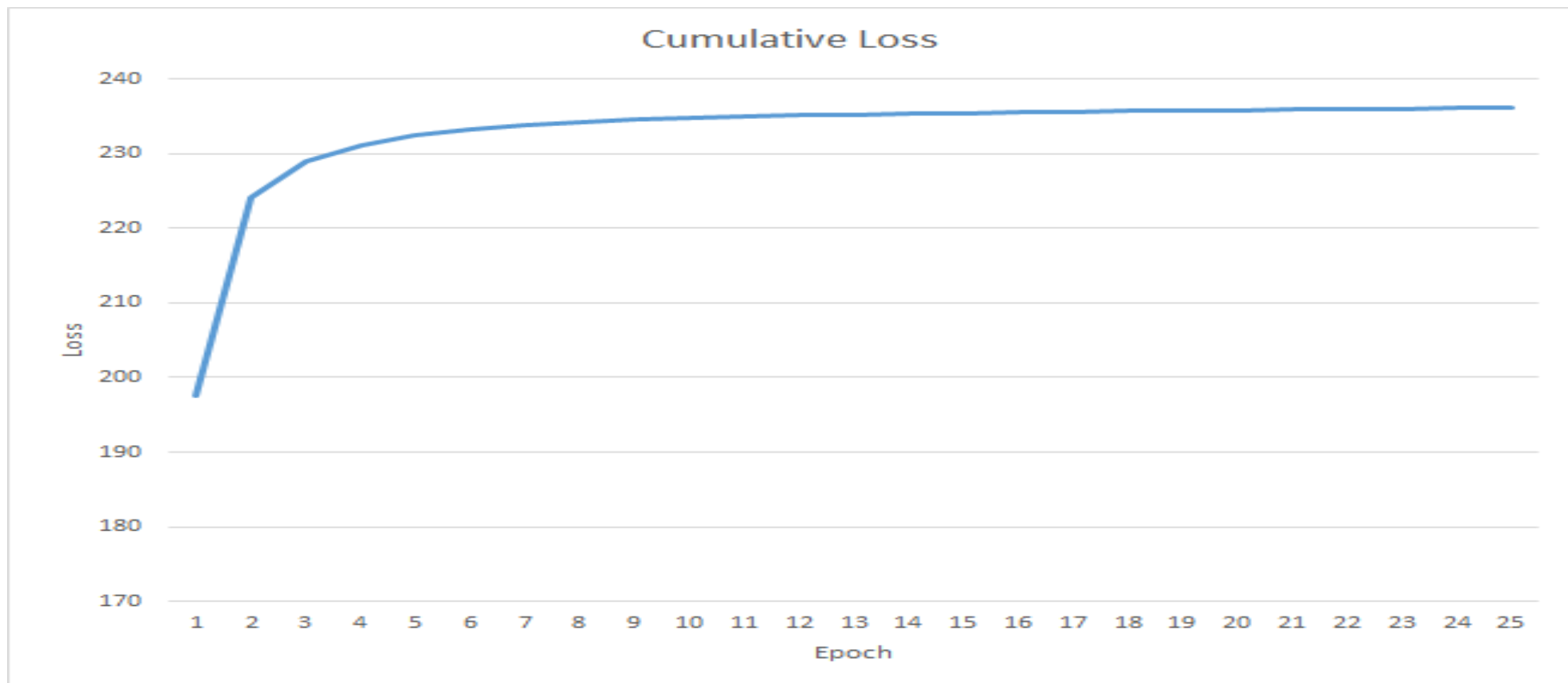
Analysis of Neural Network

```
in epoch 0
Difference between 2 epochs is -197.523269252
Training epoch 0, total_loss -197.523269252
in epoch 1
Difference between 2 epochs is -26.5869619806
Training epoch 1, total_loss -224.110231233
in epoch 2
Difference between 2 epochs is -4.79907833399
Training epoch 2, total_loss -228.909309567
in epoch 3
Difference between 2 epochs is -2.28421542988
Training epoch 3, total_loss -231.193524997
in epoch 4
Difference between 2 epochs is -1.3076397206
Training epoch 4, total_loss -232.501164718
in epoch 5
Difference between 2 epochs is -0.790555801314
Training epoch 5, total_loss -233.291720519
in epoch 6
Difference between 2 epochs is -0.533166655164
Training epoch 6, total_loss -233.824887174
in epoch 7
Difference between 2 epochs is -0.398115717356
Training epoch 7, total_loss -234.223002891
in epoch 8
Difference between 2 epochs is -0.299461671904
Training epoch 8, total_loss -234.522464563
in epoch 9
Difference between 2 epochs is -0.230254455552
Training epoch 9, total_loss -234.752719019
in epoch 10
Difference between 2 epochs is -0.186838584127
Training epoch 10, total_loss -234.939557603
in epoch 11
Difference between 2 epochs is -0.157376413821
Training epoch 11, total_loss -235.096934017
in epoch 12
Difference between 2 epochs is -0.137198533361
```

Analysis of Neural Network



Analysis of Neural Network



References

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Thank You

Questions and Suggestions are welcome

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Mathematics and Computing