

Rt gf levkqp'qhl'ij qt v/vgt o 'r cuugpi gt 'hny 'qhl'wdy c{ 'dcugf 'qp' NUVO 'b qf gn

Lcj cp'J w

Eqngi g"qh"Vtcur qt cvkqp"Cpi kpggtkpi . "Vapi lk'Wpkxgtuk{. "Uj cpi j ck'Ej kpc

4374; : 3B vapi lk'gf wlp

Cduktcew0Y kj "vj g"eqpvpwqwu"fgxgnr o gpv'qh'vtdcp"tckl'vcpuk{."vj g"wdy c{ "ku'dgeqo kpi "vj g"
vtxgnl'ej qleg'hqt"o qtg"cpf "o qtg'r gqr ngOCpf "vj g'lpetgcug'lp"vtxgnl'go cpf "cnuq'dtlpi u'cdqvw'vj g"
r tqdrgo "qh'uwdy c{ "eqpi guvkqp0Vj ku'r cr gt "y kni'wug"vj g"wdy c{ "ectf "uy k'g"fcw"qh'J cpi | j qw'
Ek{ "Itqo "Lcpwt{ "3uv'q"42vj . "423; . "y j lej "y gtg"eqwpvgf "chgt "f cwc"ergcpkpi 0Y kj "tqqv'o gcp"
us wctg'gttqt "TO UG+ "b gcp'cdunwgr'gtegpvcu g'gttqt "O CRG+ "eqgh'hekgpv'qhl'f gvgto kpcvkqp"8& +"
cpf "iqui'xcnwg"cu'ucpf ctf u. "vj g"npi "uj qt v/vgt o "o go qt { ai"NUVO + "r ctco gvgtu'y gtg"cf lwngf 0'
Vj g'NUVO "o qf gnku'vckpgf "y kj "ko g"cpf "r cuugpi gt 'hny "f cwc. "cpf "vj g"o qf gnku'wugf "q"r tgf lev'
vj g'uj qt v/vgt o "r cuugpi gt 'hny "kp"cpf "qww'qh'uwdy c{ "ucvkqp0Hqo "vj g"r tgf levkqp"tguwu. "vj g"
NUVO "o qf gn'cu'c'i qqf "cf cr vcdkkl' "q"vj g"wdy c{ "ucvkqp"uj qt v/vgt o "r cuugpi gt 'hny 0Vj g'vtpf "
qh'vj g"r tgf levf "hpg"ku'vj g"uco g"cu'vj g'tgcn'xcnw. "cpf "vj g"f khtgpeg"ku'cnuq'eqpvtqncdng0Vj g"
uj qt v/vgt o "r cuugpi gt 'hny "r tgf levkqp"qh'uwdy c{ "ucvkqp"ku'dgpghekn'q'tgf weg"vj g"iqui'ecwugf "
d{ "eqpi guvkqp"cpf "lo r tqxg"vj g'vtxgnl'gh'hekgpe{ "qh'tgukf gpv0

Mg{ y qtf u<O gvtq. "NUVO . "F cwc"Engcpkpi 0

1. Kpvt qf wevkqp

Cu" c" nlpf "qh"tckl'vcpur qt cvkqp. "vj g"wdy c{ "j cu"dggp"r ckl "cwgpvkqp"vq" d{ "o cp{ "eqwpvtkgu"ht"ku"
eqpxgplgpv' "cu'cpf "rti g"xqno g"qh'vtdcp0Vj g'fgxgnr o gpv'qh'vj g"wdy c{ "u'vgo "dgi cp'lp"vj g"3; vj "
egpwt{ 0Cu'vj g"wdy c{ "j cu'i tqy p"lp"uqr j knkcvkqp. "k'j cu'lpetgcukpi n{ "tgr nregf "qvj gt"o qf gu'qh'vtdcp"
vcpur qt cvkqp"cu'r gqr ng'ht'uv'qr vkqp0Cu'qh'Hgdtwct{ "4245. "J cpi | j qw'O gvtq"j cu'34"qr gtcvkpi "hpgu'cpf "
482'ucvkqp0Qp"Cr tkil4: . "4245. "J cpi | j qw'O gvtq"vuj gtgf "lp"vj g'j ki j guv'f ckl' "r cuugpi gt 'hny "qh'vj g'hpg"
pgwy qtm"6.838.622"r gqr ng0

Y j kg" vj g"wdy c{ "dtlpi u"eqpxgplgpeg"vq" vtdcp"tgukf gpv. "k' cnuq" hcegu"o cp{ "f khl'ewkn'cu'cpf "
ej cmgpi gu0Qpg"qh'vj g"o quv'r tqo kpgpv'r tqdrgo u'ku'etqy f kpi 0Etqy f kpi "y kni'pqv'qpn{ "tgf weg"vj g'vtxgnl'
gh'hekgpe{ "cpf "vtxgnl'gztg'peg"qh'vtxgnl'gztg'dw" cnuq" dtlpi "geqpqo le"quugu0Cnj qvi j "vj g"rko kgf "
tguqwtegu"qh'vj g"wdy c{ "ctg"qpg"qh'vj g'tgcuqpu"ht"vj g"eqpi guvkqp. "k'ku"ko r qt vcp'vq"pqvg"vj cv'vj g"
wkl'vkqp'v'cg'qh'uqo g'ugevkpu'ku'hny 0H'qpn{ "d{ "lpetgcukpi "vj g'pwo dgt'qh'uwdy c{ "hpgu'vq'cngxlcvg"vj g"
eqpi guvkqp"r tqdrgo "y kni'dtlpi "o cp{ "r tqdrgo u"j3_0Hqt"gzco r ng. "j ki j gt"lpht'cuxwewt"ur gpf kpi "cpf "
y cug"qh' tguqwtegu" f wtkpi "qh'r gcn' r gkqf u0' Vj gtghqtg. "k'ku" pgeguuct{ "vq" uggm'ko r tqxgo gpv"lp"
o cpci go gpv0Co qpi "vj go . "r tgf levkpi "vj g'uj qt v/vgt o "wdy c{ "r cuugpi gt 'hny "ku'etweln'0Vj ku'ecp"j gn "
o gvtq'cwj qtkkgu'wpf gtucpf "vtxgnl'go cpf "cpf "qr vko k' g'uej gf wngu"j4_0Cv'vj g'uco g'vko g. "vj ku'ecp"cnuq "
j grr "vtxgnl'qr vko k' g'vtxgnl'gekukpu'cpf "lo r tqxg"vtxgnl'gh'hekgpe{ "j4_0

Kp"vj g'r cuvhgy "f gecf gu."vj g'r tgf levqkp"qh"uj qtv"ko g'tchle"j cu'cwtevgf "vj g'cwgpvqkp"qh'tgugctej gtu'
ctqwpf "vj g'y qtrf 0Cu"vj g'tgugctej "r tqi tguugu."f khtgpnv"r gu"qh'o gj qf u'cpf "o qf gnu'ctg"fgxgnr gf 0'
Vj gug"vej pls wgu"ecp"dg"ecvgi qtk gf "kpq"vj tgg"i tqwr u<pcxg"o gj qf u'r ctco gtle"o gj qf u'cpf "pqp/
r ctco gtle"o gj qf u'j5_0F ggr "ngctpkpi "j cu'dggp"t'gugctej "j qwr qvlp'tgegpv"t'gctucpf "ku'y kf gn" "wugf "kp"
xctkqwu" uekgpvkhe" t'gugctej "hgrf u0' Vj g" cr r rlecqvqkp" qh' f ggr "ngctpkpi "kp" uj qtv'vgo "r cuugpi gt" hny " "
r tgf levqkp"qh'uwdy c{ u'j cu'dggp"t'gugctej "o cwtg."cpf "o cp{ "vcti gvgf "o qf gnu'cpf "o gj qf u'j cxg"dggp"
hqt o gf "j6_0F khtgpnv'tgugctej "o gj qf u'cpf "o qf gnu'ctg"eqo dkgf "cpf "ko r tqxgf "f wtkpi "vj g'tgugctej " "
r tgegu0Vj gk'r tgf levqkp"ceewtce{ "j cu'dggp"i tgevw "ko r tqxgf "eqo r ctgf "vq"vj g'qtki kpcn'o qf gnu' O /TDH'
pgwtcn'pgwy qtn'r tgf levqkp"o qf gnu'eqo dkgu"vj g'ej ctcevgtku"qh"i tc{ "o qf gnu' I O +y kj "nguu"uco r ng"
enqy "f go cpf "cpf "tcf kncidcuku"hwpevqkp"pgwtcn'pgwy qtni*TDH+y kj "i qqf "cf cr vxg"cdkxk "j7_0Vj g'EP P /
I TW"eqo dkgvqkp"o qf gnu'eqo dkgu"vj g'eqpxqmwkpcn'pgwtcn'pgwy qtni"o qf gnu' *EP P + "cpf "vj g"i cvg"
tgewtgpnv'wkp'o qf gnu' I TW+cpf "u{ pvy guk gu"vj g'kphwpeg"qh"ko g'hcevtu'cpf "ur ceg'hcevtu'qp"r cuugpi gt"
hny "j8_0Cpqy gt"uwf { "wugf "mipi "uj qtv'vgo "o go qt { "pgwtcn'pgwy qtni" *NUVO P P + "y kj "ucengf "
cwqgpeqf gtu'*UCGu+vq"etgcv"vj g'dguv'r tgf levqkp"o qf gnu'y kj "eqo r tguugf "f cv"qh"xctkqwu"ko gpukpu0'
j9_0K'ecp"dg"uggp"htqo "vj gug'tgugctej "gzco r ngu"vj cvk'ku"t'vtpf "qh'tchle"htgecukpi "vq"dwkf "c"o kzgf "
o qf gnu'wukpi "f khtgpnv'cf xcpvi gu"qh"i khtgpnv'o qf gnu'0

K'ku'r quikdg"vq"vj kpnqhv"j g'r tgf levqkp"qh'uwdy c{ 'r cuugpi gt'hny "cu'c"ko g'ugtgu'r tqdngo "vj cv'gxqnxgu"
qxgt"ko g"j4_0Nqpi "uj qtv'vgo "o go qt { "NUVO +ecp"cf cr v'vq"vj g'tcpf qo "cpf "pqpikpgct"ej ctcevgtku" "
qh'uwdy c{ 'r cuugpi gt'hny "j: _0Vj g'i tcf kpnv'f kucr r gctcepg'kuuwg'kp'tgewtgpnv'pgwtcn'pgwy qtni*TP P +ecp"
cnq"dg"uqnxgf "d{ 'NUVO "j: _0'

Vj ku'r cr gt "y knitghgt"vq"vj g'gzkukpi "t'gugctej ".dcugf "qp"NUVO "vq"htgecu"vj g'uwdy c{ 'r cuugpi gt'hny 0'
Vj g'f cv"uwgf "hqt "vckpki "vj g'o qf gnu'ctg"vj g'uy kr g'ectf "f cv"qh"J cpi | j qw'Ekx{ "htq" "Lcpwct { "3"vq"42."
423; 0Chgt"vj g'o qf gnu'j cxg"dggp"eqputwewf. "vj gk'r tgf levxg'r qy gt "y knitdg"cuuguugf "wukpi "ej ctu'w'cpf "
gxncvqkp"o gtleu0Vj tqwi j "vj g'uwf { "qh"vj ku'r cr gt. "k'ecp"r tqxkf g'c'tghgtgpeg"htq'r cuugpi gt "v'cxgn'cpf "
vj g'o cpci go gpv'qh'uwdy c{ "ucvqpu0

2. O gj qf

2.1. F cv"uqwt eg

Vj g'f cv"uwgf "kp"vj ku'r cr gt"ctg"vj g'uwdy c{ "ectf "uy kr g'f cv"tgeqtf u'qh"J cpi | j qw'Ekx{ "htq" "c"vqcn'qh"42"
f c{ u'htqo "Lcpwct { "3"vq"42."423; 0Vj g'f cv"lpenmf g": 3"ucvqpu"qp"vj tgg"uwdy c{ "kpgu0Vj g'uqwt eg"qh"vj g"
f cv"ku"vj g'Vcpej kDki "F cv"Eqo r gvkqpu0

2.2. Kpf gz "ugrgevqkp"cpf "f guet kr vqkp"

Vj g'hqmqy kpi "vdrng"uj qy u"vj g"9"xctkcdngu"lpenmf gf "kp"vj g'f cv"*Vcdng"3+0Vj ku'f cvau"lphqto cvqkp"ku"
eqo r ctcevxgn"gzvgpukxg"cpf "ecp"i kxg"t'gkcdng"tgr tguvpcvqkp"qh"vj g'kpdqwpf "cpf "qwdqwpf "vchle"qh"
r cuugpi gtu'cv'gcej "ucvqpu0F wtkpi "vj g'tgugctej "r tgegu."t'cpucevqkp"v'rg."ectf "pwo dgt"cpf "t'cpucevqkp"
f cvg'y gtg"uwgf "htq" "f cv"engcpkpi 0Chgt"v'rg'hngtkpi ".ugs wgpvkcniqi le'hngtkpi "cpf "o kuukpi "hngtkpi ".vj g"
engcp"f cv"ecp"dg"uwgf "htq"o cej kpg'ngctpkpi 0Vj g'r tko ct{ "lpr wu"wkxk gf "kp"vckpki "vj g'o qf gnu'ctg"vj g"
kpdqwpf "cpf "qwi qkpi "r cuugpi gt'hny "ucvku"htq"gej "ucvqpu0

Table 1. Name and definition of the variable.

Variable Name	Xctkcdng" F ghpkqkp	Data Type
time	Transaction date time	Time character
lineID	Line number	Character string
stationID	Station number	Character string
deviceID	Device coding	Character string
status	Type of card used	Character string
userID	Card number	Character string

Table 1. (continued).

payType	Payment type	Character string
---------	--------------	------------------

2.3. O qf gni'kpt qf wevkqp

NUVO "ku" c"xctkcpv"qh"TP P "hqt" r tqegulpi "ugs wpep" f c v c . "y j lej "ku" ur gekhkecmf "f guki pgf "vq" uqrxg" y j g" r tqdrgo u"qh" f kucr r gctkpi "i tcf kgpw" cpf "gzz r qf kpi "i tcf kgpw" r tgugpv" kp "tcf kkpccn" TP P 0' TP P "j cu" c" i tcf kgpv" r tqdrgo "y j gp" r tqegulpi "ugs wgpvcn" f c v c . "y j lej "tguwau" kp "r gthqto cpeg" f gi tcf cvkqp" qp" npi " ugs wpegu0NUVO "uqrxgu" y j ku" r tqdrgo "d{ "kpt qf wekpi "c" ur geknkpvgtpcnf gr ctvo gpv'eqpvtqn' b gej cpluo 0

Vj g"eqtg" qh'NUVO "ku" y j g'o go qt { "wpkx" cnq" npqy p" cu" y j g'NUVO "wpk0Kj" cu" c" egm'ucvg" cpf "c" j kf f gp" ucvg0Vj ku'egm'ucvg" tcpuo ku'kphqto cvkqp" dgwy ggp" f khtgtpv' lko g' ugr u. "cmqy kpi "y j g'NUVO "vq" ecr wtg" npi /vgto "f gr gpf gpeku0

Vj g'NUVO "eqpukuu" qh' y j tgg" i cvgf "wpku" y j cv' f gvgto kpg" j qy "y j g' hqy "qh" kphqto cvkqp" hqy u" dgwy ggp" y j g' egm'ucvg" cpf "y j g" j kf f gp" ucvg0Vj g' Hqti gv' I cvg" f gvgto kpgu" y j cv' kphqto cvkqp" ku' tgvckpgf "kp" y j g' egm' ucvg" cpf "y j cv' kphqto cvkqp" ku' f kuctf gf 0Kj" r tqf wegu" cp" qwr w' dgwy ggp" 2" cpf "3" xlc" c" Uki o qkf "hpevkqp. " y j lej "ku" wugf "vq" eqpvtqn' tgvkqp" qt" hqti gvkpi "qh" kphqto cvkqp0Vj g' Kpr w' I cvg" eqpvtqn" j qy "htguj" kphqto cvkqp" ku' cf f gf "vq" y j g' egm'ucvg0Kj" wugu" c" Uki o qkf "hpevkqp" vq" r tqf weg" cp" qwr w' dgwy ggp" 2" cpf "3. " cpf "c" cpj "hpevkqp" vq" r tqf weg" c" pgy "ecpf kf cvg0Vj g' Qwr w' I cvg" ej qqugu" j qy "o wej "f c v c" u j qwf "dg" f gtxgf "htqo "y j g' egm'ucvg0Kj" r tqf wegu" cp" qwr w' dgwy ggp" 2" cpf "3" xlc" c" Uki o qkf "hpevkqp. " r cuugu" y j g' egm' ucvg" vq" y j g' cpj "hpevkqp" hqt" eqo r tguukqp. " cpf "y j gp" o wnr kgu" k' y kj "y j g' qwr w' qh' Uki o qkf "vq" r tqf weg" y j g' kpcn' j kf f gp" ucvg0Vj g' hqmy kpi "f kci tco "uj qy u" y j g' kpgtpcn' utwewt g' qh'NUVO "Hki wtg0B+]: _0

Figure 1. The internal structure of LSTM [8].

Cv'gcej "lko g' ugr. "y j g'NUVO "tgegkxgu" j kf f gp" ucvgu" cpf "egm'ucvgu" htqo "y j g' r t g x k q w u" lko g' ugr" cpf " wr f cvgu" y j gug" ucvgu" dcugf "qp" y j g' qwr w' qh' y j g" i cvgf "wpk0Vj gug" ucvgu" ctg" y j gp" r cuugf "qp" vq" y j g' pgzv' lko g' ugr 0'NUVO "ku" f guki pgf "vq" ecr wtg" npi /vgto "f gr gpf gpeku" ghgevkxgnf. "o cnkpi "k" wughw" y j gp" f gcrkpi "y kj "cumu" y j cv' tgs wkt g' wpf gtucpf kpi "eqpvz v' cpf "lko g' f gr gpf gpeku0

2.4. Kpf kecvtu'kpt qf wevkqp

Vj ku' r er gt" wugf "b gcp" us wctg" gttqt " *O UG+ " cu' hquu' f wtkpi "b qf gni' tcklpi 0Vj g' O UG" dgwy ggp" y j g' r tgf kev f " xcnwg" cpf "y j g' cewcn' xcnwg" f kgevnf "tgr tgugpv" y j g' o qf gmi' r tgf kev xg" r qy gt0C v' y j g' uco g' "lko g. "y j g' O UG" rquu" hpevkqp" ku" wuwmf "eqpxgz" cpf "y j gtg" ku" c" wps wg" i mqdcn' o kpo wo 0' Ku" i tcr j "ku" eqpxgpkp v' hqt" qdugt xkpi "y j g' ej cpi g' qh' r tgf kev qp" gttqt "f wtkpi "tcklpi 0

Tqqv' o gcp" us wctg" gttqt " *TO UG+ " o gcp" cduqnwg" r gtegpvi g" gttqt " *O CRG+ " cpf " eqghlekpv" qh' f gvgto kpcvkqp" * & + " y gtg" wugf "cu" gxcnecvkqp" kpf kecvtu' hqt" y j g' o qf gn0Vj g' o qf gmi' r tgf kev qp" gttqt "ku" o gcuwtf "lpwkkxgnf " d{ " y j g' TO UG" ucwknk. " y j lej "cxgtci gu" y j g' f khtgtpgpeg" dgwy ggp" y j g' o qf gmi' r tgf kev f "xcnwg" cpf "y j g' cewcn' xcnwg0O CRG" o gcuwgu" y j g' r gtegpvi g' r tgf kev qp" gttqt "qh" y j g' o qf gn"

o c n k p i " k ' g c u l g t " v " g z r n k p " v j g " q x g t c m " g h g e v " q h " v j g " o q f g m u ' r t g f l e v k p 0 & " t g h n g e w " j q y " y g m ' v j g " o q f g n ' e c p " g z r n k p " e j c p i g u ' k p " v j g " q d u g t x g f " f c v c 0

3. T g u m m u ' c p f " f k e w u k q p

3.1. F c v c " f g u e t k r v k p p " c p f " H n g t k p i

R t k q t " v " t c k p k p i " v j g " o q f g n " v j g " o q f g n ' o w u v ' d g " e n g c p g f " v " e q p h k o " v j g " x c n k f k { " q h " v j g " f c v c 0 " H k u v ' q h ' c m " v j g " f c v c " w u g f " k u ' e j g e n g f " h q t " i c r u " q t " o k u k p i " x c n w g u 0 P q " x c e c p e { " x c n w g " y c u " h q w p f " k p " v j g " f c v c . " y j k e j " k p f l e c v g u " v j c v " v j g " f c v c " k u ' t g r c v k x g n { " e n g c p 0 U g e q p f n { . " f g c n k p i " y k j " f w r n e c v g " x c n w g u " k p " v j g " f c v c 0 F w r n e c v g " x c n w g u " y g t g " j c p f n g f " d { " r t g u g t x k p i " w p k s w g " x c n w g u 0 V j k t f n { . " e j g e n k p i " v j g " w o k p i " h q i k e " k p " v j g " f c v c " v q " o c n g " u w t g " v j g " f c v c " k u " h q i k e c n 0 k p " q t f g t " v q " k o r t q x g " v j g " r t q e g u k p i " g h h e k g p e { " c p f " g p u w t g " v j c v " v j g t g " k u " p q " y t q p i " f c v c . " v j g " f c v c " v j c v " x k q m v g u " v j g " w o k p i " h q i k e " y c u " f g n g v g f 0 N c u v " q h ' c m " v j g " u e c w g t " r n q u " y g t g " w u g f " v q " e j g e n i " y j g v j g t " v j g t g " y g t g " q w d g t u " k p " v j g " f c v c 0 H q t " g z c o r n g . " H k i w t g 0 " u j q y u " v j g " u e c w g t " r n q v " q h ' e t g f k ' e c t f " v { r g " c v " u k g " ; " q p " L c p w c t { " 3 u 0 C u " e c p " d g " u g g p " h t q o " v j g " h k i w t g . " v j g t g " c t g " p q " f k u e t g v g " r q k p u . " c p f " v j g " f c v c " c t g " u c p f c t f k g f . " u q " v j g " p g z v " u c v k u k e c n " q r g t c v k p p " e c p " d g " e c t t k g f " q w 0

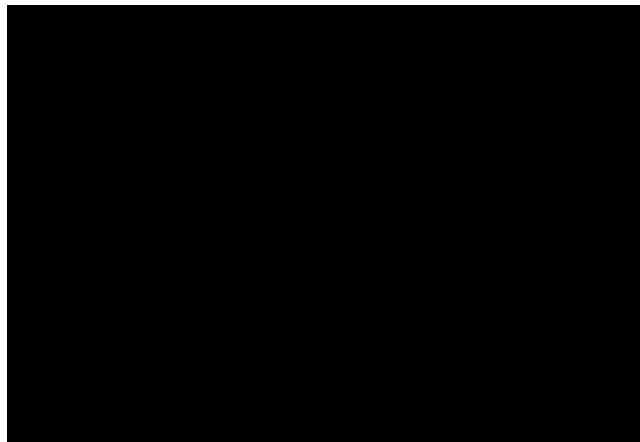


Figure 2. Scatter plot of credit card type at site 9 on January 1st.

C h g t " f c v c " e n g c p k p i " y c u " e q o r n g v g . " v j g " f c v c " y c u " e q m g e v g f " d { " v j g " u k g 0 " H k i w t g 0 " u j q y u " v j g " r c u u g p i g t " h q y " q h " g c e j " u c v k p p " q p " L c p w c t { " 3 u 0 K " e c p " d g " u g g p " v j c v " v j g " r c u u g p i g t " h q y " q h " u c v k p p " ; " c p f " u c v k p p " 3 7 " c t g " o q t g " r t q o k p g p v " v j c p " q v j g t " u c v k p p u 0 k p " q t f g t " v q " g p u w t g " v j g t g " y g t g " u w h h e k g p v " f c v c " h q t " t c k p k p i . " f c v c " h t q o " v j g u g " y q " u k g u " y g t g " u g r g e v g f " h q t " o q f g n ' t c k p k p i 0

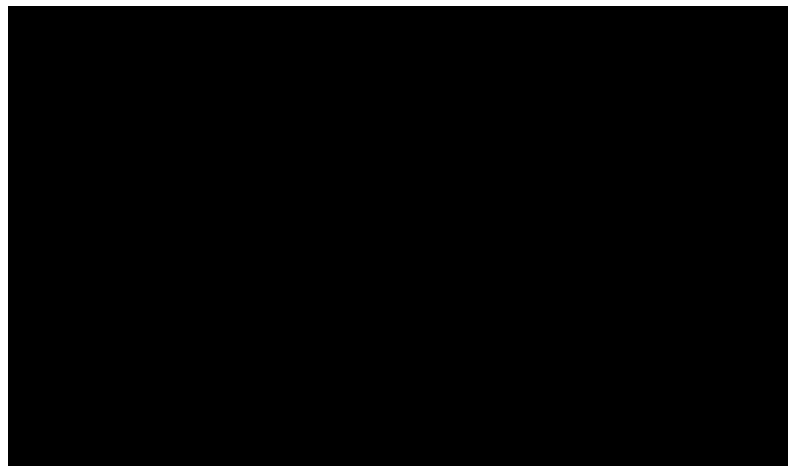


Figure 3. The passenger flow of each station on January 1st.

Vj g"fcv"y gtg"eqmgev"cv"kpvtxcu"qh"vgp"o kpwgu"v"qdvclp"vj g"r cuugpi gt"hmjy "fcv"qh"vj g"vy q"
uvcvkpu"ltqo "Lcpwt{"3uv"v"42j 0Hki wtg0"uj qy u"vj g"ej cpi g"lp"r cuugpi gt"hmjy "cv"Uvcvkq"; 0K'ecp"dg"
uggp"vj cv"vj g"r cuugpi gt"hmjy u"qh"uvcvkpu"j cxg'tgi wctk{"cpf"ej cpi g0Vj g"r cuugpi gt"hmjy "qp"lcpwt{"3uv"
y cu"uki phtecpvt{"j ki j gt"vj cp"qp"qvj gt"fc{u"y j lej "y cu"eqpukvgpv"y kj "vj g"lcev"vj cv"vj cv"fc{"y cu"c"
j qrkfc{0Ur gekn'xcnwg'u"j qwf"dg'gh'qww"v"qxtkh{"vj g'o qf gnu'cdkkr{"v"hs'f cv0Vj g"fcv"ltqo "vj g"3uv"
fc{"y cu"vj wu"grko kpcvgf"ltqo "vj g"uwdugs wgpv"tclpki "r tqegf wtg."y j lej "wugf"vj g"fcv"ltqo "vj g"
uwdugs wgpv3; "fc{u"lpugcf 0

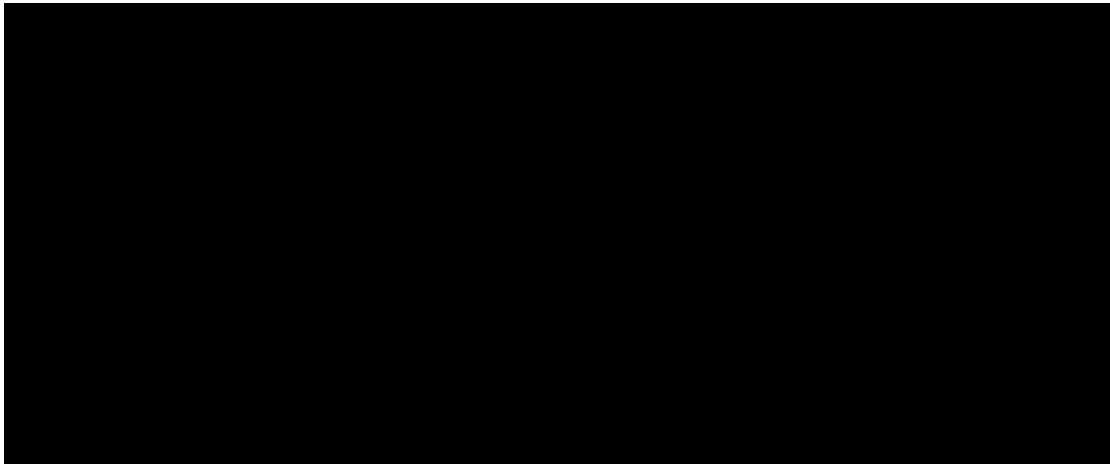


Figure 4. The passenger flow of station 9 in 5 days.

Chgt"fcv"engcplpi "y cu"eqo r ngvf"cpf"vj g"tcpi g"qh"fcv"y cu"ugnev"3; /fc{"r cuugpi gt"hmjy "fcv"
qh"Uvcvkq"; "cpf"Uvcvkq"37"y gtg"qdvclpgf 0Hki wtg0"uj qy u"vj g"eqo r ctukq"qh"r cuugpi gt"hmjy "lp"cpf"qww"
qh"uvcvkq"; "qp"lcpwt{"4pf 0Vj g'o qf gny cu"tclpgf"y kj "vj g"fcv"ltqo "lcpwt{"4pf/3; vj "cpf"vgugf"y kj "
vj g"fcv"ltqo "lcpwt{"42j "cu"vj g"xcrkf cvkq"ugv0

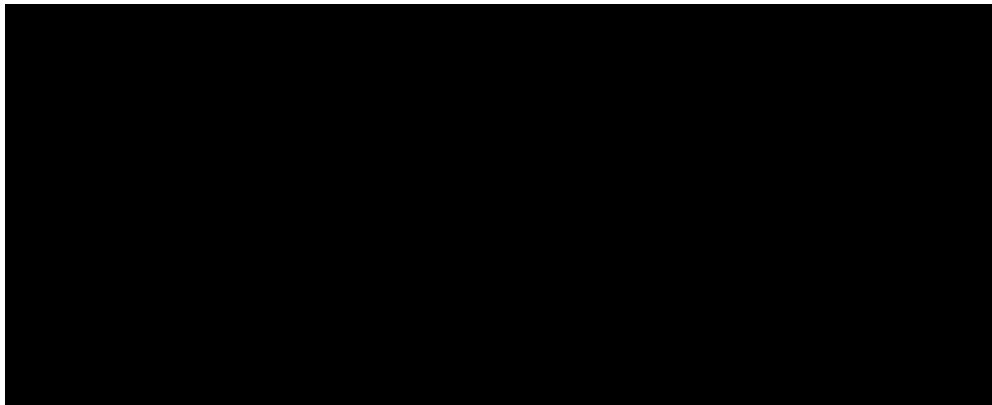


Figure 5. Comparison of passenger flow in and out of station 9 on January 2nd.

3.2. Ugrgevq"qhrctco gvtu

Vj g"NUVO "o qf grlwugf "lp"vj ku'r cr gt"ugv"vj g"dcvej "pwo dgt"v"3"cpf"cnq"pggf gf "v"f gvgto kpg"vj g"s wcpvk{"
qh"tclpki "ko gu"cpf"vj g"s wcpvk{"qh"pgwtqpu0Vj g"s wcpvk{"qh"tclpki "ko gu"ku"pqv"vj g'o qtg"vj g"dgwt."
vqq"o cp{"tclpki "ko gu"o c{"rgcf"v"qxgt/hkwp"cpf"tgf weg"tclpki "ghlekpe{0Wukpi "O UG"cu"iquu."
Hki wtg0"uj qy u"vj g"ej cpi g"qh"iquu"ftclpi "522"tclpki "uguukpu"qh"54"rc{gtu"qh"pgwtqpu0Vj g"ko ci g"
knwutcvgu"j qy ."cv"vj g"uctvqh"tclpki ."vj g"iquu'xcnw"getgcugf"tcrkf n"y kj "vj g"lpetgcug"lp"tclpki "ko gu."
cpf"vj gp"vj g"t genkpg'tcvg"uuy gf "f qy p."cpf"lpcm"."vj g"iquu'xcnw"lpetgcugf"y kj "vj g"lpetgcug"lp"tclpki "
ko gu0

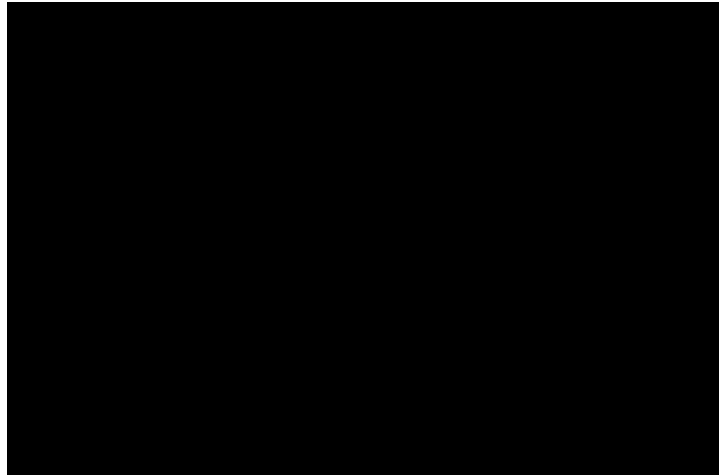


Figure 6. Change of loss during 300 training sessions of 32 layers of neurons.

Dgukf gu"vj g"pwo dgt"qh"tcklpi "lko gu."vj g"ugwkp "qh"vj g"pwo dgt"qh"pgwtqpu"y kn'cnuq"j cxg"cp"ko r cev" qp"vj g"tcklpi "tguwmu0Ceeqtf kpi "vq"Vcdrg"4."vj g"tcklpi "tguwmu"qh"f khtgtpv"pgwtqp"pwo dgtu"cv"322" tcklpi "lko gu0Vj g"etkgtk"wgf"ctg"TO UG."O CRG"cpf"& 0

Table 2. The training results of different neurons numbers at 100 training times.

pwo dgt"qh"pgwtqpu	TO UG	O CRG [#] +	&
4	: ; Ø527	57Ø; :	2Q 87:
6	: 5Ø523	54Q 64	2Q 8; 9
:	: 4Ø666	5: 0 ; 2	2Q 928
38	: 4Ø64: 3	42Ø83	2Q 929
54	: 3Ø744	38Q : 3	2Q 934
86	: 6Ø2335	38Ø86	2Q 8; 8

Cu'ecp'dg"uggp"htqo "Vcdrg"4."cm'vj tgg'r etco gvgtu'r gthqto "dgwgt"y j gp"vj g"pgwtqpu"ctg"540Cnj qwi j " vj g"O CRG"y cu"uo cmgt"y j gp"vj g"pgwtqpu"y gtg"86."ku"TO UG"cpf"& "y gtg"dqv "y qtug"vj cp"y j gp"vj g" pgwtqpu"y gtg"540Equkf gtlpi "vj g"vj tgg"etkgtk"eqo r tgi gpukxgn". "vj g"pwo dgt"qh"pgwtqpu"lp"vj g"o qf gni" y cu"f gvgto kpgf"vq"dg"540Cv"vj g"uco g"lko g."d{ "qdugtclpi "Hli vtg"8."k'ecp"dg"hwpgf"vj cv"vj g"o kplko wo " nquu'qeevtu"y j gp"vj g"tcklpi "lko gu"ctg"550Vj gtghqtg."55"ku'ugrgevgt"cu"vj g"uwkcdrg"tcklpi "pwo dgt"ht" vj g"lpdqwpf"b qf gni'cv'ucvqp"; 0Vj tqwi j "vj g"uco g"o gvj qf. "vj g"uwkcdrg"tcklpi "lko gu"qh"vj g"hwto"o qf gnu" ecp"dg"qdvclpgf."cu'uj qy p"lp"Vcdrg"50

Table 3. The training times of the four models.

Ucvkqp"KF	Kpdqwpf"qt"qwdqwpf	Uwkcdrg"tcklpi "lko gu
;	Kpdqwpf	55
;	Qwdqwpf	;
37	Kpdqwpf	6;
37	Qwdqwpf	54

3.3. Tguwn'cpcrfuku

Chgt"f gvgto klpki "vj g'r ctco gvgtu"qh"vj g"NUVO "o qf gnu."vj g"o qf gnu"y gtg"vtckpgf "wukpi "vj g"fcvc"htqo "
Lcpwct{ "4pf "q"3: vj "cpf "xgtkkgf "y kj "fcvc"htqo "Lcpwct{ "42vj 0Vj g'htgecuv'tguwnu'ctg'uj qy p'lp'Hi wtg0"
cpf "Hi wtg0 0

Figure 7. Predicted results of station 9 (left for inbound and right for outbound).

Figure 8. Predicted results of station 15 (left for inbound and right for outbound). Predicted results of station 15 (left for inbound and right for outbound).

Cu"uj qy p'lp"vj g"Hi wtgu."vj g'htgecuv'tguwnu"qh"vj g'hqwt"o qf gnu"fhgt0Vj gk"etkgtk"ctg'uj qy p'lp"
Vcdng"60

Table 4. Vj g'hqwt"o qf gnu'etkgtk0

Ucwkqp"K	Kpdqwpf "qt"qwdqwpf	TO UG	O CRG" ^{ss} +	
;	Kpdqwpf	: 4082; 9	4: 0757	20 928
;	Qwdqwpf	3280246;	lph	20 548
37	Kpdqwpf	44: 07336	5: 0877	20629
37	Qwdqwpf	3450 555	lph	20 585

K'ecp'dg'uggp'htqo "vj g'tguwnu"vj cv'vj g'r tgf levgf "tguwnu"qh"vj g'hqwt"NUVO "o qf gnu'ctg'f hgtgpv'wpf gt"
vj g'eqpf kkkp"qh'ugwki "vj g"uco g"pwo dgt"qh'pgwtqpu0'Kpwkxgnf."vj ku"o qf gnu'r tgf levgf "vj g"Kpdqwpf "
r cuugpi gt'hqy "qh'ucwkq"; 'dgu0Htqo "vj g'vj tgg'etkgtk."vj g'ghgeu'qh"vj g'hqwt"o qf gnu'ctg'cnuq'f hgtgpv0'
Co qpi "vj go ."vj g'tgecuq"y j { "vj g'O CRG"qh'qwdqwpf "r cuugpi gt'hqy "r tgf levkpu'ku'kphkpg"lph+ku"vj cv"
vj gtg'ku'c'xcnwg"qh'2'lp"vj g'tgcnxcnwg."y j lej "hgc f u'q'kphkpg'O CRG'ecrewnvkqp0K'cf f kkkp."k'ku'er r ctgpv"
htqo "vj g'r tgf levkq"qweqo gu"vj cv'vj g'NUVO "htgecuv'kpg'y knib qxg"q'vj g'tki j v0Vj ku'ku'eqpukngpv'y kj "
vj g'rci "qh'NUVO a'r tgf levkq"]32_0

Cm'lp'cm"vj g'hqwt'cpvlekr cvgf'r cuugpi gt'hqy 'tgpfu'ctg'eqo r cvldng'y kj "vj g'tgpf"qh'vj g'tgcn'xcnwg." y j lej "ecp"tghngev"vj g'ej cpi g'lp'r cuugpi gt'hqy "y kj "vko g'eqttgevn{0J qy gxgt."uqo g'o qf gnu'ecp"pqv' ceewtcvgn{ 'r tgf lev'vj g'ur gekh'le'xcnwg"qh'r cuugpi gt'hqy .lwej "cu'vj g'r gcn'xcnwg"qh'r cuugpi gt'hqy 0Vj gtg" ctg"ugxgtcn'tgcuqpu'hqt"vj g'f khtgtgpegu'dgy ggp"vj g'o qf gnu'r tgf lev'qpu'0Hkuv'qh'cm"vj g'NUVO "o qf gr' j cu" f khtgtgpv'cf cr cvkqp"ghgevu"vq" f khtgtgpv'f cvc'0 Ugeqpf n{."vj g"ugrgev'qpu"etkgtk"qh'r ctco gvgtu'ctg" f khtgtgpv'0Kp"vj ku'r cr gt."vj g"vj tgg"etkgtk"cpf "mqu"xcnwg"y gtg" wugf "vq"ugrgev'r ctco gvgtu'0F khtgtgpv' ugrgev'qpu"etkgtk"ecp"rgcf "vq" f khtgtgpv'tguwmu'0Vj kfn{."cnj qwi j "vj g'r cuugpi gt'hqy "qh'wudy c{ 'lucv'qpu'ku' tgi wrct."uqo g"ur gekcn'ekewo ucpegu"y kn'rgcf "vq"ur gekcn'r cuugpi gt'hqy ."y j lej "y kn'ecwug" f khtgtgpv' f gxlc'v'qpu'lp"vj g'o qf gnu'0Ncuw{."vj gtg'ku'tcpf qo pgu'lp"vj g'o cej kpg'rgctpki "cni qtkj o ."gxgp'kh'cm'vj g' r ctco gvgtu'ctg"vj g'uco g."vj g'tguwmu'pi "r tgf lev'qpu'tguwmu'y kn'dg'f khtgtgpv'0

4. Eqpenwukqp

Vj ku'r cr gt/vclp'gf "NUVO "cpf "wugf "vj g'o qf gr'vq"r tgf lev'r cuugpi gt'hqy 0Ceeqtf kpi "vq"vj g'hkpf kpi u."vj g' NUVO "o qf gr'j cu'c'i qqf "r tgf lev'pi "ko r cev'qpu'vj g'xqno g'qh'r cuugpi gtu'lp'wudy c{ 'lucv'qpu'0Y kj "TO UG." O CRG. & "cpf "mqu'xcnwg"vj g'NUVO "o qf gnu'r ctco gvgtu'ecp'dg'ej cpi gf "vq"tghngev'vj g'ewttgpv'uegpctkq0 Vj g'o qf gnu'ecp" f gr'lev'vj g'tgpf "qh'r cuugpi gt'hqy "ceewtcvgn{0Vj ku'f go qpwtcvgu'vj cv'vj g'NUVO "o qf gr' ecp"ceewtcvgn{ 'hqtgecu'f cvc'y j lej "ku'utqpi n{ "vkgf "vq"vko g0

Cv'vj g'uco g'vko g."dgecwug"vj g'o qf gr'ku'ulpi rg."vj g'NUVO "o qf gr'j cu'egtvc'p" f khtgtgpegu"lp"vj g' r tgf lev'qpu'qh'f khtgtgpv'f cvc'0Eqo dlpki "vj g'NUVO "o qf gr'y kj "vj gt'o cej kpg'rgctpki "o gvj qf u."c'dgwgt" r cuugpi gt'hqy "r tgf lev'qpu"o qf gr'ecp"dg'qdvclp'gf 0Cm'lp'cm"vj g'NUVO "o qf gr'j cu'c'uki pkh'ecpv'ko r cev' qp"vj g'hkpf "qh'r tgf lev'pi "wudy c{ 'r cuugpi gt'hqy ."y j lej "dgpghku'dqvj "tgu'f gpw'v'vcxgn'gzr gtlgpegu"cpf " vj g'ghgevxgpguu"qh'wtdcp"tckn'v'cpuk'qr gtcv'qpu'0J ki j gt"r tgf lev'qpu"ceewtc{ "y kn'dg'cej kxgf "d{ "vj g' wr eqo kpi "NUVO /dcugf'r cuugpi gt'hqy "r tgf lev'qpu"o qf gr'y j lej "j cu'c'i vkf kpi "uki pkh'ecpeg'hqt'tgf velpi " eqpi gukqp"cpf "ko r tqxlpki "gh'ekgpe{0

Tghgtgpegu

- [1] Ding X et al 2018 *J.Eur. Transp. Res. Rev.* 10(2) pp 1-11
- [2] Liu Y, Liu Z and Jia R 2019 *J.Transp. Res. Part C: Emerg. Technol.* 101 pp 18-34
- [3] Xie C et al 2021 *J. Adv. Transp.* 2021 pp 1-8
- [4] Zhang S 2021 *Lanzhou Jiaotong University*
- [5] Chen Y et al 2021 *The world transportation engineering technology BBS (WTC2021) *Rgqr ngau' traffic press co., LTD) p 9*
- [6] Luo J 2023 *Guangdong University of Technology*
- [7] Jia F et al 2019 *IET Intelligent Transport Systems* 13(11) pp 1708-16
- [8] Chang H 2023 *Xijing University*
- [9] Yang L et al 2018 *J. Comput. Appl.* 38(S2) pp 1-6+26
- [10] Huang T and Yu L 2019 *J.CEA.* 55(01)142-148