Project2_3L_NN(Forestfires)

April 3, 2022

```
********************** Exploratory Data Analysis ************************


------------------ Displaying head ------------------

```

	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain	area
0	7	5	mar	fri	86.2	26.2	94.3	5.1	8.2	51	6.7	0.0	0.0
1	7	4	oct	tue	90.6	35.4	669.1	6.7	18.0	33	0.9	0.0	0.0
2	7	4	oct	sat	90.6	43.7	686.9	6.7	14.6	33	1.3	0.0	0.0
3	8	6	mar	fri	91.7	33.3	77.5	9.0	8.3	97	4.0	0.2	0.0
4	8	6	mar	sun	89.3	51.3	102.2	9.6	11.4	99	1.8	0.0	0.0

```
------------------ Dimensions of dataset ------------------


(517, 13)


------------------ Contents of dataset  ------------------

<class 'pandas.core.frame.DataFrame'>
RangeIndex: 517 entries, 0 to 516
Data columns (total 13 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   X       517 non-null    int64
 1   Y       517 non-null    int64
 2   month   517 non-null    object
 3   day     517 non-null    object
 4   FFMC    517 non-null    float64
 5   DMC     517 non-null    float64
 6   DC      517 non-null    float64
 7   ISI     517 non-null    float64
 8   temp    517 non-null    float64
 9   RH      517 non-null    int64
 10  wind    517 non-null    float64
 11  rain    517 non-null    float64
 12  area    517 non-null    float64
```

```
dtypes: float64(8), int64(3), object(2)
memory usage: 52.6+ KB
```

None

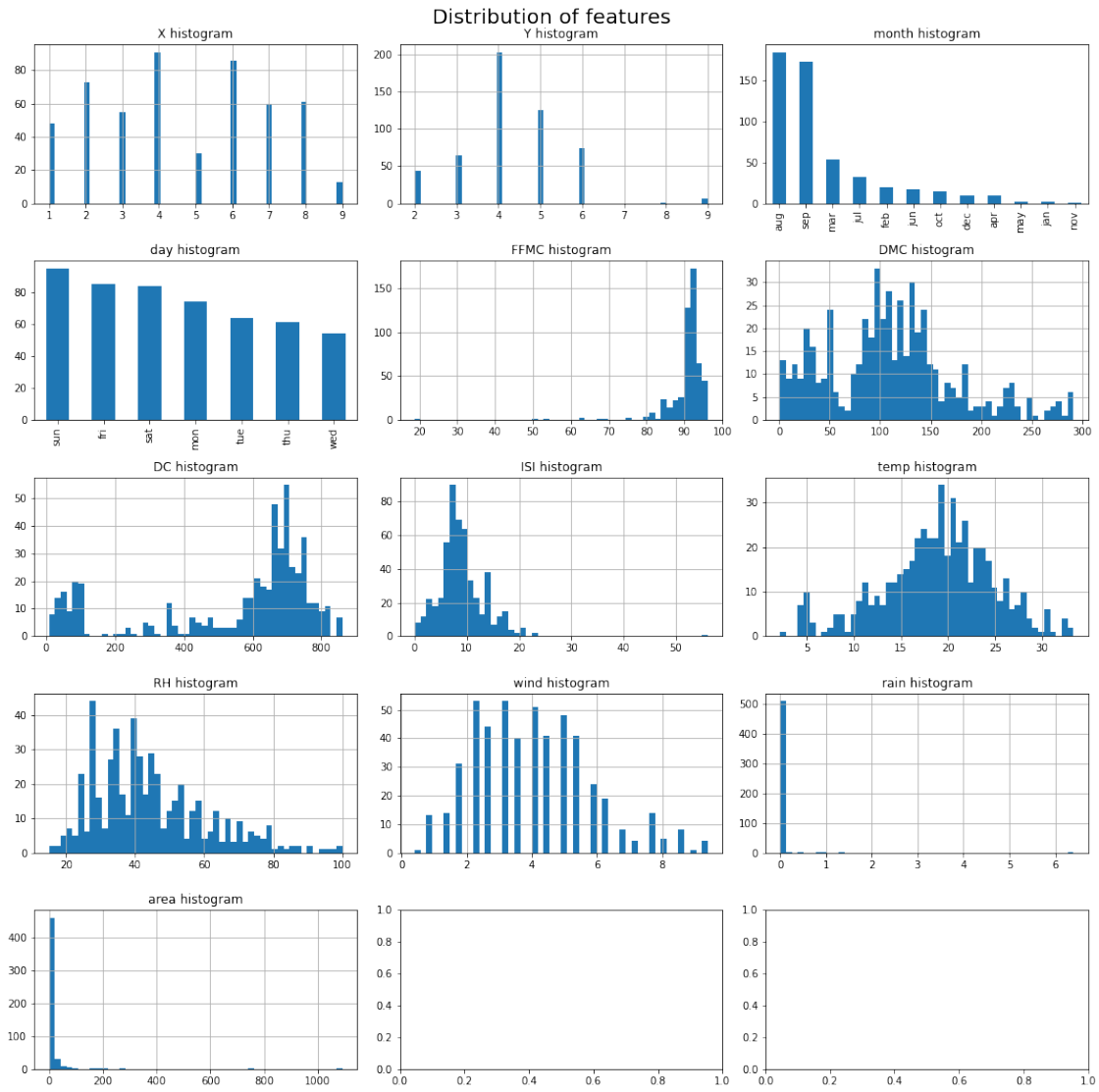
---------- Summary of Numerical feature ----------

	Feature_name	datatype	Count	min	quartile1	Mean	Median	\
0	X	int64	517	1.0	3.0	4.669246	4.00	
1	Y	int64	517	2.0	4.0	4.299807	4.00	
2	FFMC	float64	517	18.7	90.2	90.644681	91.60	
3	DMC	float64	517	1.1	68.6	110.872340	108.30	
4	DC	float64	517	7.9	437.7	547.940039	664.20	
5	ISI	float64	517	0.0	6.5	9.021663	8.40	
6	temp	float64	517	2.2	15.5	18.889168	19.30	
7	RH	int64	517	15.0	33.0	44.288201	42.00	
8	wind	float64	517	0.4	2.7	4.017602	4.00	
9	rain	float64	517	0.0	0.0	0.021663	0.00	
10	area	float64	517	0.0	0.0	12.847292	0.52	

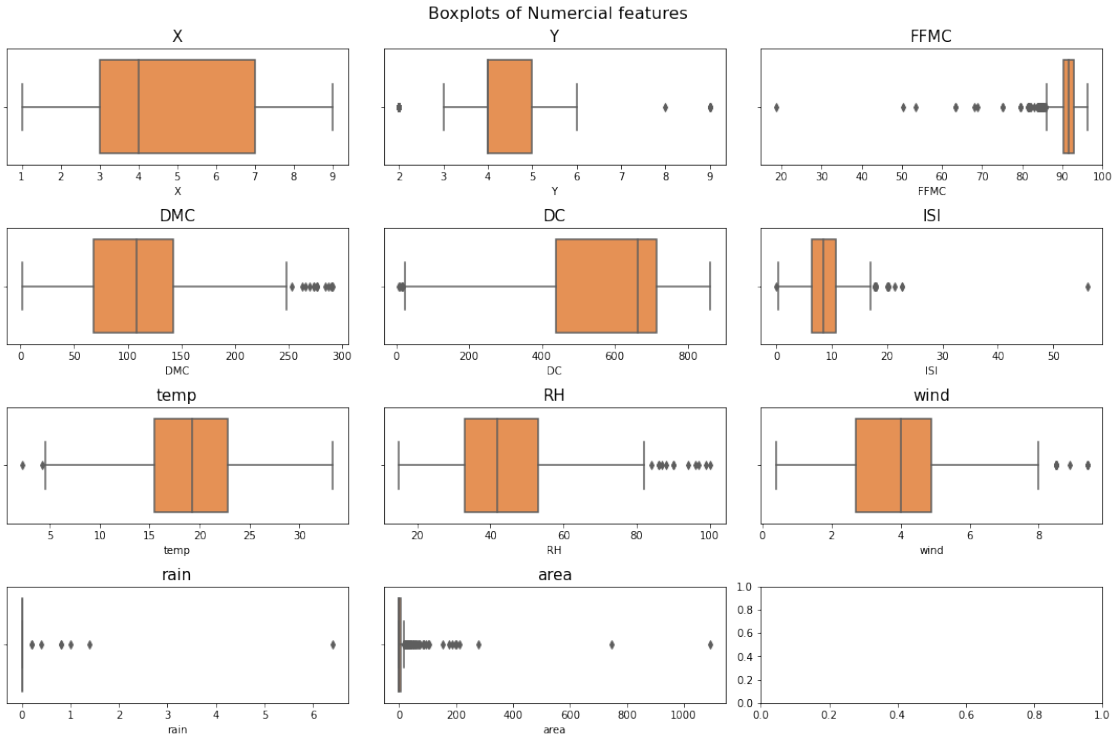
	quartile3	max	Std dev	Skewness	Kurtosis	Range	IQR	\
0	7.00	9.00	2.31	0.04	-1.17	8.00	4.00	
1	5.00	9.00	1.23	0.42	1.42	7.00	1.00	
2	92.90	96.20	5.52	-6.58	67.07	77.50	2.70	
3	142.40	291.30	64.05	0.55	0.20	290.20	73.80	
4	713.90	860.60	248.07	-1.10	-0.25	852.70	276.20	
5	10.80	56.10	4.56	2.54	21.46	56.10	4.30	
6	22.80	33.30	5.81	-0.33	0.14	31.10	7.30	
7	53.00	100.00	16.32	0.86	0.44	85.00	20.00	
8	4.90	9.40	1.79	0.57	0.05	9.00	2.20	
9	0.00	6.40	0.30	19.82	421.30	6.40	0.00	
10	6.57	1090.84	63.66	12.85	194.14	1090.84	6.57	

	skewness comment	outlier comment
0	Fairly symmetric(positive)	No outliers
1	Fairly symmetric(positive)	Has outilers
2	High negative skewed	Has outilers
3	Moderate positive skewed	Has outilers
4	High negative skewed	Has outilers
5	High positive skewed	Has outilers
6	Fairly symmetric(negative)	Has outilers
7	Moderate positive skewed	Has outilers
8	Moderate positive skewed	Has outilers
9	High positive skewed	Has outilers
10	High positive skewed	Has outilers

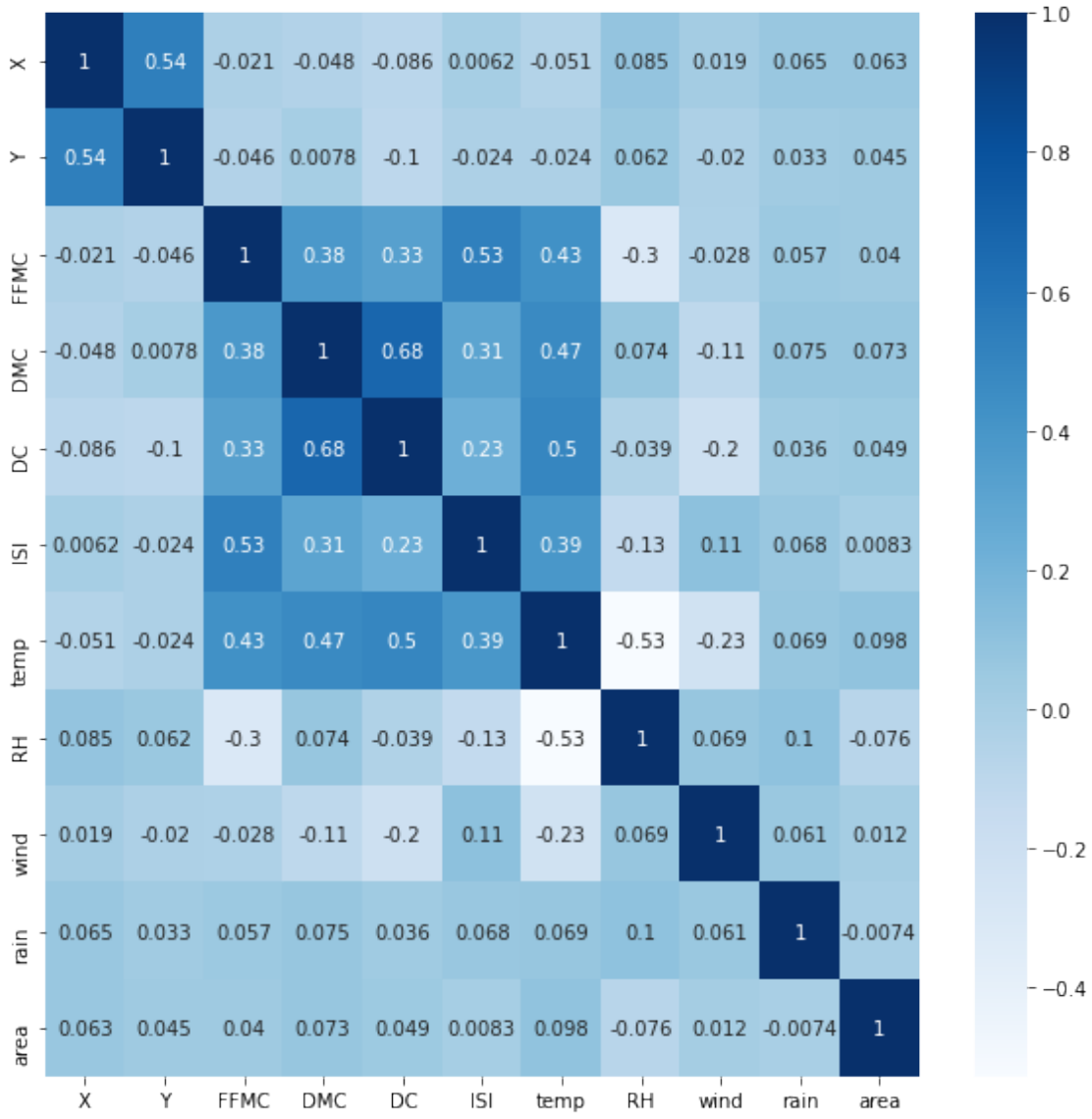
None


Distribution of features
X histogram
Y histogram
month histogram
day histogram
FFMC histogram
DMC histogram
DC histogram
ISI histogram
temp histogram
RH histogram
wind histogram
rain histogram
area histogram
aug
sep
mar
jul
feb
jun
oct
dec
apr
may
jan
nov
sun
fri
sat
mon
tue
thu
wed

None



[7]: <AxesSubplot:>



[10]:

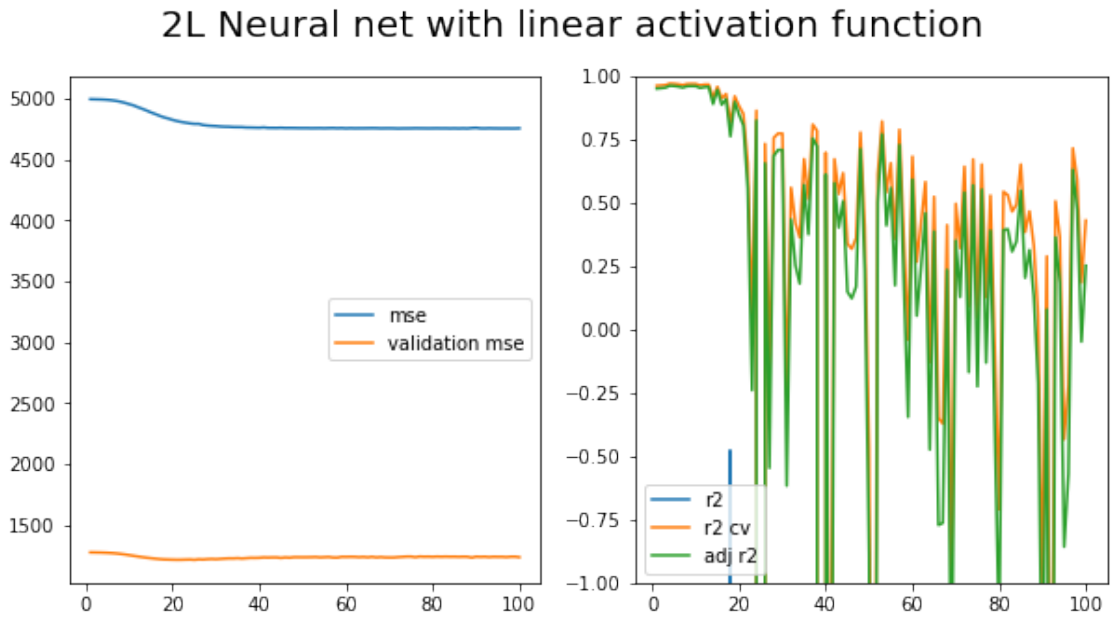
	X	Y	month	day	FFMC	DMC	DC	ISI	temp	RH	wind	rain
0	7	5	2	5	86.2	26.2	94.3	5.1	8.2	51	6.7	0.0
1	7	4	9	2	90.6	35.4	669.1	6.7	18.0	33	0.9	0.0
2	7	4	9	6	90.6	43.7	686.9	6.7	14.6	33	1.3	0.0
3	8	6	2	5	91.7	33.3	77.5	9.0	8.3	97	4.0	0.2
4	8	6	2	0	89.3	51.3	102.2	9.6	11.4	99	1.8	0.0
..	..	..	…	…	…	…	…	…	…	..	…	…
512	4	3	7	0	81.6	56.7	665.6	1.9	27.8	32	2.7	0.0

```
513  2  4      7    0  81.6   56.7  665.6   1.9  21.9  71   5.8   0.0
514  7  4      7    0  81.6   56.7  665.6   1.9  21.2  70   6.7   0.0
515  1  4      7    6  94.4  146.0  614.7  11.3  25.6  42   4.0   0.0
516  6  3     10    2  79.5    3.0  106.7   1.1  11.8  31   4.5   0.0

[517 rows x 12 columns]
```

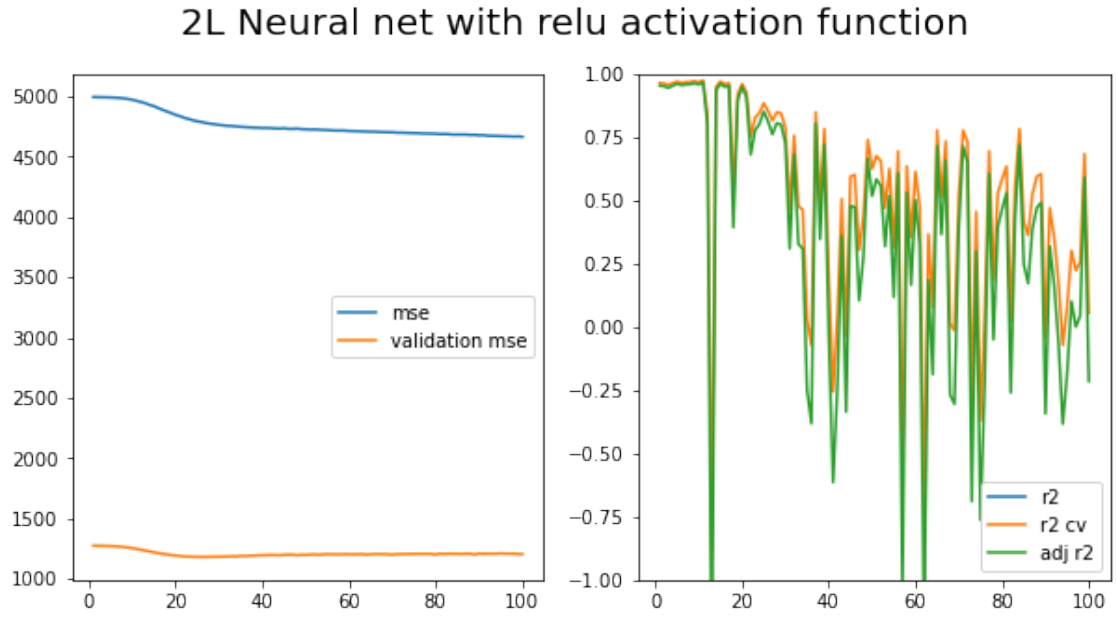
[13]: `['X', 'Y', 'DC', 'temp', 'RH', 'wind', 'rain']`

Building Neural nets with linear activation function



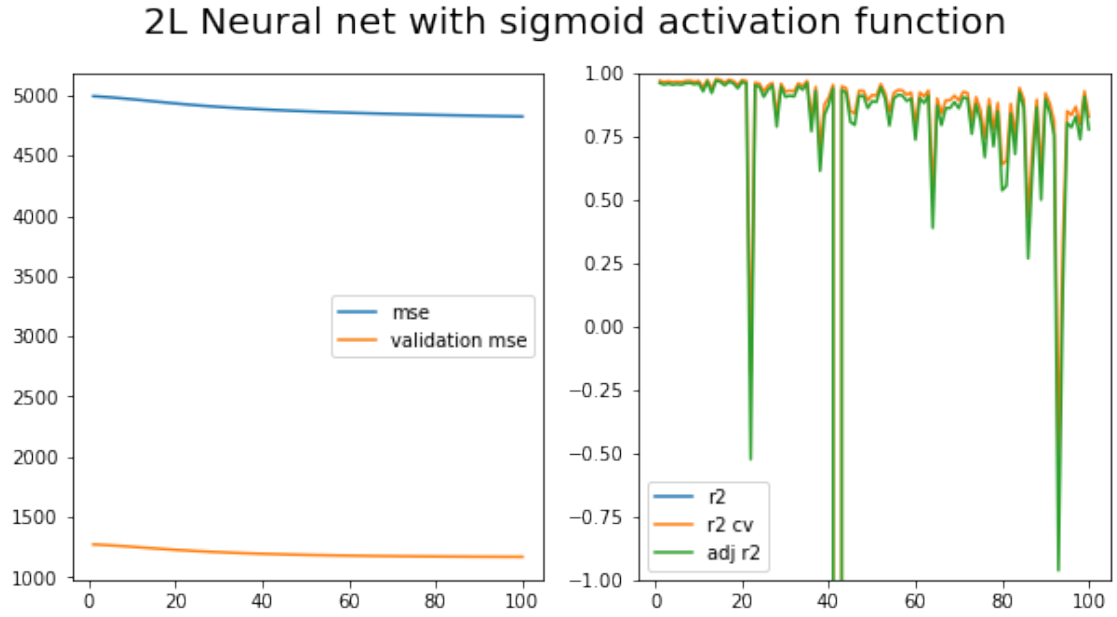
****

Building Neural nets with relu activation function



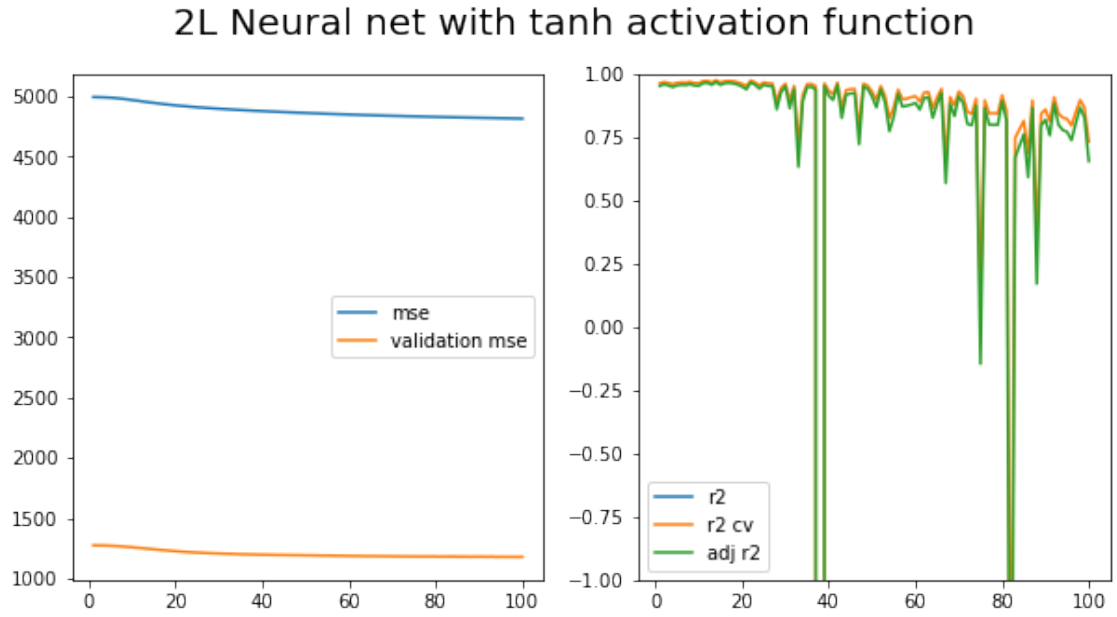
****

Building Neural nets with sigmoid activation function



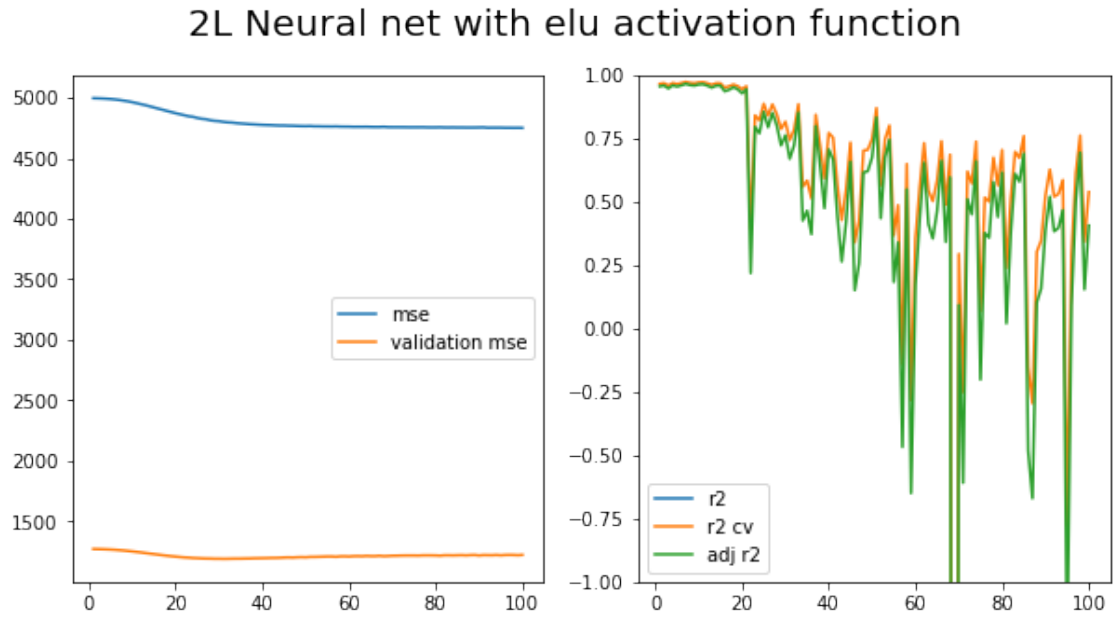
****

Building Neural nets with tanh activation function



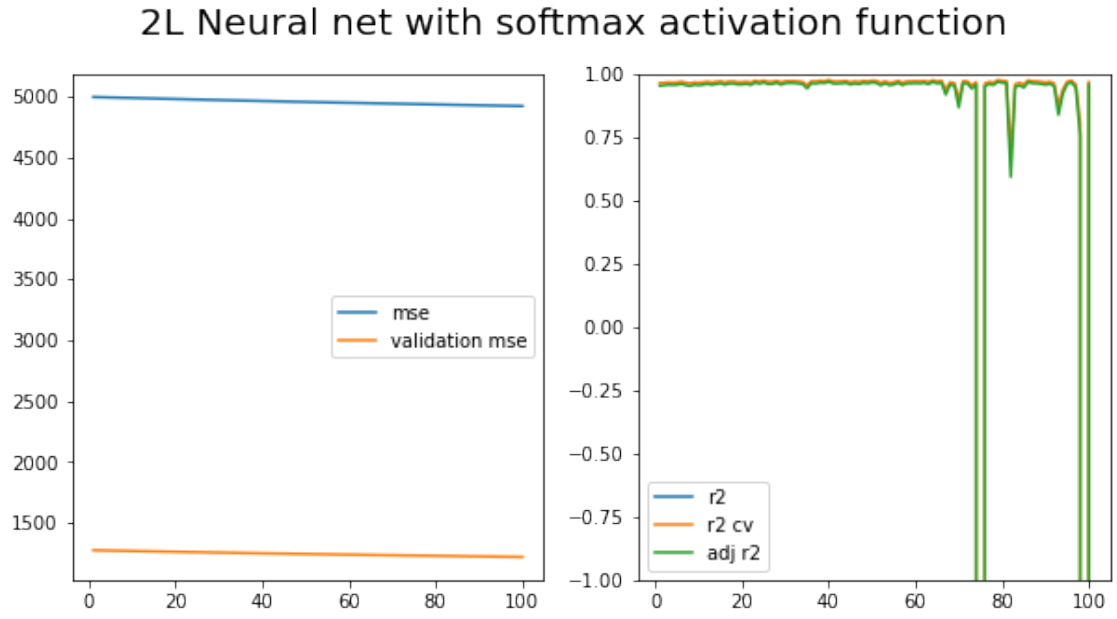
****

Building Neural nets with elu activation function



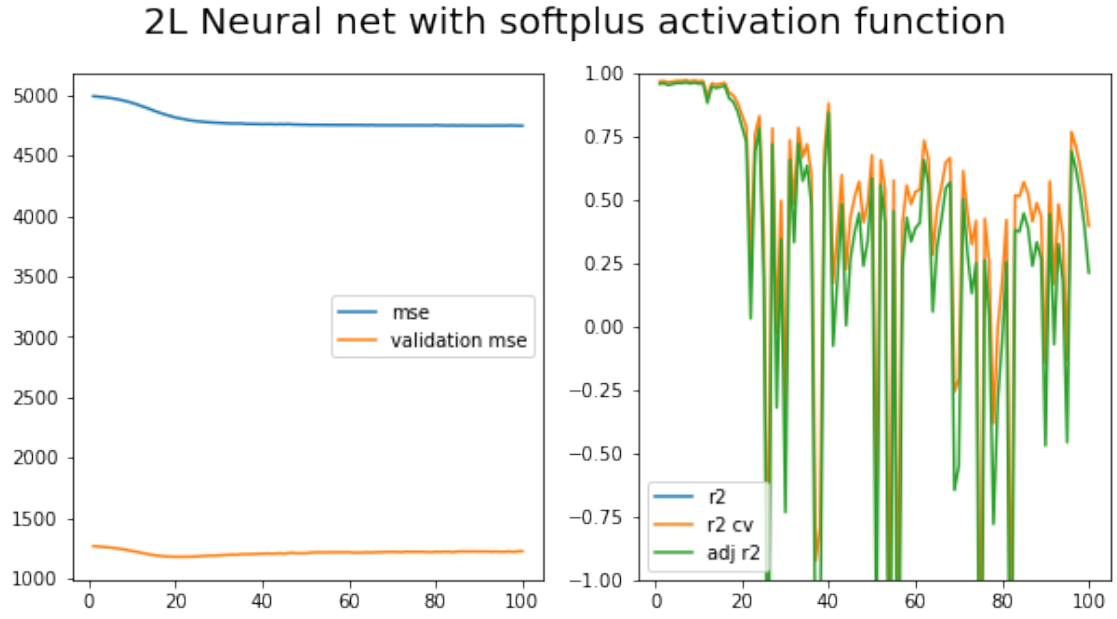
****

Building Neural nets with softmax activation function



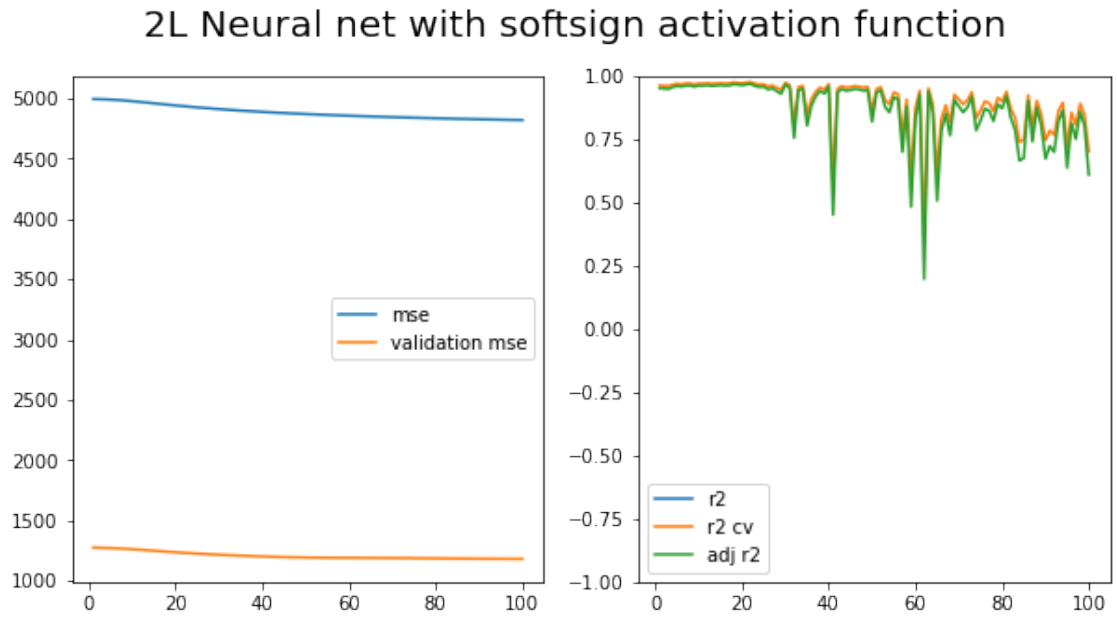
****

Building Neural nets with softplus activation function



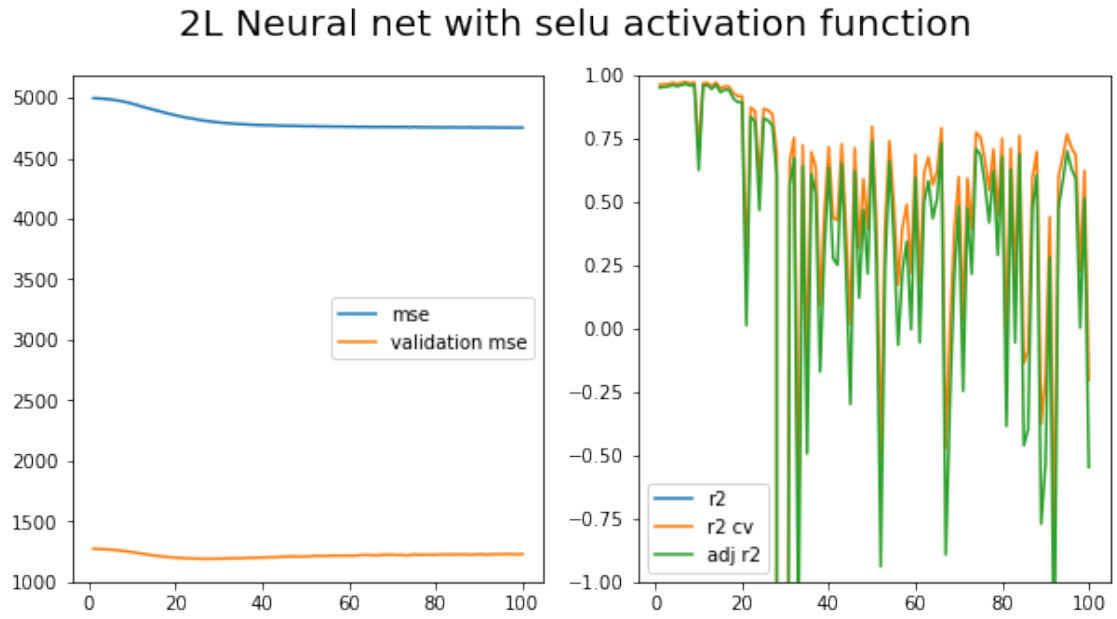
****

Building Neural nets with softsign activation function



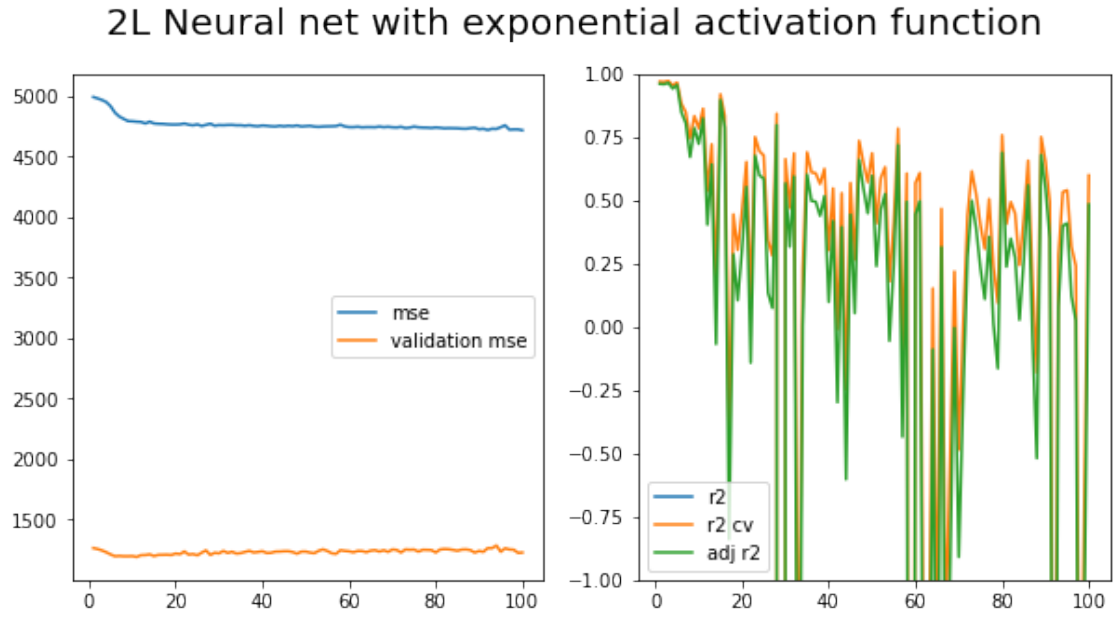
****

Building Neural nets with selu activation function



****

Building Neural nets with exponential activation function



****

********** R2 scores of various activation functions
****

R2 for NN using linear activation is 0.4071243534417346
Adj R2 for NN using linear activation is -1.2808904880253547
R2 CV for NN using linear activation is 0.28662602360332023

R2 for NN using relu activation is 5.575565539631267
Adj R2 for NN using relu activation is 3.975151396235188
R2 CV for NN using relu activation is 5.603131533340844

R2 for NN using sigmoid activation is -0.16378231033851165
Adj R2 for NN using sigmoid activation is -1.8614735359374635
R2 CV for NN using sigmoid activation is -0.2075636463069408

```
R2 for NN using tanh activation is  -0.20754070483106624
Adj R2 for NN using tanh activation is  -1.9059735981332704
R2 CV for NN using tanh activation is  -0.1507874104037965


R2 for NN using elu activation is  3.189019705880003
Adj R2 for NN using elu activation is  1.5481556330983026
R2 CV for NN using elu activation is  2.789993599053475


R2 for NN using softmax activation is  -2.0386637917591877
Adj R2 for NN using softmax activation is  -3.768132669585622
R2 CV for NN using softmax activation is  -2.4298540826917847


R2 for NN using softplus activation is  4.0813140215795185
Adj R2 for NN using softplus activation is  2.455573581267312
R2 CV for NN using softplus activation is  4.483309505525169


R2 for NN using softsign activation is  -0.15215587151240495
Adj R2 for NN using softsign activation is  -1.8496500388261783
R2 CV for NN using softsign activation is  -0.18603865927024898


R2 for NN using selu activation is  2.2060868928445276
Adj R2 for NN using selu activation is  0.5485629418757965
R2 CV for NN using selu activation is  3.0548703782337316


R2 for NN using exponential activation is  5.084681094645937
Adj R2 for NN using exponential activation is  3.475946875911118
R2 CV for NN using exponential activation is  -5360941.226626415


[NbConvertApp] Converting notebook Project2_3L_NN(Expedia).ipynb to pdf
[NbConvertApp] Writing 398595 bytes to Project2_3L_NN(Expedia).pdf
```