

```
In [83]: import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt
%matplotlib inline

!pip install dmba
import dmba
from dmba import classificationSummary

!pip install eli5
import eli5
from eli5.sklearn import PermutationImportance

from sklearn import preprocessing
from sklearn.model_selection import train_test_split, cross_val_score, GridSearchCV, KFold
from sklearn.metrics import accuracy_score
from sklearn.datasets import make_moons
from sklearn.ensemble import GradientBoostingClassifier

from keras.models import Sequential, load_model
from keras.layers import Dense
from keras.wrappers.scikit_learn import KerasClassifier
from keras.callbacks import EarlyStopping, ModelCheckpoint
import joblib

Requirement already satisfied: dmba in /usr/local/lib/python3.6/dist-packages (0.0.13)
Requirement already satisfied: eli5 in /usr/local/lib/python3.6/dist-packages (0.10.1)
Requirement already satisfied: scipy in /usr/local/lib/python3.6/dist-packages (from eli5) (1.4.1)
Requirement already satisfied: six in /usr/local/lib/python3.6/dist-packages (from eli5) (1.15.0)
Requirement already satisfied: scikit-learn>=0.18 in /usr/local/lib/python3.6/dist-packages (from eli5) (0.22.2.post1)
Requirement already satisfied: graphviz in /usr/local/lib/python3.6/dist-packages (from eli5) (0.10.1)
Requirement already satisfied: attrs>16.0.0 in /usr/local/lib/python3.6/dist-packages (from eli5) (20.3.0)
Requirement already satisfied: jinja2 in /usr/local/lib/python3.6/dist-packages (from eli5) (2.11.2)
Requirement already satisfied: tabulate>=0.7.7 in /usr/local/lib/python3.6/dist-packages (from eli5) (0.8.7)
Requirement already satisfied: numpy>=1.9.0 in /usr/local/lib/python3.6/dist-packages (from eli5) (1.19.5)
Requirement already satisfied: joblib>=0.11 in /usr/local/lib/python3.6/dist-packages (from scikit-learn>=0.18->eli5) (1.0.0)
Requirement already satisfied: MarkupSafe>=0.23 in /usr/local/lib/python3.6/dist-packages (from jinja2->eli5) (1.1.1)
```

```
In [84]: #from google.colab import drive
#drive.mount('/content/gdrive',force_remount=True)

df = pd.read_csv('USCensusTraining.csv')
```

EDA

```
In [ ]: # EDA

# countplot for age w.r.t. income
plt.figure(figsize=(26, 10))
sns.countplot(x = "age", data = df, hue = "income")

# countplot for workclass w.r.t. income
plt.figure(figsize=(16, 6))
sns.countplot(x = "workclass", data = df, hue = "income")

# countplot for education w.r.t. income
plt.figure(figsize=(20, 8))
sns.countplot(x = "education", data = df, hue = "income")

# countplot for occupation w.r.t. income
plt.figure(figsize=(25, 10))
sns.countplot(x = "occupation", data = df, hue = "income")

# countplot for marital-status w.r.t. income
plt.figure(figsize=(25, 10))
sns.countplot(x = "marital-status", data = df, hue = "income")

# countplot for relationship w.r.t. income
plt.figure(figsize=(25, 10))
sns.countplot(x = "relationship", data = df, hue = "income")

# countplot for hours-per-week w.r.t. income
plt.figure(figsize=(25,12))
sns.countplot(x = "hours-per-week", data = df, hue = "income")

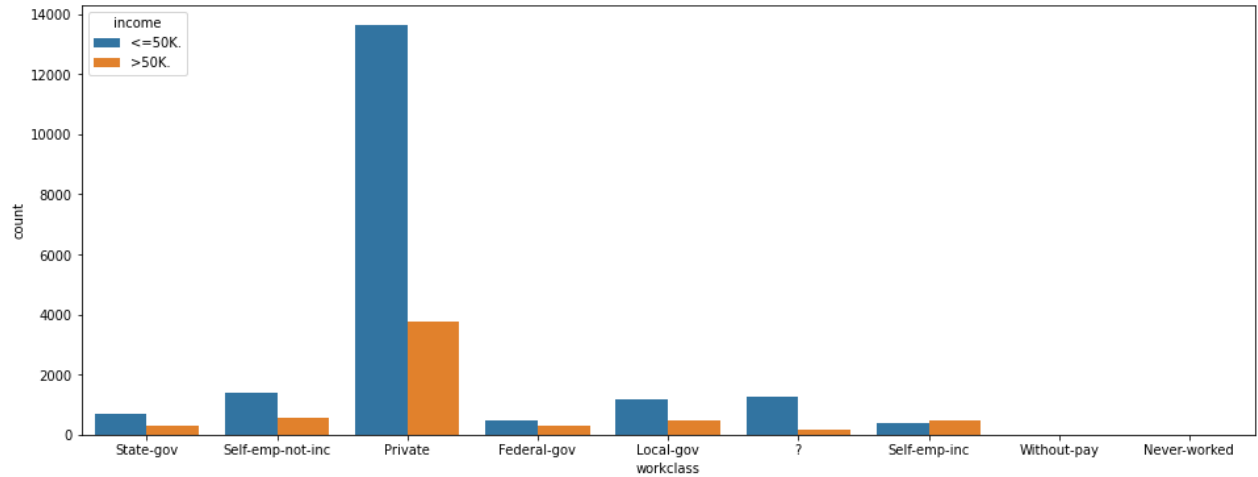
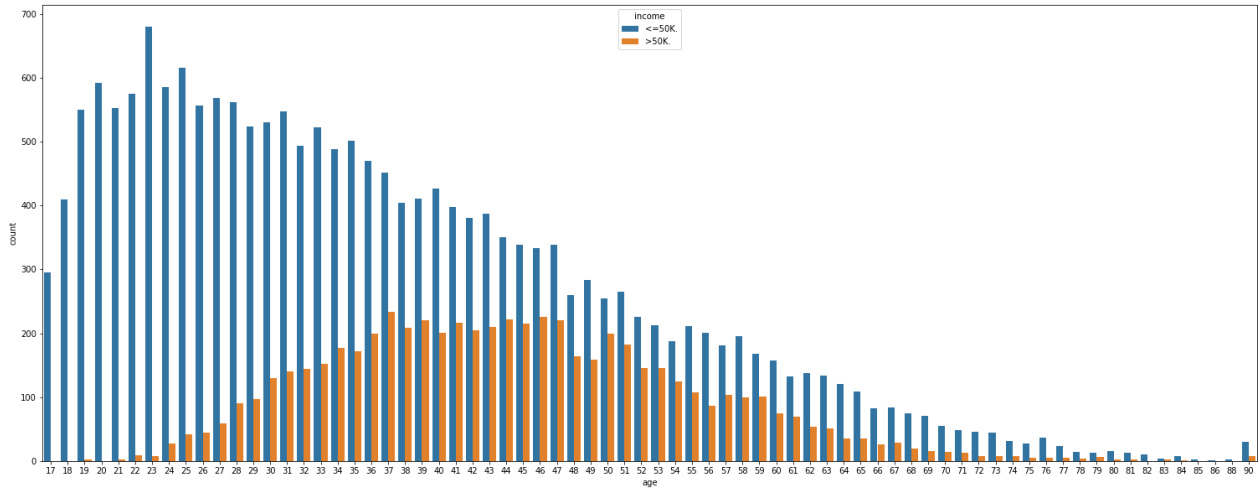
# cross-Tabulation to show the perfect correlation between education & education-num
pd.crosstab(df["education"], df["education-num"])

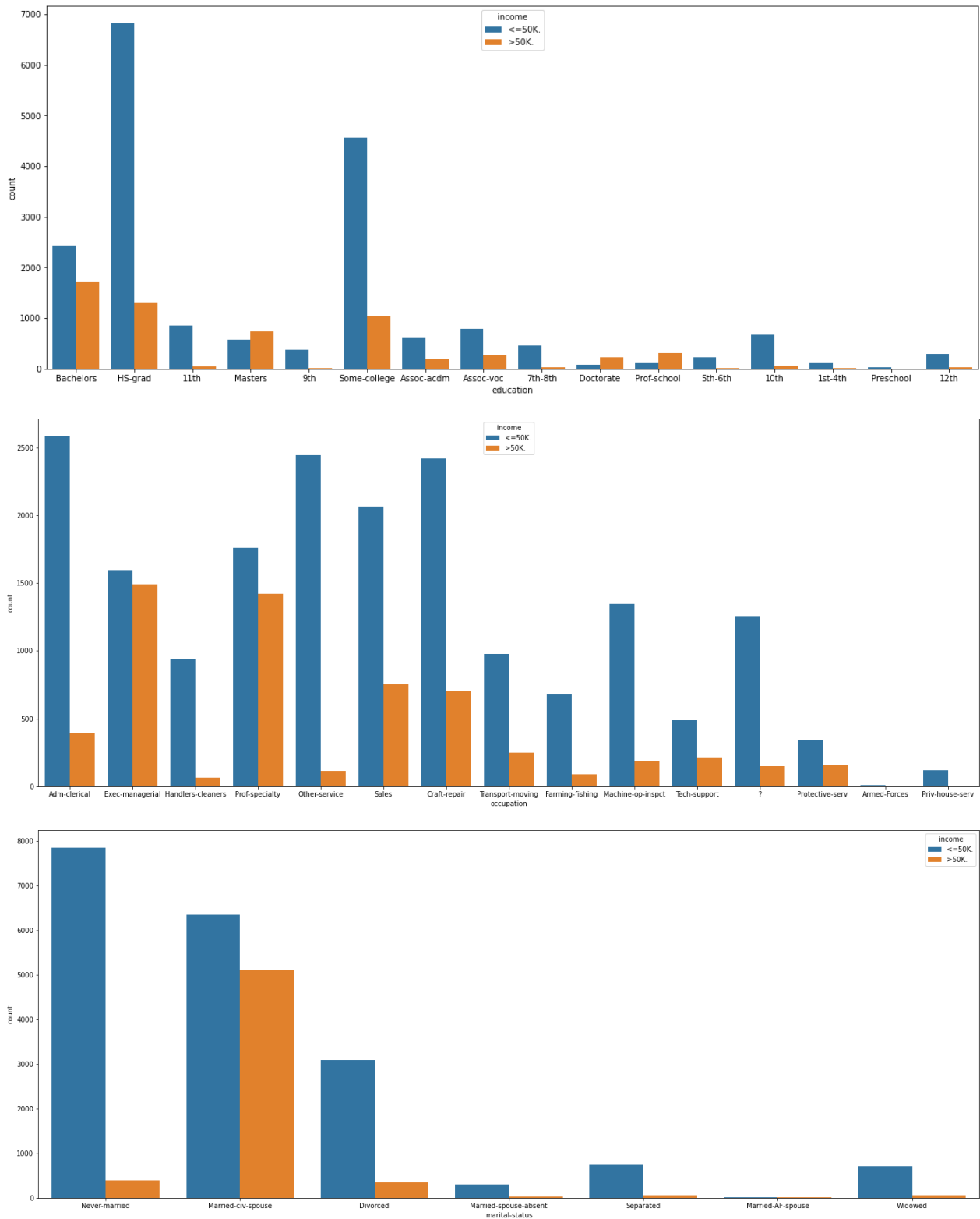
# cross tabulation on workclass and occupation
pd.crosstab(df['workclass'], df["occupation"])

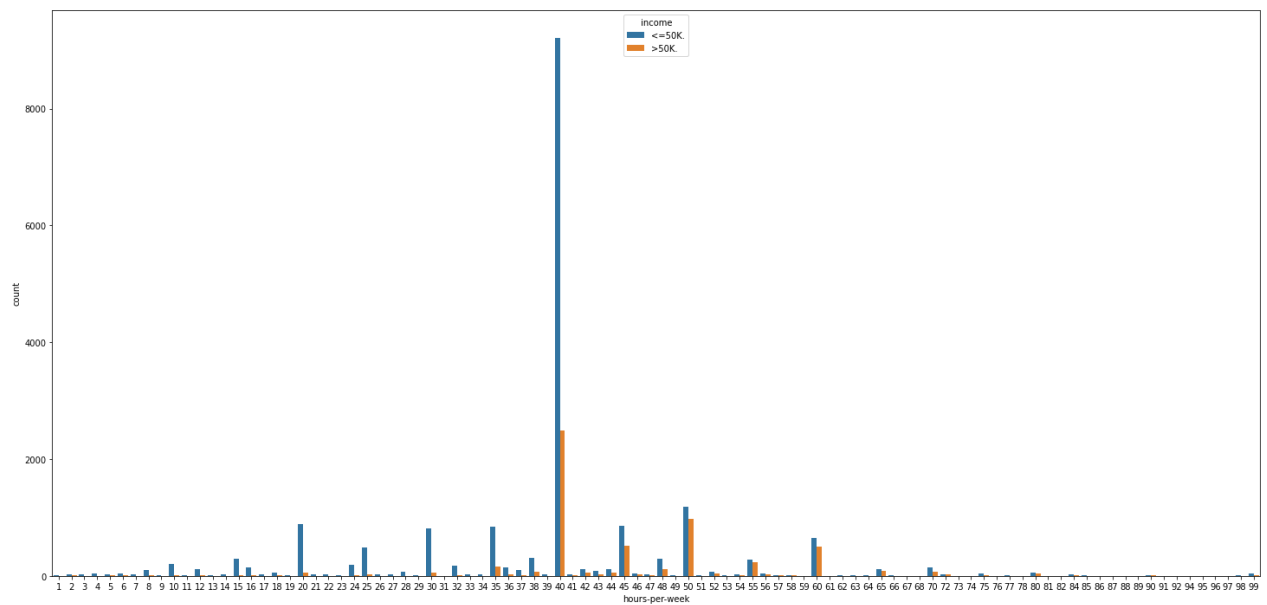
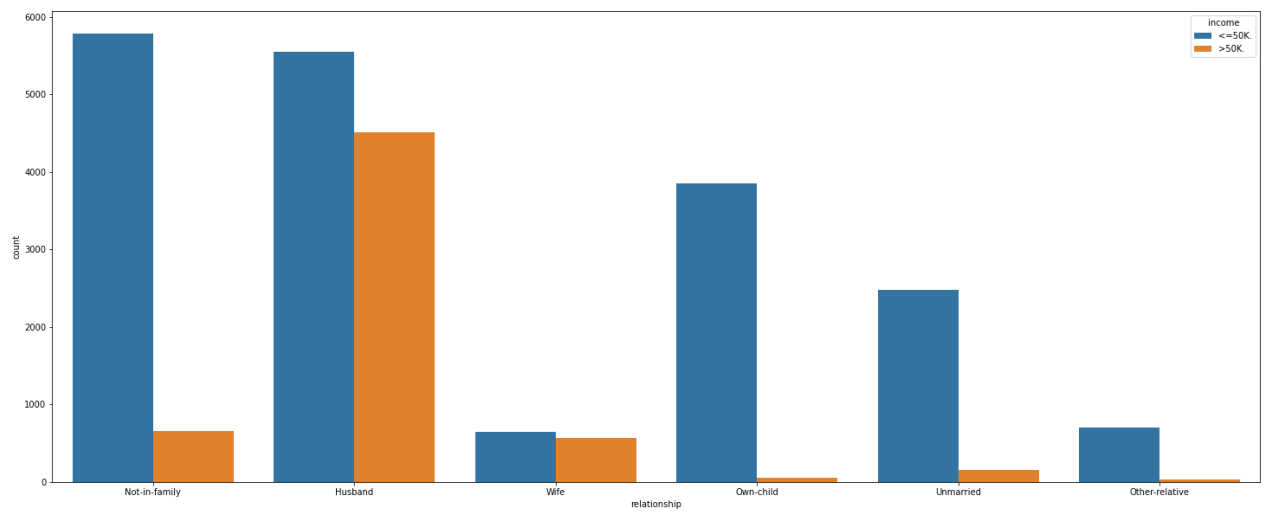
# cross tabulation on marital-status and relationship
pd.crosstab(df['marital-status'], df["relationship"])
```

Out[]:

	relationship	Husband	Not-in-family	Other-relative	Own-child	Unmarried	Wife
marital-status							
	Divorced	0	1850	90	250	1245	0
	Married-AF-spouse	5	0	1	1	0	9
	Married-civ-spouse	10059	12	100	66	0	1204
	Married-spouse-absent	0	172	26	37	93	0
	Never-married	0	3656	431	3462	676	0
	Separated	0	327	45	82	332	0
	Widowed	0	426	36	13	294	0

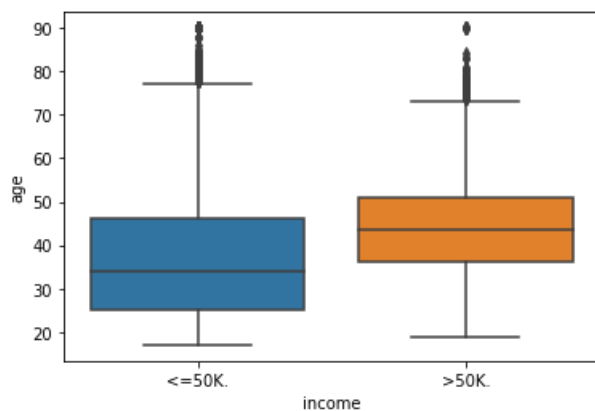






```
In [ ]: sns.boxplot(x="income", y="age", data=df)
```

```
Out[ ]: <matplotlib.axes._subplots.AxesSubplot at 0x7fc44af42128>
```



```
In [ ]: pd.crosstab(df['income'], df["occupation"])
pd.crosstab(df['income'], df["education"])
```

Out[]:

	education	10th	11th	12th	1st-4th	5th-6th	7th-8th	9th	Assoc-acdm	Assoc-voc	Bachelors	Doctorate	HS-grad	Masters	Preschool	Prof-school
income																
<=50K.	666	858	299	115	233	460	374	599	786	2428	84	6826	569	36	114	
>50K.	55	51	24	5	11	31	20	202	273	1712	231	1294	731	0	316	

Data Preprocessing

```
In [85]: # data preprocessing

# education/education-num - drop education
df = df.drop(columns=['education'])

# standadize inputs
# continuous variables - MinMax normalization
scaler = preprocessing.MinMaxScaler()
df['age'] = scaler.fit_transform(df[['age']])
df['demogweight'] = scaler.fit_transform(df[['demogweight']])
df['education-num'] = scaler.fit_transform(df[['education-num']])
df['capital-gain'] = scaler.fit_transform(df[['capital-gain']])
df['capital-loss'] = scaler.fit_transform(df[['capital-loss']])
df['hours-per-week'] = scaler.fit_transform(df[['hours-per-week']])

# categorical variables - Indicator
df['sex'].replace({'Male': 1, 'Female': 0}, inplace=True)
df['income'].replace({'>50K.': 1, '<=50K.': 0}, inplace=True)
df = pd.get_dummies(df,
                    prefix=['w', 'o', 'm', 'r', 'race', 'c'],
                    columns=['workclass', 'occupation', 'marital-status', 'relationship', 'race', 'native-country'])
```

```
In [86]: # correlation matrix  
df.corr()
```

Out [86] :

	age	demogweight	education-num	sex	capital-gain	capital-loss	hours-per-week	income	w_?	w_Fe
age	1.000000	-0.075810	0.032765	0.084250	0.073591	0.056408	0.069045	0.230700	0.036401	0.0
demogweight	-0.075810	1.000000	-0.043853	0.029492	0.004366	-0.012152	-0.015179	-0.008029	-0.000828	-0.0
education-num	0.032765	-0.043853	1.000000	0.015325	0.120998	0.078483	0.145903	0.333539	-0.076632	0.0
sex	0.084250	0.029492	0.015325	1.000000	0.046675	0.047298	0.231300	0.216744	-0.064332	0.0
capital-gain	0.073591	0.004366	0.120998	0.046675	1.000000	-0.031346	0.079760	0.222510	-0.011963	-0.0
capital-loss	0.056408	-0.012152	0.078483	0.047298	-0.031346	1.000000	0.055278	0.147657	-0.019842	0.0
hours-per-week	0.069045	-0.015179	0.145903	0.231300	0.079760	0.055278	1.000000	0.227305	-0.171922	0.0
income	0.230700	-0.008029	0.333539	0.216744	0.222510	0.147657	0.227305	1.000000	-0.076215	0.0
w_?	0.036401	-0.000828	-0.076632	-0.064332	-0.011963	-0.019842	-0.171922	-0.076215	1.000000	-0.0
w_Federal-gov	0.046560	-0.011089	0.061801	0.001360	-0.006027	0.011206	0.018120	0.056866	-0.042817	1.0
w_Local-gov	0.063846	-0.002865	0.093544	-0.037375	-0.007134	0.016130	0.008648	0.030156	-0.064173	-0.0
w_Never-worked	-0.020054	0.008137	-0.019257	0.003955	-0.002057	-0.003049	-0.010818	-0.007934	-0.003444	-0.0
w_Private	-0.195954	0.037964	-0.117293	-0.038663	-0.036334	-0.029561	-0.022269	-0.081530	-0.367871	-0.2
w_Self-emp-inc	0.105089	-0.024646	0.074560	0.082752	0.088260	0.030359	0.126515	0.140589	-0.045871	-0.0
w_Self-emp-not-inc	0.135998	-0.030783	0.016396	0.108901	0.029712	0.026063	0.098524	0.032488	-0.071365	-0.0
w_State-gov	0.012933	-0.010128	0.104780	-0.015087	-0.009090	-0.000816	-0.023873	0.019831	-0.049516	-0.0
w_Without-pay	0.003626	-0.001468	-0.009675	-0.000068	-0.000836	-0.004091	-0.013487	-0.010645	-0.004620	-0.0
o_?	0.035108	-0.000327	-0.077686	-0.063981	-0.012069	-0.019996	-0.172298	-0.076574	0.998112	-0.0
o_Adm-clerical	-0.043545	0.002274	0.001677	-0.261708	-0.026552	-0.022826	-0.086002	-0.092386	-0.089481	0.1
o_Armed-Forces	-0.011746	0.002097	-0.002403	0.011789	-0.002433	-0.003608	0.006832	-0.009388	-0.004075	0.0
o_Craft-repair	0.012166	0.010296	-0.144104	0.220351	-0.023552	-0.001435	0.053873	-0.012557	-0.091972	-0.0
o_Exec-managerial	0.097187	-0.017099	0.198788	0.041797	0.054153	0.048437	0.140787	0.213747	-0.091331	0.0
o_Farming-fishing	0.032172	-0.030834	-0.103183	0.098223	-0.010702	-0.009970	0.101812	-0.050876	-0.043315	-0.0
o_Handlers-cleaners	-0.100066	0.027499	-0.120100	0.090026	-0.022290	-0.019002	-0.038080	-0.083890	-0.049698	-0.0
o_Machine-op-inspct	-0.012148	0.016231	-0.160261	0.028092	-0.025296	-0.013646	0.005054	-0.070135	-0.062293	-0.0
o_Other-service	-0.083478	-0.005282	-0.166606	-0.152487	-0.040791	-0.041324	-0.158089	-0.154604	-0.082145	-0.0
o_Priv-house-serv	0.018551	0.011137	-0.072322	-0.092882	-0.009280	-0.010443	-0.041721	-0.039121	-0.016979	-0.0
o_Prof-specialty	0.048809	-0.018223	0.420669	-0.029677	0.087860	0.049235	0.058090	0.185925	-0.092946	0.0

	age	demogweight	education-num	sex	capital-gain	capital-loss	hours-per-week	income	w_?	w_Fe
o_Protective-serv	0.003741	0.017104	0.007580	0.068263	-0.006556	-0.005645	0.028399	0.026440	-0.034888	0.0
o_Sales	-0.024984	0.007688	0.030819	-0.008180	0.012519	0.006799	0.013078	0.022895	-0.086727	-0.0
o_Tech-support	-0.022003	-0.000041	0.056185	-0.014317	-0.010222	0.007481	-0.011773	0.026499	-0.041414	0.0
o_Transport-moving	0.027554	-0.001721	-0.117117	0.135334	-0.018225	-0.002012	0.079753	-0.019057	-0.055336	-0.0
m_Divorced	0.129938	-0.018035	-0.012802	-0.227740	-0.016525	-0.020203	0.028222	-0.128580	-0.025893	0.0
m_Married-AF-spouse	-0.010366	0.002586	-0.001425	-0.019128	-0.003119	-0.005455	-0.005211	0.011751	0.007601	0.0
m_Married-civ-spouse	0.312885	-0.023808	0.085792	0.428777	0.086638	0.078373	0.213275	0.445289	-0.054926	0.0
m_Married-spouse-absent	0.020570	0.003888	-0.028831	-0.036005	-0.004786	-0.007371	-0.006221	-0.042436	0.008634	-0.0
m_Never-married	-0.532415	0.035494	-0.026164	-0.168035	-0.067831	-0.060309	-0.196156	-0.315986	0.045458	-0.0
m_Separated	0.006732	0.029382	-0.056298	-0.105813	-0.016633	-0.013159	-0.018288	-0.074208	0.005002	-0.0
m_Widowed	0.268079	-0.024567	-0.074710	-0.192378	-0.012032	-0.002788	-0.114527	-0.067359	0.074551	0.0
r_Husband	0.313163	-0.019162	0.078546	0.578051	0.080896	0.073720	0.247201	0.401629	-0.068908	0.0
r_Not-in-family	-0.010713	0.003392	0.054017	-0.164772	-0.026559	-0.016947	0.006401	-0.189083	-0.011758	0.0
r_Other-relative	-0.060138	0.025574	-0.089569	-0.042030	-0.018309	-0.013064	-0.051591	-0.081620	0.013658	-0.0
r_Own-child	-0.432241	0.013083	-0.094243	-0.101727	-0.054354	-0.050220	-0.245686	-0.227382	0.090131	-0.0
r_Unmarried	0.044975	0.006629	-0.065155	-0.320817	-0.029451	-0.038438	-0.037797	-0.144253	-0.006079	0.0
r_Wife	0.020590	-0.014796	0.033434	-0.320182	0.017783	0.016352	-0.067407	0.122886	0.026826	-0.0
race_Amer-Indian-Eskimo	-0.011074	-0.070516	-0.029399	-0.013108	-0.005776	-0.012180	-0.000572	-0.029441	0.013383	0.0
race_Asian-Pac-Islander	-0.005739	-0.051432	0.062088	0.000010	0.014440	0.008460	-0.003223	0.007841	0.006658	0.0
race_Black	-0.020923	0.120882	-0.073343	-0.113508	-0.023755	-0.021971	-0.054357	-0.086716	0.010599	0.0
race_Other	-0.035494	0.009401	-0.047280	-0.017550	-0.005521	-0.007606	-0.006926	-0.036860	0.011381	-0.0
race_White	0.032681	-0.058423	0.051183	0.103009	0.015766	0.019553	0.048948	0.086381	-0.018837	-0.0
c_?	0.000683	0.005641	0.026118	0.015794	0.012328	0.009639	0.010446	0.001053	-0.006452	-0.0
c_Cambodia	-0.005051	0.000635	-0.013177	0.007748	0.000446	0.008254	0.001348	0.000631	0.000720	0.0
c_Canada	0.020935	-0.010107	0.010197	-0.001580	0.006315	0.005144	0.002468	0.016872	0.009588	-0.0
c_China	0.015862	-0.008856	0.019219	0.005033	-0.004131	0.013832	-0.012459	0.001223	0.009398	-0.0
c_Columbia	-0.000435	0.006546	-0.009472	-0.004161	-0.005738	-0.009154	-0.002711	-0.019398	-0.002128	0.0
c_Cuba	0.030883	0.030293	-0.014264	-0.016048	-0.004336	-0.009019	-0.013797	-0.003908	-0.003342	-0.0
c_Dominican-Republic	-0.003007	0.003193	-0.054384	-0.011148	0.005126	-0.006246	0.006305	-0.022061	-0.000082	-0.0

	age	demogweight	education- num	sex	capital- gain	capital- loss	hours- per-week	income	w_?	w_Fe
c_Ecuador	0.003761	0.002033	-0.012232	0.000928	-0.001146	-0.005945	-0.005988	-0.008667	-0.000399	-0.0
c_El-Salvador	-0.018907	0.034100	-0.059220	0.002978	-0.003259	-0.008648	-0.015254	-0.017903	-0.003342	-0.0
c_England	0.012232	-0.000818	0.021058	-0.003364	-0.002430	0.002270	0.003318	0.015335	-0.003342	0.0
c_France	-0.002093	0.002485	0.028235	-0.003037	-0.002879	-0.006251	0.015991	0.012857	-0.001052	-0.0
c_Germany	-0.000408	-0.005904	0.017840	-0.017557	-0.004398	-0.003073	0.000278	0.011155	0.003528	0.0
c_Greece	0.019861	-0.013729	-0.000967	0.012969	0.002149	0.013072	0.017124	0.004622	-0.007388	-0.0
c_Guatemala	-0.021609	0.035315	-0.074257	-0.000795	-0.005590	-0.006094	-0.003958	-0.023014	-0.007004	-0.0
c_Haiti	-0.000155	0.008835	-0.020116	-0.007410	-0.005673	-0.003959	-0.011978	-0.014668	-0.005032	-0.0
c_Holand-Netherlands	-0.003053	-0.009723	-0.000201	-0.008979	-0.000920	0.033393	-0.000210	-0.003548	-0.001540	-0.0
c_Honduras	-0.002917	0.009367	-0.010191	-0.011148	-0.002602	0.006744	-0.008412	-0.004795	0.005374	-0.0
c_Hong	-0.003160	0.006459	0.000824	-0.001426	-0.003051	-0.004523	0.001166	0.006111	0.003190	-0.0
c_Hungary	0.014166	-0.002536	0.007968	-0.007153	-0.001803	0.004003	-0.014813	-0.006533	-0.004870	-0.0
c_India	0.000923	-0.007650	0.048578	0.025012	0.017188	0.003757	0.005140	0.016252	-0.012621	-0.0
c_Iran	0.000606	0.000441	0.032696	0.008197	0.007119	0.001436	0.012764	0.011589	-0.004462	0.0
c_Ireland	-0.002177	-0.014243	0.000257	0.000928	-0.002500	0.000881	0.004161	0.001538	-0.006715	-0.0
c_Italy	0.025300	-0.000030	-0.013182	0.002249	-0.002609	-0.005916	0.006635	0.017678	0.003425	-0.0
c_Jamaica	-0.013133	0.010710	-0.010315	-0.026074	-0.007012	-0.010396	-0.004775	-0.011463	-0.008123	-0.0
c_Japan	-0.001477	-0.000894	0.023618	0.003724	0.012574	-0.005834	0.009617	0.018225	-0.002728	0.0
c_Laos	-0.006675	0.004573	-0.005818	0.003102	-0.001740	-0.003857	-0.000593	-0.004795	0.005374	-0.0
c_Mexico	-0.055328	0.135171	-0.208710	0.029994	-0.012803	-0.023695	-0.001360	-0.062211	-0.000388	-0.0
c_Nicaragua	-0.013977	0.042862	-0.016846	-0.001906	-0.003452	0.003988	-0.014425	-0.011816	-0.002197	0.0
c_Outlying-US(Guam-USVI-etc)	-0.001447	0.000079	0.003803	-0.001648	-0.002602	-0.003857	0.006135	-0.010036	-0.004356	-0.0
c_Peru	-0.008189	0.024041	-0.013350	-0.009450	-0.004090	-0.000465	-0.014200	-0.013931	-0.001648	-0.0
c_Philippines	0.006123	-0.018450	0.023562	-0.006494	-0.000619	0.005976	-0.002918	0.005876	-0.001011	0.0
c_Poland	0.008739	0.000162	0.001418	-0.005282	-0.005214	-0.009553	-0.006101	-0.005783	0.001015	-0.0
c_Portugal	-0.001048	-0.014834	-0.043159	-0.001814	-0.003519	-0.007219	0.002975	-0.010376	0.007457	-0.0
c_Puerto-Rico	0.009957	0.006168	-0.041182	-0.019455	-0.006005	-0.003237	-0.010418	-0.018156	-0.006675	0.0
c_Scotland	-0.000379	-0.002379	-0.003078	-0.004547	-0.002759	-0.004091	-0.004058	-0.005704	-0.004620	-0.0

	age	demogweight	education-num	sex	capital-gain	capital-loss	hours-per-week	income	w_?	w_Fe
c_South	0.004694	-0.009925	0.016651	-0.006347	0.008449	0.012681	0.009392	-0.000592	0.015218	-0.0
c_Taiwan	-0.015448	-0.001430	0.055609	0.001927	0.008321	0.005565	-0.001518	0.018191	0.028258	-0.0
c_Thailand	-0.005979	-0.002753	0.006886	-0.010497	-0.003563	-0.005282	0.014196	-0.002260	0.001141	-0.0
c_Trinidad&Tobago	0.007567	0.004747	-0.016410	-0.007837	-0.003186	0.014509	-0.003844	-0.008013	0.002610	-0.0
c_United-States	0.014750	-0.075252	0.097154	-0.002877	0.003183	0.008887	0.003120	0.034922	0.003616	0.0
c_Vietnam	-0.013497	-0.010839	-0.012280	-0.004598	-0.003567	0.003401	-0.010146	-0.020916	-0.007004	-0.0
c_Yugoslavia	0.002971	-0.003121	-0.001414	0.002625	-0.001635	-0.004523	0.001631	0.006111	-0.005108	-0.0

92 rows × 92 columns

```
In [ ]: df.columns
```

```
Out[ ]: Index(['age', 'demogweight', 'education-num', 'sex', 'capital-gain',
'capital-loss', 'hours-per-week', 'income', 'w_?', 'w_Federal-gov',
'w_Local-gov', 'w_Never-worked', 'w_Private', 'w_Self-emp-inc',
'w_Self-emp-not-inc', 'w_State-gov', 'w_Without-pay', 'o_?',
'o_Adm-clerical', 'o_Armed-Forces', 'o_Craft-repair',
'o_Exec-managerial', 'o_Farming-fishing', 'o_Handlers-cleaners',
'o_Machine-op-inspct', 'o_Other-service', 'o_Priv-house-serv',
'o_Prof-specialty', 'o_Protective-serv', 'o_Sales', 'o_Tech-support',
'o_Transport-moving', 'm_Divorced', 'm_Married-AF-spouse',
'm_Married-civ-spouse', 'm_Married-spouse-absent', 'm_Never-married',
'm_Separated', 'm_Widowed', 'r_Husband', 'r_Not-in-family',
'r_Other-relative', 'r_Own-child', 'r_Unmarried', 'r_Wife',
'race_Amer-Indian-Eskimo', 'race_Asian-Pac-Islander', 'race_Black',
'race_Other', 'race_White', 'c_?', 'c_Cambodia', 'c_Canada', 'c_China',
'c_Columbia', 'c_Cuba', 'c_Dominican-Republic', 'c_Ecuador',
'c_El-Salvador', 'c_England', 'c_France', 'c_Germany', 'c_Greece',
'c_Guatemala', 'c_Haiti', 'c_Holand-Netherlands', 'c_Honduras',
'c_Hong', 'c_Hungary', 'c_India', 'c_Iran', 'c_Ireland', 'c_Italy',
'c_Jamaica', 'c_Japan', 'c_Laos', 'c_Mexico', 'c_Nicaragua',
'c_Outlying-US(Guam-USVI-etc)', 'c_Peru', 'c_Philippines', 'c_Poland',
'c_Portugal', 'c_Puerto-Rico', 'c_Scotland', 'c_South', 'c_Taiwan',
'c_Thailand', 'c_Trinidad&Tobago', 'c_United-States', 'c_Vietnam',
'c_Yugoslavia'],
dtype='object')
```

Parameter Tuning

```
In [87]: # setting
seed = 7
num_folds = 10
kfold = KFold(n_splits=num_folds, shuffle=True, random_state=seed)
```

```
In [ ]: # create model
def create_model(neurons, learning_rate):
    model = Sequential()

    # hidden layers
    model.add(Dense(neurons, input_dim=91, kernel_initializer='uniform', activation='relu'))
    model.add(Dense(20, kernel_initializer='uniform', activation='relu'))

    # output layer
    model.add(Dense(1, kernel_initializer='uniform', activation='sigmoid'))

    adam = keras.optimizers.Adam(lr = learning_rate)
    model.compile(loss='binary_crossentropy', optimizer=adam, metrics=['accuracy'])

    return model

model = KerasClassifier(build_fn=create_model)
```

```
In [98]: # full model
X = df.drop(columns=['income'])
y = df['income']

# split the data into training and test datasets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.4, random_state=seed)
```

```
In [89]: # simple early stopping
import keras
es = EarlyStopping(monitor='val_loss', mode='min', patience=5)
mc = ModelCheckpoint('best_model.h5', monitor='val_accuracy', mode='max', save_best_only=True)
```

```
In [ ]: # grid search neurons, epochs, and batch size
param_grid = {
    'neurons': [60,80,100],
    'epochs': [50, 100],
    'batch_size': [5,10],
    'learning_rate': [0.001,0.01]
}

grid = GridSearchCV(estimator=model, param_grid=param_grid, cv=kfold)
grid_result = grid.fit(X_train, y_train, validation_data=(X_test, y_test), callbacks=[es, mc],
verbose=1)
```

Streaming output truncated to the last 5000 lines.

```
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4296 - accuracy: 0.7994 -
  val_loss: 0.3638 - val_accuracy: 0.8322
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3548 - accuracy: 0.8303 -
  val_loss: 0.3356 - val_accuracy: 0.8465
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3330 - accuracy: 0.8451 -
  val_loss: 0.3259 - val_accuracy: 0.8529
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3221 - accuracy: 0.8487 -
  val_loss: 0.3264 - val_accuracy: 0.8491
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3225 - accuracy: 0.8460 -
  val_loss: 0.3242 - val_accuracy: 0.8516
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3039 - accuracy: 0.8577 -
  val_loss: 0.3234 - val_accuracy: 0.8528
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3016 - accuracy: 0.8598 -
  val_loss: 0.3223 - val_accuracy: 0.8532
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3104 - accuracy: 0.8552 -
  val_loss: 0.3264 - val_accuracy: 0.8503
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2965 - accuracy: 0.8617 -
  val_loss: 0.3256 - val_accuracy: 0.8539
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3026 - accuracy: 0.8591 -
  val_loss: 0.3307 - val_accuracy: 0.8478
Epoch 11/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2971 - accuracy: 0.8601 -
  val_loss: 0.3297 - val_accuracy: 0.8526
Epoch 12/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2924 - accuracy: 0.8635 -
  val_loss: 0.3316 - val_accuracy: 0.8518
300/300 [=====] - 0s 1ms/step - loss: 0.3283 - accuracy: 0.8593
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4293 - accuracy: 0.7988 -
  val_loss: 0.3488 - val_accuracy: 0.8411
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3411 - accuracy: 0.8420 -
  val_loss: 0.3303 - val_accuracy: 0.8471
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3236 - accuracy: 0.8435 -
  val_loss: 0.3260 - val_accuracy: 0.8501
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3212 - accuracy: 0.8472 -
  val_loss: 0.3290 - val_accuracy: 0.8440
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3110 - accuracy: 0.8547 -
  val_loss: 0.3245 - val_accuracy: 0.8531
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3156 - accuracy: 0.8507 -
  val_loss: 0.3388 - val_accuracy: 0.8450
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3131 - accuracy: 0.8528 -
  val_loss: 0.3275 - val_accuracy: 0.8524
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3047 - accuracy: 0.8587 -
  val_loss: 0.3246 - val_accuracy: 0.8505
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3002 - accuracy: 0.8580 -
  val_loss: 0.3351 - val_accuracy: 0.8480
Epoch 10/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3042 - accuracy: 0.8556 -
  val_loss: 0.3243 - val_accuracy: 0.8528
Epoch 11/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2993 - accuracy: 0.8563 -
  val_loss: 0.3251 - val_accuracy: 0.8506
```

Epoch 12/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2914 - accuracy: 0.8631 -
val_loss: 0.3302 - val_accuracy: 0.8519
Epoch 13/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2919 - accuracy: 0.8653 -
val_loss: 0.3273 - val_accuracy: 0.8507
Epoch 14/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2913 - accuracy: 0.8623 -
val_loss: 0.3401 - val_accuracy: 0.8450
Epoch 15/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2964 - accuracy: 0.8600 -
val_loss: 0.3408 - val_accuracy: 0.8527
300/300 [=====] - 0s 1ms/step - loss: 0.3216 - accuracy: 0.8540
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4268 - accuracy: 0.7972 -
val_loss: 0.3427 - val_accuracy: 0.8437
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3365 - accuracy: 0.8429 -
val_loss: 0.3380 - val_accuracy: 0.8413
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3328 - accuracy: 0.8432 -
val_loss: 0.3257 - val_accuracy: 0.8502
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3179 - accuracy: 0.8557 -
val_loss: 0.3217 - val_accuracy: 0.8548
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3158 - accuracy: 0.8511 -
val_loss: 0.3382 - val_accuracy: 0.8434
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3150 - accuracy: 0.8492 -
val_loss: 0.3213 - val_accuracy: 0.8535
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3064 - accuracy: 0.8568 -
val_loss: 0.3226 - val_accuracy: 0.8523
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3071 - accuracy: 0.8583 -
val_loss: 0.3244 - val_accuracy: 0.8519
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3053 - accuracy: 0.8582 -
val_loss: 0.3352 - val_accuracy: 0.8444
Epoch 10/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3063 - accuracy: 0.8549 -
val_loss: 0.3308 - val_accuracy: 0.8469
Epoch 11/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3044 - accuracy: 0.8566 -
val_loss: 0.3271 - val_accuracy: 0.8548
300/300 [=====] - 0s 957us/step - loss: 0.3244 - accuracy: 0.8467
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4277 - accuracy: 0.8008 -
val_loss: 0.3393 - val_accuracy: 0.8440
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3298 - accuracy: 0.8444 -
val_loss: 0.3284 - val_accuracy: 0.8502
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3185 - accuracy: 0.8481 -
val_loss: 0.3380 - val_accuracy: 0.8449
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3186 - accuracy: 0.8537 -
val_loss: 0.3225 - val_accuracy: 0.8544
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3069 - accuracy: 0.8542 -
val_loss: 0.3256 - val_accuracy: 0.8513
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3140 - accuracy: 0.8509 -
val_loss: 0.3265 - val_accuracy: 0.8497
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3116 - accuracy: 0.8495 -
val_loss: 0.3336 - val_accuracy: 0.8506
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3045 - accuracy: 0.8533 -
val_loss: 0.3268 - val_accuracy: 0.8538
Epoch 9/50

```
2700/2700 [=====] - 5s 2ms/step - loss: 0.3024 - accuracy: 0.8562 -  
  val_loss: 0.3247 - val_accuracy: 0.8524  
300/300 [=====] - 0s 904us/step - loss: 0.3309 - accuracy: 0.8553  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4213 - accuracy: 0.8015 -  
  val_loss: 0.3412 - val_accuracy: 0.8417  
Epoch 2/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3393 - accuracy: 0.8443 -  
  val_loss: 0.3267 - val_accuracy: 0.8474  
Epoch 3/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3311 - accuracy: 0.8421 -  
  val_loss: 0.3329 - val_accuracy: 0.8422  
Epoch 4/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3252 - accuracy: 0.8445 -  
  val_loss: 0.3296 - val_accuracy: 0.8479  
Epoch 5/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3188 - accuracy: 0.8471 -  
  val_loss: 0.3393 - val_accuracy: 0.8374  
Epoch 6/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3113 - accuracy: 0.8507 -  
  val_loss: 0.3222 - val_accuracy: 0.8516  
Epoch 7/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3125 - accuracy: 0.8537 -  
  val_loss: 0.3223 - val_accuracy: 0.8520  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3030 - accuracy: 0.8597 -  
  val_loss: 0.3268 - val_accuracy: 0.8497  
Epoch 9/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2959 - accuracy: 0.8596 -  
  val_loss: 0.3228 - val_accuracy: 0.8541  
Epoch 10/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2984 - accuracy: 0.8587 -  
  val_loss: 0.3368 - val_accuracy: 0.8414  
Epoch 11/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2975 - accuracy: 0.8604 -  
  val_loss: 0.3295 - val_accuracy: 0.8516  
300/300 [=====] - 0s 966us/step - loss: 0.3441 - accuracy: 0.8453  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4305 - accuracy: 0.8027 -  
  val_loss: 0.3423 - val_accuracy: 0.8385  
Epoch 2/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3411 - accuracy: 0.8370 -  
  val_loss: 0.3319 - val_accuracy: 0.8464  
Epoch 3/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3264 - accuracy: 0.8449 -  
  val_loss: 0.3240 - val_accuracy: 0.8528  
Epoch 4/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3218 - accuracy: 0.8478 -  
  val_loss: 0.3276 - val_accuracy: 0.8492  
Epoch 5/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3175 - accuracy: 0.8512 -  
  val_loss: 0.3239 - val_accuracy: 0.8518  
Epoch 6/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3093 - accuracy: 0.8557 -  
  val_loss: 0.3250 - val_accuracy: 0.8503  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3043 - accuracy: 0.8563 -  
  val_loss: 0.3242 - val_accuracy: 0.8526  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3085 - accuracy: 0.8538 -  
  val_loss: 0.3290 - val_accuracy: 0.8528  
Epoch 9/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3039 - accuracy: 0.8626 -  
  val_loss: 0.3339 - val_accuracy: 0.8468  
Epoch 10/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2923 - accuracy: 0.8633 -  
  val_loss: 0.3279 - val_accuracy: 0.8503  
300/300 [=====] - 0s 945us/step - loss: 0.3243 - accuracy: 0.8500  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4256 - accuracy: 0.8021 -  
  val_loss: 0.3572 - val_accuracy: 0.8390  
Epoch 2/50
```



```
2700/2700 [=====] - 6s 2ms/step - loss: 0.3480 - accuracy: 0.8317 -  
  val_loss: 0.3293 - val_accuracy: 0.8502  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3262 - accuracy: 0.8446 -  
  val_loss: 0.3204 - val_accuracy: 0.8552  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3221 - accuracy: 0.8495 -  
  val_loss: 0.3310 - val_accuracy: 0.8489  
Epoch 5/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3200 - accuracy: 0.8478 -  
  val_loss: 0.3230 - val_accuracy: 0.8536  
Epoch 6/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3217 - accuracy: 0.8455 -  
  val_loss: 0.3272 - val_accuracy: 0.8499  
Epoch 7/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3171 - accuracy: 0.8488 -  
  val_loss: 0.3236 - val_accuracy: 0.8548  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3089 - accuracy: 0.8524 -  
  val_loss: 0.3312 - val_accuracy: 0.8443  
300/300 [=====] - 0s 975us/step - loss: 0.3273 - accuracy: 0.8420  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4272 - accuracy: 0.7970 -  
  val_loss: 0.3402 - val_accuracy: 0.8446  
Epoch 2/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3369 - accuracy: 0.8436 -  
  val_loss: 0.3288 - val_accuracy: 0.8485  
Epoch 3/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3223 - accuracy: 0.8418 -  
  val_loss: 0.3270 - val_accuracy: 0.8496  
Epoch 4/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3208 - accuracy: 0.8470 -  
  val_loss: 0.3203 - val_accuracy: 0.8535  
Epoch 5/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3155 - accuracy: 0.8553 -  
  val_loss: 0.3282 - val_accuracy: 0.8465  
Epoch 6/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3115 - accuracy: 0.8519 -  
  val_loss: 0.3217 - val_accuracy: 0.8527  
Epoch 7/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3088 - accuracy: 0.8580 -  
  val_loss: 0.3328 - val_accuracy: 0.8464  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3077 - accuracy: 0.8558 -  
  val_loss: 0.3248 - val_accuracy: 0.8531  
Epoch 9/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3057 - accuracy: 0.8575 -  
  val_loss: 0.3254 - val_accuracy: 0.8490  
300/300 [=====] - 0s 978us/step - loss: 0.3236 - accuracy: 0.8467  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4288 - accuracy: 0.8007 -  
  val_loss: 0.3418 - val_accuracy: 0.8408  
Epoch 2/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3363 - accuracy: 0.8417 -  
  val_loss: 0.3255 - val_accuracy: 0.8490  
Epoch 3/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3212 - accuracy: 0.8509 -  
  val_loss: 0.3615 - val_accuracy: 0.8316  
Epoch 4/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3152 - accuracy: 0.8487 -  
  val_loss: 0.3241 - val_accuracy: 0.8499  
Epoch 5/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3114 - accuracy: 0.8531 -  
  val_loss: 0.3242 - val_accuracy: 0.8527  
Epoch 6/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3107 - accuracy: 0.8544 -  
  val_loss: 0.3318 - val_accuracy: 0.8487  
Epoch 7/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3139 - accuracy: 0.8558 -  
  val_loss: 0.3281 - val_accuracy: 0.8453  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3055 - accuracy: 0.8546 -
```

```
val_loss: 0.3410 - val_accuracy: 0.8452
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3037 - accuracy: 0.8561 -
val_loss: 0.3241 - val_accuracy: 0.8527
300/300 [=====] - 0s 1ms/step - loss: 0.3086 - accuracy: 0.8567
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4197 - accuracy: 0.8062 -
val_loss: 0.3466 - val_accuracy: 0.8374
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3306 - accuracy: 0.8434 -
val_loss: 0.3266 - val_accuracy: 0.8508
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3239 - accuracy: 0.8454 -
val_loss: 0.3362 - val_accuracy: 0.8387
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3148 - accuracy: 0.8455 -
val_loss: 0.3240 - val_accuracy: 0.8516
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3213 - accuracy: 0.8446 -
val_loss: 0.3221 - val_accuracy: 0.8521
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3163 - accuracy: 0.8484 -
val_loss: 0.3216 - val_accuracy: 0.8531
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3089 - accuracy: 0.8556 -
val_loss: 0.3342 - val_accuracy: 0.8498
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2949 - accuracy: 0.8651 -
val_loss: 0.3234 - val_accuracy: 0.8541
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3005 - accuracy: 0.8594 -
val_loss: 0.3271 - val_accuracy: 0.8530
Epoch 10/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3027 - accuracy: 0.8546 -
val_loss: 0.3282 - val_accuracy: 0.8501
Epoch 11/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3038 - accuracy: 0.8578 -
val_loss: 0.3279 - val_accuracy: 0.8506
300/300 [=====] - 0s 982us/step - loss: 0.3288 - accuracy: 0.8480
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4237 - accuracy: 0.8005 -
val_loss: 0.3409 - val_accuracy: 0.8436
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3353 - accuracy: 0.8402 -
val_loss: 0.3338 - val_accuracy: 0.8427
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3317 - accuracy: 0.8435 -
val_loss: 0.3234 - val_accuracy: 0.8521
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3151 - accuracy: 0.8501 -
val_loss: 0.3218 - val_accuracy: 0.8538
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3143 - accuracy: 0.8473 -
val_loss: 0.3333 - val_accuracy: 0.8415
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3077 - accuracy: 0.8548 -
val_loss: 0.3226 - val_accuracy: 0.8512
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3019 - accuracy: 0.8633 -
val_loss: 0.3280 - val_accuracy: 0.8489
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3031 - accuracy: 0.8572 -
val_loss: 0.3277 - val_accuracy: 0.8510
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3057 - accuracy: 0.8555 -
val_loss: 0.3304 - val_accuracy: 0.8472
300/300 [=====] - 0s 996us/step - loss: 0.3171 - accuracy: 0.8580
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4243 - accuracy: 0.8014 -
val_loss: 0.3447 - val_accuracy: 0.8425
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3377 - accuracy: 0.8392 -
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val_loss: 0.3431 - val_accuracy: 0.8359
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3196 - accuracy: 0.8501 -
val_loss: 0.3301 - val_accuracy: 0.8427
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3246 - accuracy: 0.8463 -
val_loss: 0.3310 - val_accuracy: 0.8548
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3101 - accuracy: 0.8542 -
val_loss: 0.3211 - val_accuracy: 0.8503
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3093 - accuracy: 0.8521 -
val_loss: 0.3224 - val_accuracy: 0.8516
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3145 - accuracy: 0.8479 -
val_loss: 0.3237 - val_accuracy: 0.8498
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3048 - accuracy: 0.8558 -
val_loss: 0.3234 - val_accuracy: 0.8523
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3110 - accuracy: 0.8532 -
val_loss: 0.3281 - val_accuracy: 0.8481
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3030 - accuracy: 0.8596 -
val_loss: 0.3330 - val_accuracy: 0.8507
300/300 [=====] - 0s 1ms/step - loss: 0.3206 - accuracy: 0.8560
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4231 - accuracy: 0.8002 -
val_loss: 0.3363 - val_accuracy: 0.8445
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3413 - accuracy: 0.8404 -
val_loss: 0.3251 - val_accuracy: 0.8527
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3211 - accuracy: 0.8492 -
val_loss: 0.3301 - val_accuracy: 0.8466
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3226 - accuracy: 0.8498 -
val_loss: 0.3234 - val_accuracy: 0.8514
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3183 - accuracy: 0.8491 -
val_loss: 0.3322 - val_accuracy: 0.8467
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3118 - accuracy: 0.8538 -
val_loss: 0.3226 - val_accuracy: 0.8522
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3159 - accuracy: 0.8502 -
val_loss: 0.3260 - val_accuracy: 0.8529
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2974 - accuracy: 0.8610 -
val_loss: 0.3256 - val_accuracy: 0.8506
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3096 - accuracy: 0.8526 -
val_loss: 0.3238 - val_accuracy: 0.8526
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3049 - accuracy: 0.8547 -
val_loss: 0.3275 - val_accuracy: 0.8523
Epoch 11/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2923 - accuracy: 0.8631 -
val_loss: 0.3325 - val_accuracy: 0.8475
300/300 [=====] - 0s 966us/step - loss: 0.3264 - accuracy: 0.8393
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4250 - accuracy: 0.7983 -
val_loss: 0.3440 - val_accuracy: 0.8416
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3405 - accuracy: 0.8391 -
val_loss: 0.3270 - val_accuracy: 0.8500
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3142 - accuracy: 0.8510 -
val_loss: 0.3260 - val_accuracy: 0.8507
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3184 - accuracy: 0.8469 -
val_loss: 0.3226 - val_accuracy: 0.8534
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Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3142 - accuracy: 0.8488 -
val_loss: 0.3226 - val_accuracy: 0.8530
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3116 - accuracy: 0.8571 -
val_loss: 0.3236 - val_accuracy: 0.8506
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3113 - accuracy: 0.8536 -
val_loss: 0.3258 - val_accuracy: 0.8540
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3091 - accuracy: 0.8548 -
val_loss: 0.3227 - val_accuracy: 0.8518
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2931 - accuracy: 0.8641 -
val_loss: 0.3299 - val_accuracy: 0.8516
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3022 - accuracy: 0.8576 -
val_loss: 0.3279 - val_accuracy: 0.8518
300/300 [=====] - 0s 958us/step - loss: 0.3309 - accuracy: 0.8513
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4227 - accuracy: 0.7987 -
val_loss: 0.3501 - val_accuracy: 0.8347
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3415 - accuracy: 0.8390 -
val_loss: 0.3374 - val_accuracy: 0.8366
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3301 - accuracy: 0.8434 -
val_loss: 0.3220 - val_accuracy: 0.8535
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3165 - accuracy: 0.8501 -
val_loss: 0.3462 - val_accuracy: 0.8415
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3139 - accuracy: 0.8497 -
val_loss: 0.3318 - val_accuracy: 0.8490
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3117 - accuracy: 0.8500 -
val_loss: 0.3223 - val_accuracy: 0.8529
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3112 - accuracy: 0.8554 -
val_loss: 0.3364 - val_accuracy: 0.8468
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3094 - accuracy: 0.8557 -
val_loss: 0.3326 - val_accuracy: 0.8536
300/300 [=====] - 0s 976us/step - loss: 0.3460 - accuracy: 0.8420
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4202 - accuracy: 0.8009 -
val_loss: 0.3385 - val_accuracy: 0.8446
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3432 - accuracy: 0.8397 -
val_loss: 0.3261 - val_accuracy: 0.8521
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3252 - accuracy: 0.8448 -
val_loss: 0.3235 - val_accuracy: 0.8510
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3294 - accuracy: 0.8432 -
val_loss: 0.3265 - val_accuracy: 0.8524
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3189 - accuracy: 0.8511 -
val_loss: 0.3331 - val_accuracy: 0.8416
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3150 - accuracy: 0.8523 -
val_loss: 0.3228 - val_accuracy: 0.8506
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3117 - accuracy: 0.8578 -
val_loss: 0.3330 - val_accuracy: 0.8488
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3107 - accuracy: 0.8518 -
val_loss: 0.3248 - val_accuracy: 0.8499
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3062 - accuracy: 0.8554 -
val_loss: 0.3248 - val_accuracy: 0.8515
Epoch 10/50
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2700/2700 [=====] - 5s 2ms/step - loss: 0.2984 - accuracy: 0.8602 -  
  val_loss: 0.3249 - val_accuracy: 0.8526  
Epoch 11/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2997 - accuracy: 0.8575 -  
  val_loss: 0.3256 - val_accuracy: 0.8521  
300/300 [=====] - 0s 1ms/step - loss: 0.3260 - accuracy: 0.8447  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4341 - accuracy: 0.7967 -  
  val_loss: 0.3427 - val_accuracy: 0.8448  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3444 - accuracy: 0.8367 -  
  val_loss: 0.3500 - val_accuracy: 0.8398  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3247 - accuracy: 0.8465 -  
  val_loss: 0.3261 - val_accuracy: 0.8501  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3192 - accuracy: 0.8484 -  
  val_loss: 0.3286 - val_accuracy: 0.8491  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3166 - accuracy: 0.8528 -  
  val_loss: 0.3215 - val_accuracy: 0.8567  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3092 - accuracy: 0.8560 -  
  val_loss: 0.3228 - val_accuracy: 0.8529  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3088 - accuracy: 0.8569 -  
  val_loss: 0.3279 - val_accuracy: 0.8514  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3042 - accuracy: 0.8585 -  
  val_loss: 0.3210 - val_accuracy: 0.8528  
Epoch 9/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2949 - accuracy: 0.8641 -  
  val_loss: 0.3274 - val_accuracy: 0.8495  
Epoch 10/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2924 - accuracy: 0.8659 -  
  val_loss: 0.3361 - val_accuracy: 0.8454  
Epoch 11/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2968 - accuracy: 0.8617 -  
  val_loss: 0.3351 - val_accuracy: 0.8522  
Epoch 12/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2934 - accuracy: 0.8618 -  
  val_loss: 0.3348 - val_accuracy: 0.8465  
Epoch 13/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2863 - accuracy: 0.8676 -  
  val_loss: 0.3310 - val_accuracy: 0.8524  
300/300 [=====] - 0s 1ms/step - loss: 0.3292 - accuracy: 0.8507  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4247 - accuracy: 0.8008 -  
  val_loss: 0.3415 - val_accuracy: 0.8396  
Epoch 2/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3329 - accuracy: 0.8448 -  
  val_loss: 0.3264 - val_accuracy: 0.8502  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3244 - accuracy: 0.8445 -  
  val_loss: 0.3338 - val_accuracy: 0.8467  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3214 - accuracy: 0.8478 -  
  val_loss: 0.3225 - val_accuracy: 0.8540  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3155 - accuracy: 0.8470 -  
  val_loss: 0.3293 - val_accuracy: 0.8501  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3046 - accuracy: 0.8553 -  
  val_loss: 0.3268 - val_accuracy: 0.8546  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3148 - accuracy: 0.8502 -  
  val_loss: 0.3279 - val_accuracy: 0.8470  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3106 - accuracy: 0.8543 -  
  val_loss: 0.3279 - val_accuracy: 0.8528  
Epoch 9/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3061 - accuracy: 0.8583 -
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val_loss: 0.3240 - val_accuracy: 0.8522
300/300 [=====] - 0s 1ms/step - loss: 0.3246 - accuracy: 0.8473
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4264 - accuracy: 0.8025 -
val_loss: 0.3451 - val_accuracy: 0.8422
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3418 - accuracy: 0.8399 -
val_loss: 0.3298 - val_accuracy: 0.8475
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3264 - accuracy: 0.8464 -
val_loss: 0.3293 - val_accuracy: 0.8492
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3217 - accuracy: 0.8475 -
val_loss: 0.3243 - val_accuracy: 0.8517
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3124 - accuracy: 0.8485 -
val_loss: 0.3223 - val_accuracy: 0.8517
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3148 - accuracy: 0.8506 -
val_loss: 0.3239 - val_accuracy: 0.8536
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3153 - accuracy: 0.8525 -
val_loss: 0.3230 - val_accuracy: 0.8504
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3070 - accuracy: 0.8541 -
val_loss: 0.3209 - val_accuracy: 0.8551
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3045 - accuracy: 0.8623 -
val_loss: 0.3354 - val_accuracy: 0.8422
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2990 - accuracy: 0.8608 -
val_loss: 0.3451 - val_accuracy: 0.8391
Epoch 11/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2874 - accuracy: 0.8664 -
val_loss: 0.3328 - val_accuracy: 0.8460
Epoch 12/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2893 - accuracy: 0.8651 -
val_loss: 0.3274 - val_accuracy: 0.8525
Epoch 13/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2869 - accuracy: 0.8642 -
val_loss: 0.3248 - val_accuracy: 0.8538
300/300 [=====] - 0s 1ms/step - loss: 0.3156 - accuracy: 0.8527
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4217 - accuracy: 0.8025 -
val_loss: 0.3488 - val_accuracy: 0.8400
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3395 - accuracy: 0.8351 -
val_loss: 0.3308 - val_accuracy: 0.8484
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3165 - accuracy: 0.8543 -
val_loss: 0.3279 - val_accuracy: 0.8452
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3138 - accuracy: 0.8539 -
val_loss: 0.3344 - val_accuracy: 0.8429
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3106 - accuracy: 0.8553 -
val_loss: 0.3239 - val_accuracy: 0.8514
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3116 - accuracy: 0.8486 -
val_loss: 0.3260 - val_accuracy: 0.8508
Epoch 7/50
2700/2700 [=====] - 7s 2ms/step - loss: 0.3048 - accuracy: 0.8593 -
val_loss: 0.3418 - val_accuracy: 0.8392
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3028 - accuracy: 0.8541 -
val_loss: 0.3366 - val_accuracy: 0.8389
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3038 - accuracy: 0.8564 -
val_loss: 0.3331 - val_accuracy: 0.8446
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2992 - accuracy: 0.8575 -
val_loss: 0.3284 - val_accuracy: 0.8479
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300/300 [=====] - 0s 1ms/step - loss: 0.3280 - accuracy: 0.8407
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4057 - accuracy: 0.8001 -
  val_loss: 0.3606 - val_accuracy: 0.8400
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3516 - accuracy: 0.8376 -
  val_loss: 0.3417 - val_accuracy: 0.8456
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3315 - accuracy: 0.8462 -
  val_loss: 0.3329 - val_accuracy: 0.8489
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3274 - accuracy: 0.8478 -
  val_loss: 0.3381 - val_accuracy: 0.8493
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3217 - accuracy: 0.8474 -
  val_loss: 0.3313 - val_accuracy: 0.8481
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3131 - accuracy: 0.8572 -
  val_loss: 0.3331 - val_accuracy: 0.8467
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3110 - accuracy: 0.8533 -
  val_loss: 0.3343 - val_accuracy: 0.8508
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3142 - accuracy: 0.8544 -
  val_loss: 0.3452 - val_accuracy: 0.8486
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3089 - accuracy: 0.8554 -
  val_loss: 0.3451 - val_accuracy: 0.8460
Epoch 10/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3088 - accuracy: 0.8597 -
  val_loss: 0.3405 - val_accuracy: 0.8468
300/300 [=====] - 0s 1ms/step - loss: 0.3327 - accuracy: 0.8567
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3916 - accuracy: 0.8098 -
  val_loss: 0.3389 - val_accuracy: 0.8449
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3468 - accuracy: 0.8358 -
  val_loss: 0.3272 - val_accuracy: 0.8498
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3341 - accuracy: 0.8419 -
  val_loss: 0.3355 - val_accuracy: 0.8448
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3296 - accuracy: 0.8433 -
  val_loss: 0.3313 - val_accuracy: 0.8523
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3201 - accuracy: 0.8479 -
  val_loss: 0.3371 - val_accuracy: 0.8442
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3061 - accuracy: 0.8551 -
  val_loss: 0.3368 - val_accuracy: 0.8494
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3168 - accuracy: 0.8483 -
  val_loss: 0.3284 - val_accuracy: 0.8509
300/300 [=====] - 0s 994us/step - loss: 0.3221 - accuracy: 0.8480
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4050 - accuracy: 0.8059 -
  val_loss: 0.3584 - val_accuracy: 0.8425
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3489 - accuracy: 0.8375 -
  val_loss: 0.3399 - val_accuracy: 0.8419
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3358 - accuracy: 0.8434 -
  val_loss: 0.3379 - val_accuracy: 0.8418
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3290 - accuracy: 0.8493 -
  val_loss: 0.3363 - val_accuracy: 0.8453
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3209 - accuracy: 0.8489 -
  val_loss: 0.3318 - val_accuracy: 0.8522
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3133 - accuracy: 0.8499 -
  val_loss: 0.3306 - val_accuracy: 0.8489
```

Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3209 - accuracy: 0.8471 -
val_loss: 0.3285 - val_accuracy: 0.8483
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3111 - accuracy: 0.8553 -
val_loss: 0.3360 - val_accuracy: 0.8433
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2954 - accuracy: 0.8601 -
val_loss: 0.3501 - val_accuracy: 0.8459
Epoch 10/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3015 - accuracy: 0.8617 -
val_loss: 0.3479 - val_accuracy: 0.8453
Epoch 11/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2999 - accuracy: 0.8569 -
val_loss: 0.3391 - val_accuracy: 0.8493
Epoch 12/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.2987 - accuracy: 0.8607 -
val_loss: 0.3568 - val_accuracy: 0.8406
300/300 [=====] - 0s 941us/step - loss: 0.3431 - accuracy: 0.8380
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4049 - accuracy: 0.8010 -
val_loss: 0.3497 - val_accuracy: 0.8398
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3462 - accuracy: 0.8394 -
val_loss: 0.3297 - val_accuracy: 0.8504
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3295 - accuracy: 0.8459 -
val_loss: 0.3360 - val_accuracy: 0.8481
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3205 - accuracy: 0.8522 -
val_loss: 0.3373 - val_accuracy: 0.8461
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3184 - accuracy: 0.8481 -
val_loss: 0.3429 - val_accuracy: 0.8450
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3202 - accuracy: 0.8483 -
val_loss: 0.3342 - val_accuracy: 0.8522
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3151 - accuracy: 0.8513 -
val_loss: 0.3634 - val_accuracy: 0.8197
300/300 [=====] - 0s 956us/step - loss: 0.3680 - accuracy: 0.8067
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4074 - accuracy: 0.8070 -
val_loss: 0.3365 - val_accuracy: 0.8438
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3439 - accuracy: 0.8414 -
val_loss: 0.3304 - val_accuracy: 0.8508
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3336 - accuracy: 0.8359 -
val_loss: 0.3364 - val_accuracy: 0.8503
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3292 - accuracy: 0.8422 -
val_loss: 0.3284 - val_accuracy: 0.8502
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3184 - accuracy: 0.8495 -
val_loss: 0.3369 - val_accuracy: 0.8444
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3147 - accuracy: 0.8528 -
val_loss: 0.3370 - val_accuracy: 0.8494
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3105 - accuracy: 0.8552 -
val_loss: 0.3318 - val_accuracy: 0.8474
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3104 - accuracy: 0.8555 -
val_loss: 0.3433 - val_accuracy: 0.8491
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3056 - accuracy: 0.8600 -
val_loss: 0.3367 - val_accuracy: 0.8516
300/300 [=====] - 0s 994us/step - loss: 0.3436 - accuracy: 0.8413
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4001 - accuracy: 0.8094 -
val_loss: 0.3439 - val_accuracy: 0.8458

Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3479 - accuracy: 0.8377 -
val_loss: 0.3302 - val_accuracy: 0.8490
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3343 - accuracy: 0.8468 -
val_loss: 0.3279 - val_accuracy: 0.8512
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3211 - accuracy: 0.8494 -
val_loss: 0.3298 - val_accuracy: 0.8488
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3246 - accuracy: 0.8464 -
val_loss: 0.3431 - val_accuracy: 0.8499
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3165 - accuracy: 0.8526 -
val_loss: 0.3273 - val_accuracy: 0.8523
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3168 - accuracy: 0.8511 -
val_loss: 0.3456 - val_accuracy: 0.8340
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3026 - accuracy: 0.8555 -
val_loss: 0.3335 - val_accuracy: 0.8522
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3012 - accuracy: 0.8609 -
val_loss: 0.3540 - val_accuracy: 0.8292
Epoch 10/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3067 - accuracy: 0.8558 -
val_loss: 0.3400 - val_accuracy: 0.8529
Epoch 11/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2966 - accuracy: 0.8629 -
val_loss: 0.3346 - val_accuracy: 0.8512
300/300 [=====] - 0s 966us/step - loss: 0.3335 - accuracy: 0.8520
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4124 - accuracy: 0.8020 -
val_loss: 0.3593 - val_accuracy: 0.8351
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3497 - accuracy: 0.8362 -
val_loss: 0.3368 - val_accuracy: 0.8504
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3367 - accuracy: 0.8441 -
val_loss: 0.3418 - val_accuracy: 0.8521
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3307 - accuracy: 0.8502 -
val_loss: 0.3348 - val_accuracy: 0.8520
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3227 - accuracy: 0.8545 -
val_loss: 0.3323 - val_accuracy: 0.8525
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3205 - accuracy: 0.8519 -
val_loss: 0.3390 - val_accuracy: 0.8433
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3167 - accuracy: 0.8518 -
val_loss: 0.3350 - val_accuracy: 0.8470
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3197 - accuracy: 0.8455 -
val_loss: 0.3365 - val_accuracy: 0.8483
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3090 - accuracy: 0.8541 -
val_loss: 0.3347 - val_accuracy: 0.8476
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3077 - accuracy: 0.8523 -
val_loss: 0.3360 - val_accuracy: 0.8527
300/300 [=====] - 0s 999us/step - loss: 0.3336 - accuracy: 0.8540
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4131 - accuracy: 0.7882 -
val_loss: 0.3780 - val_accuracy: 0.8402
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3340 - accuracy: 0.8440 -
val_loss: 0.3542 - val_accuracy: 0.8412
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3362 - accuracy: 0.8450 -
val_loss: 0.3283 - val_accuracy: 0.8519
Epoch 4/50

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2700/2700 [=====] - 6s 2ms/step - loss: 0.3228 - accuracy: 0.8482 -  
  val_loss: 0.3567 - val_accuracy: 0.8432  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3222 - accuracy: 0.8480 -  
  val_loss: 0.3383 - val_accuracy: 0.8485  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3174 - accuracy: 0.8531 -  
  val_loss: 0.3333 - val_accuracy: 0.8455  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3140 - accuracy: 0.8524 -  
  val_loss: 0.3374 - val_accuracy: 0.8441  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3100 - accuracy: 0.8550 -  
  val_loss: 0.3331 - val_accuracy: 0.8515  
300/300 [=====] - 0s 984us/step - loss: 0.3334 - accuracy: 0.8487  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4155 - accuracy: 0.7959 -  
  val_loss: 0.3654 - val_accuracy: 0.8310  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3591 - accuracy: 0.8319 -  
  val_loss: 0.3411 - val_accuracy: 0.8409  
Epoch 3/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3359 - accuracy: 0.8420 -  
  val_loss: 0.3273 - val_accuracy: 0.8515  
Epoch 4/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3258 - accuracy: 0.8494 -  
  val_loss: 0.3383 - val_accuracy: 0.8452  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3304 - accuracy: 0.8467 -  
  val_loss: 0.3305 - val_accuracy: 0.8474  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3228 - accuracy: 0.8490 -  
  val_loss: 0.3370 - val_accuracy: 0.8483  
Epoch 7/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3166 - accuracy: 0.8501 -  
  val_loss: 0.3428 - val_accuracy: 0.8459  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3172 - accuracy: 0.8454 -  
  val_loss: 0.3287 - val_accuracy: 0.8495  
300/300 [=====] - 0s 1ms/step - loss: 0.3218 - accuracy: 0.8560  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4105 - accuracy: 0.7973 -  
  val_loss: 0.3457 - val_accuracy: 0.8415  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3433 - accuracy: 0.8430 -  
  val_loss: 0.3315 - val_accuracy: 0.8521  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3382 - accuracy: 0.8411 -  
  val_loss: 0.3263 - val_accuracy: 0.8535  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3220 - accuracy: 0.8550 -  
  val_loss: 0.3296 - val_accuracy: 0.8501  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3260 - accuracy: 0.8488 -  
  val_loss: 0.3385 - val_accuracy: 0.8422  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3190 - accuracy: 0.8490 -  
  val_loss: 0.3445 - val_accuracy: 0.8451  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3162 - accuracy: 0.8584 -  
  val_loss: 0.3585 - val_accuracy: 0.8198  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3104 - accuracy: 0.8553 -  
  val_loss: 0.3307 - val_accuracy: 0.8527  
300/300 [=====] - 0s 1ms/step - loss: 0.3328 - accuracy: 0.8447  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4106 - accuracy: 0.8018 -  
  val_loss: 0.3453 - val_accuracy: 0.8432  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3513 - accuracy: 0.8366 -  
  val_loss: 0.3450 - val_accuracy: 0.8436  
Epoch 3/50
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2700/2700 [=====] - 6s 2ms/step - loss: 0.3377 - accuracy: 0.8427 -  
  val_loss: 0.3666 - val_accuracy: 0.8387  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3220 - accuracy: 0.8436 -  
  val_loss: 0.3358 - val_accuracy: 0.8468  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3238 - accuracy: 0.8500 -  
  val_loss: 0.3312 - val_accuracy: 0.8482  
Epoch 6/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3171 - accuracy: 0.8533 -  
  val_loss: 0.3410 - val_accuracy: 0.8396  
Epoch 7/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3239 - accuracy: 0.8435 -  
  val_loss: 0.3339 - val_accuracy: 0.8443  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3084 - accuracy: 0.8569 -  
  val_loss: 0.3370 - val_accuracy: 0.8500  
Epoch 9/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3073 - accuracy: 0.8549 -  
  val_loss: 0.3512 - val_accuracy: 0.8328  
Epoch 10/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3026 - accuracy: 0.8553 -  
  val_loss: 0.3442 - val_accuracy: 0.8424  
300/300 [=====] - 0s 935us/step - loss: 0.3435 - accuracy: 0.8460  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4109 - accuracy: 0.7984 -  
  val_loss: 0.3533 - val_accuracy: 0.8401  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3505 - accuracy: 0.8322 -  
  val_loss: 0.3408 - val_accuracy: 0.8467  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3373 - accuracy: 0.8387 -  
  val_loss: 0.3304 - val_accuracy: 0.8525  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3237 - accuracy: 0.8458 -  
  val_loss: 0.3330 - val_accuracy: 0.8521  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3278 - accuracy: 0.8450 -  
  val_loss: 0.3512 - val_accuracy: 0.8508  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3269 - accuracy: 0.8434 -  
  val_loss: 0.3412 - val_accuracy: 0.8403  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3046 - accuracy: 0.8558 -  
  val_loss: 0.3414 - val_accuracy: 0.8414  
Epoch 8/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3157 - accuracy: 0.8504 -  
  val_loss: 0.3359 - val_accuracy: 0.8503  
300/300 [=====] - 0s 1ms/step - loss: 0.3326 - accuracy: 0.8533  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3992 - accuracy: 0.8046 -  
  val_loss: 0.3646 - val_accuracy: 0.8431  
Epoch 2/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3473 - accuracy: 0.8355 -  
  val_loss: 0.3322 - val_accuracy: 0.8508  
Epoch 3/50  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3344 - accuracy: 0.8385 -  
  val_loss: 0.3360 - val_accuracy: 0.8460  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3278 - accuracy: 0.8435 -  
  val_loss: 0.3251 - val_accuracy: 0.8518  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3271 - accuracy: 0.8402 -  
  val_loss: 0.3312 - val_accuracy: 0.8499  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3102 - accuracy: 0.8545 -  
  val_loss: 0.3295 - val_accuracy: 0.8523  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3266 - accuracy: 0.8450 -  
  val_loss: 0.3523 - val_accuracy: 0.8355  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3121 - accuracy: 0.8566 -
```

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val_loss: 0.3311 - val_accuracy: 0.8479
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2977 - accuracy: 0.8574 -
val_loss: 0.3321 - val_accuracy: 0.8515
300/300 [=====] - 0s 977us/step - loss: 0.3291 - accuracy: 0.8447
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4052 - accuracy: 0.8074 -
val_loss: 0.3623 - val_accuracy: 0.8343
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3473 - accuracy: 0.8386 -
val_loss: 0.3522 - val_accuracy: 0.8466
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3355 - accuracy: 0.8444 -
val_loss: 0.3305 - val_accuracy: 0.8504
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3183 - accuracy: 0.8446 -
val_loss: 0.3288 - val_accuracy: 0.8532
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3234 - accuracy: 0.8483 -
val_loss: 0.3389 - val_accuracy: 0.8509
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3201 - accuracy: 0.8438 -
val_loss: 0.3448 - val_accuracy: 0.8460
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3175 - accuracy: 0.8474 -
val_loss: 0.3346 - val_accuracy: 0.8490
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3093 - accuracy: 0.8551 -
val_loss: 0.3397 - val_accuracy: 0.8406
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2980 - accuracy: 0.8598 -
val_loss: 0.3437 - val_accuracy: 0.8442
300/300 [=====] - 0s 1ms/step - loss: 0.3601 - accuracy: 0.8440
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4192 - accuracy: 0.7925 -
val_loss: 0.3703 - val_accuracy: 0.8408
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3544 - accuracy: 0.8329 -
val_loss: 0.4184 - val_accuracy: 0.8041
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3257 - accuracy: 0.8472 -
val_loss: 0.3348 - val_accuracy: 0.8453
Epoch 4/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3238 - accuracy: 0.8438 -
val_loss: 0.3275 - val_accuracy: 0.8536
Epoch 5/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3230 - accuracy: 0.8472 -
val_loss: 0.3278 - val_accuracy: 0.8499
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3098 - accuracy: 0.8542 -
val_loss: 0.3377 - val_accuracy: 0.8541
Epoch 7/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3234 - accuracy: 0.8473 -
val_loss: 0.3451 - val_accuracy: 0.8505
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3046 - accuracy: 0.8591 -
val_loss: 0.3742 - val_accuracy: 0.8351
Epoch 9/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3107 - accuracy: 0.8523 -
val_loss: 0.3326 - val_accuracy: 0.8495
300/300 [=====] - 0s 1ms/step - loss: 0.3365 - accuracy: 0.8420
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4062 - accuracy: 0.8046 -
val_loss: 0.3595 - val_accuracy: 0.8282
Epoch 2/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3499 - accuracy: 0.8375 -
val_loss: 0.3414 - val_accuracy: 0.8508
Epoch 3/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3320 - accuracy: 0.8457 -
val_loss: 0.3278 - val_accuracy: 0.8477
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3307 - accuracy: 0.8430 -
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val_loss: 0.3463 - val_accuracy: 0.8494
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3232 - accuracy: 0.8495 -
val_loss: 0.3320 - val_accuracy: 0.8474
Epoch 6/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3210 - accuracy: 0.8488 -
val_loss: 0.3299 - val_accuracy: 0.8500
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3121 - accuracy: 0.8547 -
val_loss: 0.3276 - val_accuracy: 0.8533
Epoch 8/50
2700/2700 [=====] - 5s 2ms/step - loss: 0.3061 - accuracy: 0.8584 -
val_loss: 0.3363 - val_accuracy: 0.8513
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3090 - accuracy: 0.8578 -
val_loss: 0.3361 - val_accuracy: 0.8477
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3054 - accuracy: 0.8524 -
val_loss: 0.3496 - val_accuracy: 0.8501
Epoch 11/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2991 - accuracy: 0.8597 -
val_loss: 0.3666 - val_accuracy: 0.8433
Epoch 12/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3021 - accuracy: 0.8600 -
val_loss: 0.3458 - val_accuracy: 0.8464
300/300 [=====] - 0s 1ms/step - loss: 0.3470 - accuracy: 0.8460
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3977 - accuracy: 0.8094 -
val_loss: 0.3799 - val_accuracy: 0.8381
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3482 - accuracy: 0.8337 -
val_loss: 0.3418 - val_accuracy: 0.8466
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3317 - accuracy: 0.8461 -
val_loss: 0.3290 - val_accuracy: 0.8516
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3347 - accuracy: 0.8403 -
val_loss: 0.3386 - val_accuracy: 0.8455
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3284 - accuracy: 0.8484 -
val_loss: 0.3587 - val_accuracy: 0.8397
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3192 - accuracy: 0.8462 -
val_loss: 0.3334 - val_accuracy: 0.8484
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3162 - accuracy: 0.8499 -
val_loss: 0.3446 - val_accuracy: 0.8427
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3026 - accuracy: 0.8587 -
val_loss: 0.3404 - val_accuracy: 0.8488
300/300 [=====] - 0s 1ms/step - loss: 0.3370 - accuracy: 0.8480
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4010 - accuracy: 0.8020 -
val_loss: 0.3657 - val_accuracy: 0.8300
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3439 - accuracy: 0.8407 -
val_loss: 0.3683 - val_accuracy: 0.8271
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3293 - accuracy: 0.8495 -
val_loss: 0.3399 - val_accuracy: 0.8510
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3289 - accuracy: 0.8492 -
val_loss: 0.3270 - val_accuracy: 0.8545
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3199 - accuracy: 0.8511 -
val_loss: 0.3294 - val_accuracy: 0.8469
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3266 - accuracy: 0.8466 -
val_loss: 0.3322 - val_accuracy: 0.8472
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3091 - accuracy: 0.8572 -
val_loss: 0.3388 - val_accuracy: 0.8488
```

Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3260 - accuracy: 0.8502 -
val_loss: 0.3339 - val_accuracy: 0.8523
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3150 - accuracy: 0.8504 -
val_loss: 0.3576 - val_accuracy: 0.8454
300/300 [=====] - 0s 1ms/step - loss: 0.3508 - accuracy: 0.8407
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4111 - accuracy: 0.7858 -
val_loss: 0.3677 - val_accuracy: 0.8330
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3597 - accuracy: 0.8295 -
val_loss: 0.3371 - val_accuracy: 0.8438
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3347 - accuracy: 0.8442 -
val_loss: 0.3302 - val_accuracy: 0.8434
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3228 - accuracy: 0.8459 -
val_loss: 0.3308 - val_accuracy: 0.8504
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3194 - accuracy: 0.8414 -
val_loss: 0.3269 - val_accuracy: 0.8530
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3102 - accuracy: 0.8565 -
val_loss: 0.3426 - val_accuracy: 0.8372
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3219 - accuracy: 0.8378 -
val_loss: 0.3379 - val_accuracy: 0.8519
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3163 - accuracy: 0.8552 -
val_loss: 0.3349 - val_accuracy: 0.8425
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3032 - accuracy: 0.8553 -
val_loss: 0.3374 - val_accuracy: 0.8497
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3053 - accuracy: 0.8565 -
val_loss: 0.3482 - val_accuracy: 0.8468
300/300 [=====] - 0s 1ms/step - loss: 0.3119 - accuracy: 0.8533
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4102 - accuracy: 0.8027 -
val_loss: 0.3491 - val_accuracy: 0.8442
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3561 - accuracy: 0.8300 -
val_loss: 0.3635 - val_accuracy: 0.8388
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3361 - accuracy: 0.8482 -
val_loss: 0.3289 - val_accuracy: 0.8510
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3331 - accuracy: 0.8456 -
val_loss: 0.3323 - val_accuracy: 0.8507
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3249 - accuracy: 0.8520 -
val_loss: 0.3247 - val_accuracy: 0.8531
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3244 - accuracy: 0.8450 -
val_loss: 0.3307 - val_accuracy: 0.8532
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3105 - accuracy: 0.8575 -
val_loss: 0.3334 - val_accuracy: 0.8419
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3167 - accuracy: 0.8508 -
val_loss: 0.3309 - val_accuracy: 0.8491
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3088 - accuracy: 0.8551 -
val_loss: 0.3357 - val_accuracy: 0.8443
Epoch 10/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3154 - accuracy: 0.8506 -
val_loss: 0.3383 - val_accuracy: 0.8515
300/300 [=====] - 0s 1ms/step - loss: 0.3376 - accuracy: 0.8473
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4100 - accuracy: 0.8033 -
val_loss: 0.3411 - val_accuracy: 0.8434

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Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3523 - accuracy: 0.8385 -
val_loss: 0.3552 - val_accuracy: 0.8449
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3379 - accuracy: 0.8405 -
val_loss: 0.3314 - val_accuracy: 0.8511
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3325 - accuracy: 0.8474 -
val_loss: 0.3318 - val_accuracy: 0.8517
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3263 - accuracy: 0.8452 -
val_loss: 0.3377 - val_accuracy: 0.8461
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3218 - accuracy: 0.8479 -
val_loss: 0.3345 - val_accuracy: 0.8445
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3146 - accuracy: 0.8548 -
val_loss: 0.3484 - val_accuracy: 0.8373
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3181 - accuracy: 0.8498 -
val_loss: 0.3421 - val_accuracy: 0.8433
300/300 [=====] - 0s 1ms/step - loss: 0.3357 - accuracy: 0.8540
Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4021 - accuracy: 0.8044 -
val_loss: 0.3597 - val_accuracy: 0.8106
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3496 - accuracy: 0.8320 -
val_loss: 0.3266 - val_accuracy: 0.8518
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3318 - accuracy: 0.8426 -
val_loss: 0.3281 - val_accuracy: 0.8474
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3211 - accuracy: 0.8503 -
val_loss: 0.3391 - val_accuracy: 0.8436
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3223 - accuracy: 0.8496 -
val_loss: 0.3309 - val_accuracy: 0.8503
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3158 - accuracy: 0.8529 -
val_loss: 0.3303 - val_accuracy: 0.8467
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3137 - accuracy: 0.8487 -
val_loss: 0.3304 - val_accuracy: 0.8455
300/300 [=====] - 0s 1ms/step - loss: 0.3234 - accuracy: 0.8493
Epoch 1/50
2700/2700 [=====] - 7s 2ms/step - loss: 0.4112 - accuracy: 0.8057 -
val_loss: 0.3492 - val_accuracy: 0.8429
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3453 - accuracy: 0.8389 -
val_loss: 0.3318 - val_accuracy: 0.8501
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3351 - accuracy: 0.8410 -
val_loss: 0.3514 - val_accuracy: 0.8404
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3273 - accuracy: 0.8483 -
val_loss: 0.3260 - val_accuracy: 0.8527
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3173 - accuracy: 0.8501 -
val_loss: 0.3297 - val_accuracy: 0.8532
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3185 - accuracy: 0.8460 -
val_loss: 0.3354 - val_accuracy: 0.8473
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3139 - accuracy: 0.8539 -
val_loss: 0.3362 - val_accuracy: 0.8447
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3104 - accuracy: 0.8561 -
val_loss: 0.3406 - val_accuracy: 0.8472
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3112 - accuracy: 0.8590 -
val_loss: 0.3533 - val_accuracy: 0.8295
300/300 [=====] - 0s 1ms/step - loss: 0.3510 - accuracy: 0.8273
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Epoch 1/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.4079 - accuracy: 0.7979 -
val_loss: 0.3387 - val_accuracy: 0.8439
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3412 - accuracy: 0.8379 -
val_loss: 0.3562 - val_accuracy: 0.8046
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3348 - accuracy: 0.8390 -
val_loss: 0.3303 - val_accuracy: 0.8494
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3272 - accuracy: 0.8399 -
val_loss: 0.3320 - val_accuracy: 0.8523
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3207 - accuracy: 0.8472 -
val_loss: 0.3644 - val_accuracy: 0.8381
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3229 - accuracy: 0.8445 -
val_loss: 0.3500 - val_accuracy: 0.8452
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3091 - accuracy: 0.8543 -
val_loss: 0.3351 - val_accuracy: 0.8478
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3157 - accuracy: 0.8522 -
val_loss: 0.3320 - val_accuracy: 0.8496
300/300 [=====] - 0s 1ms/step - loss: 0.3475 - accuracy: 0.8420
Epoch 1/50
2700/2700 [=====] - 7s 2ms/step - loss: 0.4089 - accuracy: 0.8002 -
val_loss: 0.3594 - val_accuracy: 0.8400
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3605 - accuracy: 0.8332 -
val_loss: 0.3348 - val_accuracy: 0.8473
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3250 - accuracy: 0.8447 -
val_loss: 0.3301 - val_accuracy: 0.8493
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3310 - accuracy: 0.8476 -
val_loss: 0.3278 - val_accuracy: 0.8530
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3278 - accuracy: 0.8452 -
val_loss: 0.3290 - val_accuracy: 0.8535
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3197 - accuracy: 0.8501 -
val_loss: 0.3301 - val_accuracy: 0.8494
Epoch 7/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3180 - accuracy: 0.8484 -
val_loss: 0.3351 - val_accuracy: 0.8483
Epoch 8/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3137 - accuracy: 0.8508 -
val_loss: 0.3490 - val_accuracy: 0.8494
Epoch 9/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.2983 - accuracy: 0.8579 -
val_loss: 0.3626 - val_accuracy: 0.8276
300/300 [=====] - 0s 1ms/step - loss: 0.3782 - accuracy: 0.8247
Epoch 1/50
2700/2700 [=====] - 7s 2ms/step - loss: 0.4108 - accuracy: 0.7996 -
val_loss: 0.3448 - val_accuracy: 0.8460
Epoch 2/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3487 - accuracy: 0.8369 -
val_loss: 0.3507 - val_accuracy: 0.8324
Epoch 3/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3448 - accuracy: 0.8375 -
val_loss: 0.3344 - val_accuracy: 0.8472
Epoch 4/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3378 - accuracy: 0.8430 -
val_loss: 0.3318 - val_accuracy: 0.8488
Epoch 5/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3274 - accuracy: 0.8410 -
val_loss: 0.3592 - val_accuracy: 0.8473
Epoch 6/50
2700/2700 [=====] - 6s 2ms/step - loss: 0.3225 - accuracy: 0.8519 -
val_loss: 0.3457 - val_accuracy: 0.8451
Epoch 7/50
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2700/2700 [=====] - 6s 2ms/step - loss: 0.3151 - accuracy: 0.8527 -  
  val_loss: 0.3481 - val_accuracy: 0.8401  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3127 - accuracy: 0.8572 -  
  val_loss: 0.3435 - val_accuracy: 0.8516  
Epoch 9/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3122 - accuracy: 0.8491 -  
  val_loss: 0.3363 - val_accuracy: 0.8478  
300/300 [=====] - 0s 1ms/step - loss: 0.3367 - accuracy: 0.8407  
Epoch 1/50  
2700/2700 [=====] - 7s 2ms/step - loss: 0.4103 - accuracy: 0.7966 -  
  val_loss: 0.3621 - val_accuracy: 0.8224  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3445 - accuracy: 0.8350 -  
  val_loss: 0.3573 - val_accuracy: 0.8334  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3416 - accuracy: 0.8407 -  
  val_loss: 0.3325 - val_accuracy: 0.8483  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3242 - accuracy: 0.8478 -  
  val_loss: 0.3264 - val_accuracy: 0.8528  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3215 - accuracy: 0.8515 -  
  val_loss: 0.3286 - val_accuracy: 0.8525  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3199 - accuracy: 0.8519 -  
  val_loss: 0.3530 - val_accuracy: 0.8429  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3186 - accuracy: 0.8509 -  
  val_loss: 0.3431 - val_accuracy: 0.8523  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3073 - accuracy: 0.8541 -  
  val_loss: 0.3458 - val_accuracy: 0.8467  
Epoch 9/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3032 - accuracy: 0.8569 -  
  val_loss: 0.3331 - val_accuracy: 0.8486  
300/300 [=====] - 0s 1ms/step - loss: 0.3364 - accuracy: 0.8427  
Epoch 1/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4039 - accuracy: 0.7984 -  
  val_loss: 0.3534 - val_accuracy: 0.8390  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3373 - accuracy: 0.8420 -  
  val_loss: 0.3329 - val_accuracy: 0.8465  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3379 - accuracy: 0.8372 -  
  val_loss: 0.3567 - val_accuracy: 0.8462  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3263 - accuracy: 0.8428 -  
  val_loss: 0.3323 - val_accuracy: 0.8507  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3282 - accuracy: 0.8418 -  
  val_loss: 0.3405 - val_accuracy: 0.8450  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3227 - accuracy: 0.8542 -  
  val_loss: 0.3325 - val_accuracy: 0.8512  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3052 - accuracy: 0.8545 -  
  val_loss: 0.3348 - val_accuracy: 0.8511  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3075 - accuracy: 0.8602 -  
  val_loss: 0.3459 - val_accuracy: 0.8470  
Epoch 9/50  
2700/2700 [=====] - 7s 2ms/step - loss: 0.2965 - accuracy: 0.8605 -  
  val_loss: 0.3365 - val_accuracy: 0.8477  
300/300 [=====] - 0s 1ms/step - loss: 0.3334 - accuracy: 0.8347  
Epoch 1/50  
2700/2700 [=====] - 7s 2ms/step - loss: 0.4037 - accuracy: 0.8020 -  
  val_loss: 0.3521 - val_accuracy: 0.8320  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3423 - accuracy: 0.8365 -  
  val_loss: 0.3285 - val_accuracy: 0.8547  
Epoch 3/50
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2700/2700 [=====] - 6s 2ms/step - loss: 0.3233 - accuracy: 0.8488 -  
  val_loss: 0.3422 - val_accuracy: 0.8386  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3211 - accuracy: 0.8545 -  
  val_loss: 0.3344 - val_accuracy: 0.8490  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3292 - accuracy: 0.8477 -  
  val_loss: 0.3434 - val_accuracy: 0.8332  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3236 - accuracy: 0.8433 -  
  val_loss: 0.3356 - val_accuracy: 0.8494  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3179 - accuracy: 0.8518 -  
  val_loss: 0.3385 - val_accuracy: 0.8481  
300/300 [=====] - 0s 1ms/step - loss: 0.3235 - accuracy: 0.8547  
Epoch 1/50  
2700/2700 [=====] - 7s 3ms/step - loss: 0.4095 - accuracy: 0.7980 -  
  val_loss: 0.4484 - val_accuracy: 0.8152  
Epoch 2/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3539 - accuracy: 0.8396 -  
  val_loss: 0.3327 - val_accuracy: 0.8500  
Epoch 3/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3279 - accuracy: 0.8450 -  
  val_loss: 0.3299 - val_accuracy: 0.8466  
Epoch 4/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3305 - accuracy: 0.8448 -  
  val_loss: 0.3427 - val_accuracy: 0.8454  
Epoch 5/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3182 - accuracy: 0.8516 -  
  val_loss: 0.3380 - val_accuracy: 0.8481  
Epoch 6/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3188 - accuracy: 0.8507 -  
  val_loss: 0.3562 - val_accuracy: 0.8322  
Epoch 7/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3142 - accuracy: 0.8545 -  
  val_loss: 0.3511 - val_accuracy: 0.8473  
Epoch 8/50  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3110 - accuracy: 0.8524 -  
  val_loss: 0.3597 - val_accuracy: 0.8250  
300/300 [=====] - 0s 1ms/step - loss: 0.3524 - accuracy: 0.8260  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4304 - accuracy: 0.7979 -  
  val_loss: 0.3423 - val_accuracy: 0.8437  
Epoch 2/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3365 - accuracy: 0.8423 -  
  val_loss: 0.3373 - val_accuracy: 0.8405  
Epoch 3/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3231 - accuracy: 0.8475 -  
  val_loss: 0.3252 - val_accuracy: 0.8499  
Epoch 4/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3151 - accuracy: 0.8534 -  
  val_loss: 0.3214 - val_accuracy: 0.8520  
Epoch 5/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3179 - accuracy: 0.8512 -  
  val_loss: 0.3255 - val_accuracy: 0.8463  
Epoch 6/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3203 - accuracy: 0.8474 -  
  val_loss: 0.3222 - val_accuracy: 0.8497  
Epoch 7/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3118 - accuracy: 0.8512 -  
  val_loss: 0.3216 - val_accuracy: 0.8536  
Epoch 8/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3080 - accuracy: 0.8534 -  
  val_loss: 0.3240 - val_accuracy: 0.8525  
Epoch 9/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2992 - accuracy: 0.8583 -  
  val_loss: 0.3287 - val_accuracy: 0.8509  
300/300 [=====] - 0s 1ms/step - loss: 0.3190 - accuracy: 0.8560  
Epoch 1/100  
2700/2700 [=====] - 7s 2ms/step - loss: 0.4305 - accuracy: 0.7979 -  
  val_loss: 0.3518 - val_accuracy: 0.8394  
Epoch 2/100
```

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2700/2700 [=====] - 6s 2ms/step - loss: 0.3406 - accuracy: 0.8423 -  
  val_loss: 0.3320 - val_accuracy: 0.8494  
Epoch 3/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3313 - accuracy: 0.8457 -  
  val_loss: 0.3263 - val_accuracy: 0.8513  
Epoch 4/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3229 - accuracy: 0.8458 -  
  val_loss: 0.3255 - val_accuracy: 0.8485  
Epoch 5/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3101 - accuracy: 0.8543 -  
  val_loss: 0.3217 - val_accuracy: 0.8519  
Epoch 6/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3089 - accuracy: 0.8556 -  
  val_loss: 0.3311 - val_accuracy: 0.8447  
Epoch 7/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3132 - accuracy: 0.8516 -  
  val_loss: 0.3273 - val_accuracy: 0.8508  
Epoch 8/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3107 - accuracy: 0.8509 -  
  val_loss: 0.3306 - val_accuracy: 0.8473  
Epoch 9/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3040 - accuracy: 0.8591 -  
  val_loss: 0.3296 - val_accuracy: 0.8490  
Epoch 10/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3061 - accuracy: 0.8569 -  
  val_loss: 0.3250 - val_accuracy: 0.8496  
300/300 [=====] - 0s 1ms/step - loss: 0.3154 - accuracy: 0.8533  
Epoch 1/100  
2700/2700 [=====] - 7s 2ms/step - loss: 0.4327 - accuracy: 0.7977 -  
  val_loss: 0.3492 - val_accuracy: 0.8398  
Epoch 2/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3418 - accuracy: 0.8390 -  
  val_loss: 0.3259 - val_accuracy: 0.8505  
Epoch 3/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3363 - accuracy: 0.8412 -  
  val_loss: 0.3227 - val_accuracy: 0.8540  
Epoch 4/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3220 - accuracy: 0.8485 -  
  val_loss: 0.3251 - val_accuracy: 0.8532  
Epoch 5/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3108 - accuracy: 0.8584 -  
  val_loss: 0.3221 - val_accuracy: 0.8525  
Epoch 6/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3088 - accuracy: 0.8559 -  
  val_loss: 0.3218 - val_accuracy: 0.8528  
Epoch 7/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3110 - accuracy: 0.8561 -  
  val_loss: 0.3218 - val_accuracy: 0.8506  
Epoch 8/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3057 - accuracy: 0.8574 -  
  val_loss: 0.3350 - val_accuracy: 0.8495  
Epoch 9/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3082 - accuracy: 0.8567 -  
  val_loss: 0.3249 - val_accuracy: 0.8525  
Epoch 10/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3014 - accuracy: 0.8582 -  
  val_loss: 0.3386 - val_accuracy: 0.8419  
Epoch 11/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3032 - accuracy: 0.8580 -  
  val_loss: 0.3248 - val_accuracy: 0.8515  
Epoch 12/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2939 - accuracy: 0.8646 -  
  val_loss: 0.3288 - val_accuracy: 0.8503  
300/300 [=====] - 0s 1ms/step - loss: 0.3233 - accuracy: 0.8453  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4297 - accuracy: 0.7969 -  
  val_loss: 0.3498 - val_accuracy: 0.8411  
Epoch 2/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3474 - accuracy: 0.8365 -  
  val_loss: 0.3258 - val_accuracy: 0.8495  
Epoch 3/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3261 - accuracy: 0.8467 -
```

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val_loss: 0.3315 - val_accuracy: 0.8460
Epoch 4/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3229 - accuracy: 0.8479 -
val_loss: 0.3239 - val_accuracy: 0.8499
Epoch 5/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3183 - accuracy: 0.8502 -
val_loss: 0.3231 - val_accuracy: 0.8508
Epoch 6/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3165 - accuracy: 0.8485 -
val_loss: 0.3259 - val_accuracy: 0.8527
Epoch 7/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3089 - accuracy: 0.8542 -
val_loss: 0.3351 - val_accuracy: 0.8461
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3031 - accuracy: 0.8603 -
val_loss: 0.3251 - val_accuracy: 0.8511
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3165 - accuracy: 0.8476 -
val_loss: 0.3329 - val_accuracy: 0.8400
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2997 - accuracy: 0.8603 -
val_loss: 0.3262 - val_accuracy: 0.8481
300/300 [=====] - 0s 999us/step - loss: 0.3262 - accuracy: 0.8500
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4349 - accuracy: 0.7988 -
val_loss: 0.3428 - val_accuracy: 0.8409
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3475 - accuracy: 0.8362 -
val_loss: 0.3253 - val_accuracy: 0.8508
Epoch 3/100
2700/2700 [=====] - 7s 2ms/step - loss: 0.3223 - accuracy: 0.8451 -
val_loss: 0.3302 - val_accuracy: 0.8490
Epoch 4/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3144 - accuracy: 0.8482 -
val_loss: 0.3223 - val_accuracy: 0.8531
Epoch 5/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3194 - accuracy: 0.8529 -
val_loss: 0.3322 - val_accuracy: 0.8408
Epoch 6/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3193 - accuracy: 0.8487 -
val_loss: 0.3213 - val_accuracy: 0.8513
Epoch 7/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3093 - accuracy: 0.8542 -
val_loss: 0.3242 - val_accuracy: 0.8505
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3100 - accuracy: 0.8538 -
val_loss: 0.3299 - val_accuracy: 0.8455
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2985 - accuracy: 0.8591 -
val_loss: 0.3289 - val_accuracy: 0.8501
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3029 - accuracy: 0.8557 -
val_loss: 0.3292 - val_accuracy: 0.8520
Epoch 11/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2934 - accuracy: 0.8608 -
val_loss: 0.3250 - val_accuracy: 0.8533
300/300 [=====] - 0s 987us/step - loss: 0.3426 - accuracy: 0.8413
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4372 - accuracy: 0.7861 -
val_loss: 0.3624 - val_accuracy: 0.8379
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3522 - accuracy: 0.8384 -
val_loss: 0.3573 - val_accuracy: 0.8370
Epoch 3/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3450 - accuracy: 0.8410 -
val_loss: 0.3351 - val_accuracy: 0.8501
Epoch 4/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3262 - accuracy: 0.8473 -
val_loss: 0.3399 - val_accuracy: 0.8475
Epoch 5/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3182 - accuracy: 0.8545 -
val_loss: 0.3281 - val_accuracy: 0.8529
```

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Epoch 6/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3221 - accuracy: 0.8515 -
val_loss: 0.3287 - val_accuracy: 0.8535
Epoch 7/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3080 - accuracy: 0.8603 -
val_loss: 0.3290 - val_accuracy: 0.8499
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3088 - accuracy: 0.8563 -
val_loss: 0.3263 - val_accuracy: 0.8528
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3052 - accuracy: 0.8563 -
val_loss: 0.3329 - val_accuracy: 0.8440
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3071 - accuracy: 0.8591 -
val_loss: 0.3270 - val_accuracy: 0.8487
Epoch 11/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2950 - accuracy: 0.8616 -
val_loss: 0.3278 - val_accuracy: 0.8538
Epoch 12/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2966 - accuracy: 0.8630 -
val_loss: 0.3315 - val_accuracy: 0.8489
Epoch 13/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3005 - accuracy: 0.8590 -
val_loss: 0.3351 - val_accuracy: 0.8499
300/300 [=====] - 0s 1ms/step - loss: 0.3320 - accuracy: 0.8513
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4281 - accuracy: 0.7980 -
val_loss: 0.3460 - val_accuracy: 0.8406
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3502 - accuracy: 0.8285 -
val_loss: 0.3447 - val_accuracy: 0.8384
Epoch 3/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3264 - accuracy: 0.8501 -
val_loss: 0.3226 - val_accuracy: 0.8542
Epoch 4/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3245 - accuracy: 0.8486 -
val_loss: 0.3257 - val_accuracy: 0.8535
Epoch 5/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3187 - accuracy: 0.8503 -
val_loss: 0.3233 - val_accuracy: 0.8504
Epoch 6/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3189 - accuracy: 0.8462 -
val_loss: 0.3222 - val_accuracy: 0.8541
Epoch 7/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3058 - accuracy: 0.8569 -
val_loss: 0.3213 - val_accuracy: 0.8561
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3105 - accuracy: 0.8489 -
val_loss: 0.3266 - val_accuracy: 0.8526
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3029 - accuracy: 0.8594 -
val_loss: 0.3231 - val_accuracy: 0.8513
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3034 - accuracy: 0.8598 -
val_loss: 0.3256 - val_accuracy: 0.8516
Epoch 11/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2884 - accuracy: 0.8651 -
val_loss: 0.3247 - val_accuracy: 0.8530
Epoch 12/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3022 - accuracy: 0.8600 -
val_loss: 0.3311 - val_accuracy: 0.8494
300/300 [=====] - 0s 1ms/step - loss: 0.3287 - accuracy: 0.8500
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4257 - accuracy: 0.7999 -
val_loss: 0.3494 - val_accuracy: 0.8402
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3462 - accuracy: 0.8376 -
val_loss: 0.3733 - val_accuracy: 0.8256
Epoch 3/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3243 - accuracy: 0.8479 -
val_loss: 0.3262 - val_accuracy: 0.8504
Epoch 4/100
```

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2700/2700 [=====] - 6s 2ms/step - loss: 0.3090 - accuracy: 0.8560 -  
  val_loss: 0.3310 - val_accuracy: 0.8469  
Epoch 5/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3145 - accuracy: 0.8525 -  
  val_loss: 0.3236 - val_accuracy: 0.8542  
Epoch 6/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3073 - accuracy: 0.8565 -  
  val_loss: 0.3272 - val_accuracy: 0.8493  
Epoch 7/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3105 - accuracy: 0.8533 -  
  val_loss: 0.3255 - val_accuracy: 0.8520  
Epoch 8/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3073 - accuracy: 0.8576 -  
  val_loss: 0.3261 - val_accuracy: 0.8500  
Epoch 9/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2957 - accuracy: 0.8630 -  
  val_loss: 0.3259 - val_accuracy: 0.8533  
Epoch 10/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3097 - accuracy: 0.8559 -  
  val_loss: 0.3320 - val_accuracy: 0.8474  
300/300 [=====] - 0s 1ms/step - loss: 0.3309 - accuracy: 0.8460  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4281 - accuracy: 0.8011 -  
  val_loss: 0.3470 - val_accuracy: 0.8409  
Epoch 2/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3466 - accuracy: 0.8356 -  
  val_loss: 0.3333 - val_accuracy: 0.8498  
Epoch 3/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3256 - accuracy: 0.8447 -  
  val_loss: 0.3258 - val_accuracy: 0.8537  
Epoch 4/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3282 - accuracy: 0.8418 -  
  val_loss: 0.3226 - val_accuracy: 0.8533  
Epoch 5/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3218 - accuracy: 0.8455 -  
  val_loss: 0.3376 - val_accuracy: 0.8414  
Epoch 6/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3067 - accuracy: 0.8567 -  
  val_loss: 0.3218 - val_accuracy: 0.8521  
Epoch 7/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3227 - accuracy: 0.8448 -  
  val_loss: 0.3225 - val_accuracy: 0.8565  
Epoch 8/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3101 - accuracy: 0.8557 -  
  val_loss: 0.3207 - val_accuracy: 0.8526  
Epoch 9/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3054 - accuracy: 0.8590 -  
  val_loss: 0.3236 - val_accuracy: 0.8529  
Epoch 10/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3029 - accuracy: 0.8600 -  
  val_loss: 0.3343 - val_accuracy: 0.8458  
Epoch 11/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3040 - accuracy: 0.8582 -  
  val_loss: 0.3227 - val_accuracy: 0.8512  
Epoch 12/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3010 - accuracy: 0.8564 -  
  val_loss: 0.3267 - val_accuracy: 0.8521  
Epoch 13/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2967 - accuracy: 0.8599 -  
  val_loss: 0.3282 - val_accuracy: 0.8507  
300/300 [=====] - 0s 1ms/step - loss: 0.3122 - accuracy: 0.8587  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4373 - accuracy: 0.7945 -  
  val_loss: 0.3551 - val_accuracy: 0.8398  
Epoch 2/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3410 - accuracy: 0.8439 -  
  val_loss: 0.3338 - val_accuracy: 0.8470  
Epoch 3/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3329 - accuracy: 0.8470 -  
  val_loss: 0.3255 - val_accuracy: 0.8537  
Epoch 4/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3183 - accuracy: 0.8537 -
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val_loss: 0.3202 - val_accuracy: 0.8528
Epoch 5/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3177 - accuracy: 0.8506 -
val_loss: 0.3291 - val_accuracy: 0.8483
Epoch 6/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3096 - accuracy: 0.8523 -
val_loss: 0.3212 - val_accuracy: 0.8532
Epoch 7/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3063 - accuracy: 0.8606 -
val_loss: 0.3256 - val_accuracy: 0.8509
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3088 - accuracy: 0.8554 -
val_loss: 0.3383 - val_accuracy: 0.8447
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3005 - accuracy: 0.8539 -
val_loss: 0.3261 - val_accuracy: 0.8531
300/300 [=====] - 0s 958us/step - loss: 0.3245 - accuracy: 0.8473
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4309 - accuracy: 0.7928 -
val_loss: 0.3459 - val_accuracy: 0.8393
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3466 - accuracy: 0.8390 -
val_loss: 0.3327 - val_accuracy: 0.8466
Epoch 3/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3210 - accuracy: 0.8520 -
val_loss: 0.3240 - val_accuracy: 0.8523
Epoch 4/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3229 - accuracy: 0.8457 -
val_loss: 0.3268 - val_accuracy: 0.8525
Epoch 5/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3181 - accuracy: 0.8501 -
val_loss: 0.3265 - val_accuracy: 0.8550
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3155 - accuracy: 0.8488 -
val_loss: 0.3234 - val_accuracy: 0.8522
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3150 - accuracy: 0.8480 -
val_loss: 0.3222 - val_accuracy: 0.8522
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3091 - accuracy: 0.8557 -
val_loss: 0.3689 - val_accuracy: 0.8223
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3063 - accuracy: 0.8544 -
val_loss: 0.3246 - val_accuracy: 0.8512
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3044 - accuracy: 0.8549 -
val_loss: 0.3238 - val_accuracy: 0.8535
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3071 - accuracy: 0.8545 -
val_loss: 0.3263 - val_accuracy: 0.8505
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2989 - accuracy: 0.8622 -
val_loss: 0.3276 - val_accuracy: 0.8535
300/300 [=====] - 0s 914us/step - loss: 0.3193 - accuracy: 0.8560
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4316 - accuracy: 0.7898 -
val_loss: 0.3436 - val_accuracy: 0.8410
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3347 - accuracy: 0.8415 -
val_loss: 0.3267 - val_accuracy: 0.8515
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3287 - accuracy: 0.8462 -
val_loss: 0.3319 - val_accuracy: 0.8449
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3219 - accuracy: 0.8493 -
val_loss: 0.3227 - val_accuracy: 0.8528
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3154 - accuracy: 0.8517 -
val_loss: 0.3314 - val_accuracy: 0.8442
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3122 - accuracy: 0.8534 -
val_loss: 0.3308 - val_accuracy: 0.8473
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Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3141 - accuracy: 0.8483 -
val_loss: 0.3600 - val_accuracy: 0.8331
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3063 - accuracy: 0.8547 -
val_loss: 0.3234 - val_accuracy: 0.8528
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3104 - accuracy: 0.8494 -
val_loss: 0.3263 - val_accuracy: 0.8509
300/300 [=====] - 0s 888us/step - loss: 0.3166 - accuracy: 0.8580
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4280 - accuracy: 0.7992 -
val_loss: 0.3532 - val_accuracy: 0.8407
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3449 - accuracy: 0.8397 -
val_loss: 0.3293 - val_accuracy: 0.8497
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3207 - accuracy: 0.8481 -
val_loss: 0.3240 - val_accuracy: 0.8532
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3218 - accuracy: 0.8512 -
val_loss: 0.3234 - val_accuracy: 0.8519
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3145 - accuracy: 0.8517 -
val_loss: 0.3231 - val_accuracy: 0.8539
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3135 - accuracy: 0.8495 -
val_loss: 0.3238 - val_accuracy: 0.8524
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3203 - accuracy: 0.8505 -
val_loss: 0.3242 - val_accuracy: 0.8501
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3076 - accuracy: 0.8598 -
val_loss: 0.3339 - val_accuracy: 0.8385
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2989 - accuracy: 0.8623 -
val_loss: 0.3226 - val_accuracy: 0.8503
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2996 - accuracy: 0.8613 -
val_loss: 0.3239 - val_accuracy: 0.8507
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3006 - accuracy: 0.8560 -
val_loss: 0.3238 - val_accuracy: 0.8508
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2985 - accuracy: 0.8605 -
val_loss: 0.3360 - val_accuracy: 0.8418
Epoch 13/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2977 - accuracy: 0.8643 -
val_loss: 0.3261 - val_accuracy: 0.8497
Epoch 14/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2880 - accuracy: 0.8662 -
val_loss: 0.3319 - val_accuracy: 0.8509
300/300 [=====] - 0s 929us/step - loss: 0.3311 - accuracy: 0.8393
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4213 - accuracy: 0.8001 -
val_loss: 0.3413 - val_accuracy: 0.8414
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3397 - accuracy: 0.8352 -
val_loss: 0.3333 - val_accuracy: 0.8476
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3249 - accuracy: 0.8491 -
val_loss: 0.3259 - val_accuracy: 0.8480
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3237 - accuracy: 0.8437 -
val_loss: 0.3235 - val_accuracy: 0.8493
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3130 - accuracy: 0.8496 -
val_loss: 0.3278 - val_accuracy: 0.8493
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3095 - accuracy: 0.8547 -
val_loss: 0.3318 - val_accuracy: 0.8481
Epoch 7/100
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2700/2700 [=====] - 5s 2ms/step - loss: 0.3007 - accuracy: 0.8604 -  
  val_loss: 0.3357 - val_accuracy: 0.8442  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3099 - accuracy: 0.8511 -  
  val_loss: 0.3233 - val_accuracy: 0.8544  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3070 - accuracy: 0.8520 -  
  val_loss: 0.3236 - val_accuracy: 0.8512  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2969 - accuracy: 0.8614 -  
  val_loss: 0.3289 - val_accuracy: 0.8497  
Epoch 11/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.2972 - accuracy: 0.8550 -  
  val_loss: 0.3312 - val_accuracy: 0.8470  
Epoch 12/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2918 - accuracy: 0.8621 -  
  val_loss: 0.3293 - val_accuracy: 0.8507  
Epoch 13/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2947 - accuracy: 0.8601 -  
  val_loss: 0.3296 - val_accuracy: 0.8521  
300/300 [=====] - 0s 929us/step - loss: 0.3303 - accuracy: 0.8513  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4276 - accuracy: 0.7977 -  
  val_loss: 0.3497 - val_accuracy: 0.8331  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3399 - accuracy: 0.8399 -  
  val_loss: 0.3216 - val_accuracy: 0.8551  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3231 - accuracy: 0.8480 -  
  val_loss: 0.3271 - val_accuracy: 0.8525  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3133 - accuracy: 0.8488 -  
  val_loss: 0.3384 - val_accuracy: 0.8369  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3106 - accuracy: 0.8524 -  
  val_loss: 0.3253 - val_accuracy: 0.8508  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3131 - accuracy: 0.8541 -  
  val_loss: 0.3391 - val_accuracy: 0.8410  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3132 - accuracy: 0.8502 -  
  val_loss: 0.3261 - val_accuracy: 0.8535  
300/300 [=====] - 0s 823us/step - loss: 0.3392 - accuracy: 0.8393  
Epoch 1/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.4298 - accuracy: 0.8003 -  
  val_loss: 0.3510 - val_accuracy: 0.8408  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3428 - accuracy: 0.8389 -  
  val_loss: 0.3294 - val_accuracy: 0.8507  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3241 - accuracy: 0.8475 -  
  val_loss: 0.3245 - val_accuracy: 0.8517  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3251 - accuracy: 0.8420 -  
  val_loss: 0.3290 - val_accuracy: 0.8494  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3248 - accuracy: 0.8441 -  
  val_loss: 0.3296 - val_accuracy: 0.8472  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3202 - accuracy: 0.8462 -  
  val_loss: 0.3249 - val_accuracy: 0.8530  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3109 - accuracy: 0.8532 -  
  val_loss: 0.3311 - val_accuracy: 0.8492  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3080 - accuracy: 0.8581 -  
  val_loss: 0.3228 - val_accuracy: 0.8523  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3020 - accuracy: 0.8571 -  
  val_loss: 0.3324 - val_accuracy: 0.8515  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2959 - accuracy: 0.8613 -
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val_loss: 0.3263 - val_accuracy: 0.8520
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2901 - accuracy: 0.8603 -
val_loss: 0.3305 - val_accuracy: 0.8487
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2960 - accuracy: 0.8625 -
val_loss: 0.3338 - val_accuracy: 0.8460
Epoch 13/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2838 - accuracy: 0.8670 -
val_loss: 0.3344 - val_accuracy: 0.8502
300/300 [=====] - 0s 957us/step - loss: 0.3377 - accuracy: 0.8467
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4259 - accuracy: 0.8016 -
val_loss: 0.3425 - val_accuracy: 0.8421
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3495 - accuracy: 0.8329 -
val_loss: 0.3497 - val_accuracy: 0.8446
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3305 - accuracy: 0.8459 -
val_loss: 0.3248 - val_accuracy: 0.8511
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3179 - accuracy: 0.8473 -
val_loss: 0.3279 - val_accuracy: 0.8525
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3220 - accuracy: 0.8474 -
val_loss: 0.3227 - val_accuracy: 0.8515
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3203 - accuracy: 0.8505 -
val_loss: 0.3240 - val_accuracy: 0.8520
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3050 - accuracy: 0.8567 -
val_loss: 0.3235 - val_accuracy: 0.8514
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3136 - accuracy: 0.8552 -
val_loss: 0.3332 - val_accuracy: 0.8513
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3069 - accuracy: 0.8541 -
val_loss: 0.3270 - val_accuracy: 0.8535
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2981 - accuracy: 0.8614 -
val_loss: 0.3311 - val_accuracy: 0.8511
300/300 [=====] - 0s 925us/step - loss: 0.3264 - accuracy: 0.8473
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4188 - accuracy: 0.8088 -
val_loss: 0.3466 - val_accuracy: 0.8425
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3359 - accuracy: 0.8378 -
val_loss: 0.3255 - val_accuracy: 0.8507
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3162 - accuracy: 0.8508 -
val_loss: 0.3298 - val_accuracy: 0.8525
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3190 - accuracy: 0.8489 -
val_loss: 0.3247 - val_accuracy: 0.8501
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3146 - accuracy: 0.8521 -
val_loss: 0.3260 - val_accuracy: 0.8492
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3077 - accuracy: 0.8533 -
val_loss: 0.3219 - val_accuracy: 0.8522
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3108 - accuracy: 0.8561 -
val_loss: 0.3343 - val_accuracy: 0.8463
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3048 - accuracy: 0.8532 -
val_loss: 0.3303 - val_accuracy: 0.8511
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2928 - accuracy: 0.8628 -
val_loss: 0.3284 - val_accuracy: 0.8508
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3022 - accuracy: 0.8554 -
val_loss: 0.3318 - val_accuracy: 0.8473
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Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2914 - accuracy: 0.8655 -
val_loss: 0.3273 - val_accuracy: 0.8509
300/300 [=====] - 0s 918us/step - loss: 0.3280 - accuracy: 0.8440
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4311 - accuracy: 0.7961 -
val_loss: 0.3422 - val_accuracy: 0.8425
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3416 - accuracy: 0.8367 -
val_loss: 0.3353 - val_accuracy: 0.8470
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3242 - accuracy: 0.8504 -
val_loss: 0.3313 - val_accuracy: 0.8448
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3105 - accuracy: 0.8580 -
val_loss: 0.3253 - val_accuracy: 0.8527
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3148 - accuracy: 0.8526 -
val_loss: 0.3219 - val_accuracy: 0.8539
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3123 - accuracy: 0.8558 -
val_loss: 0.3303 - val_accuracy: 0.8454
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3069 - accuracy: 0.8541 -
val_loss: 0.3264 - val_accuracy: 0.8488
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2982 - accuracy: 0.8647 -
val_loss: 0.3283 - val_accuracy: 0.8490
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3053 - accuracy: 0.8547 -
val_loss: 0.3255 - val_accuracy: 0.8491
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2966 - accuracy: 0.8609 -
val_loss: 0.3258 - val_accuracy: 0.8500
300/300 [=====] - 0s 867us/step - loss: 0.3145 - accuracy: 0.8547
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4319 - accuracy: 0.7970 -
val_loss: 0.3421 - val_accuracy: 0.8415
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3375 - accuracy: 0.8428 -
val_loss: 0.3299 - val_accuracy: 0.8464
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3218 - accuracy: 0.8456 -
val_loss: 0.3447 - val_accuracy: 0.8401
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3179 - accuracy: 0.8511 -
val_loss: 0.3215 - val_accuracy: 0.8538
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3177 - accuracy: 0.8473 -
val_loss: 0.3255 - val_accuracy: 0.8513
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3077 - accuracy: 0.8560 -
val_loss: 0.3280 - val_accuracy: 0.8490
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3037 - accuracy: 0.8534 -
val_loss: 0.3246 - val_accuracy: 0.8507
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3116 - accuracy: 0.8517 -
val_loss: 0.3232 - val_accuracy: 0.8512
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3093 - accuracy: 0.8528 -
val_loss: 0.3424 - val_accuracy: 0.8339
300/300 [=====] - 0s 976us/step - loss: 0.3399 - accuracy: 0.8293
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4238 - accuracy: 0.8010 -
val_loss: 0.3457 - val_accuracy: 0.8430
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3409 - accuracy: 0.8382 -
val_loss: 0.3378 - val_accuracy: 0.8403
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3200 - accuracy: 0.8469 -
val_loss: 0.3251 - val_accuracy: 0.8505

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Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3154 - accuracy: 0.8527 -
val_loss: 0.3258 - val_accuracy: 0.8508
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3201 - accuracy: 0.8516 -
val_loss: 0.3304 - val_accuracy: 0.8408
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3149 - accuracy: 0.8494 -
val_loss: 0.3231 - val_accuracy: 0.8533
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3132 - accuracy: 0.8519 -
val_loss: 0.3313 - val_accuracy: 0.8456
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3090 - accuracy: 0.8527 -
val_loss: 0.3243 - val_accuracy: 0.8542
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3023 - accuracy: 0.8601 -
val_loss: 0.3341 - val_accuracy: 0.8501
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3052 - accuracy: 0.8545 -
val_loss: 0.3267 - val_accuracy: 0.8483
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3033 - accuracy: 0.8599 -
val_loss: 0.3296 - val_accuracy: 0.8531
300/300 [=====] - 0s 910us/step - loss: 0.3233 - accuracy: 0.8627
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4271 - accuracy: 0.8037 -
val_loss: 0.3634 - val_accuracy: 0.8226
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3367 - accuracy: 0.8387 -
val_loss: 0.3270 - val_accuracy: 0.8504
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3321 - accuracy: 0.8396 -
val_loss: 0.3367 - val_accuracy: 0.8379
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3280 - accuracy: 0.8417 -
val_loss: 0.3248 - val_accuracy: 0.8498
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3061 - accuracy: 0.8563 -
val_loss: 0.3343 - val_accuracy: 0.8442
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3133 - accuracy: 0.8528 -
val_loss: 0.3234 - val_accuracy: 0.8515
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3121 - accuracy: 0.8517 -
val_loss: 0.3250 - val_accuracy: 0.8498
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3005 - accuracy: 0.8579 -
val_loss: 0.3388 - val_accuracy: 0.8466
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3064 - accuracy: 0.8553 -
val_loss: 0.3243 - val_accuracy: 0.8492
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2989 - accuracy: 0.8580 -
val_loss: 0.3274 - val_accuracy: 0.8494
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2911 - accuracy: 0.8619 -
val_loss: 0.3302 - val_accuracy: 0.8454
300/300 [=====] - 0s 860us/step - loss: 0.3176 - accuracy: 0.8527
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4285 - accuracy: 0.7953 -
val_loss: 0.3422 - val_accuracy: 0.8394
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3362 - accuracy: 0.8425 -
val_loss: 0.3252 - val_accuracy: 0.8524
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3330 - accuracy: 0.8427 -
val_loss: 0.3234 - val_accuracy: 0.8539
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3123 - accuracy: 0.8534 -
val_loss: 0.3223 - val_accuracy: 0.8535
Epoch 5/100
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2700/2700 [=====] - 5s 2ms/step - loss: 0.3168 - accuracy: 0.8506 -  
  val_loss: 0.3255 - val_accuracy: 0.8493  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3137 - accuracy: 0.8500 -  
  val_loss: 0.3412 - val_accuracy: 0.8364  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3143 - accuracy: 0.8499 -  
  val_loss: 0.3244 - val_accuracy: 0.8532  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3041 - accuracy: 0.8580 -  
  val_loss: 0.3278 - val_accuracy: 0.8486  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3061 - accuracy: 0.8550 -  
  val_loss: 0.3218 - val_accuracy: 0.8534  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2969 - accuracy: 0.8614 -  
  val_loss: 0.3318 - val_accuracy: 0.8473  
Epoch 11/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3007 - accuracy: 0.8581 -  
  val_loss: 0.3348 - val_accuracy: 0.8447  
Epoch 12/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3036 - accuracy: 0.8579 -  
  val_loss: 0.3270 - val_accuracy: 0.8526  
Epoch 13/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2893 - accuracy: 0.8630 -  
  val_loss: 0.3275 - val_accuracy: 0.8526  
Epoch 14/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2851 - accuracy: 0.8656 -  
  val_loss: 0.3279 - val_accuracy: 0.8500  
300/300 [=====] - 0s 957us/step - loss: 0.3228 - accuracy: 0.8460  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4301 - accuracy: 0.7897 -  
  val_loss: 0.3441 - val_accuracy: 0.8413  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3351 - accuracy: 0.8416 -  
  val_loss: 0.3262 - val_accuracy: 0.8539  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3291 - accuracy: 0.8439 -  
  val_loss: 0.3378 - val_accuracy: 0.8441  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3171 - accuracy: 0.8488 -  
  val_loss: 0.3225 - val_accuracy: 0.8526  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3163 - accuracy: 0.8490 -  
  val_loss: 0.3221 - val_accuracy: 0.8545  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3130 - accuracy: 0.8470 -  
  val_loss: 0.3243 - val_accuracy: 0.8539  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3060 - accuracy: 0.8562 -  
  val_loss: 0.3349 - val_accuracy: 0.8392  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3078 - accuracy: 0.8554 -  
  val_loss: 0.3239 - val_accuracy: 0.8525  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3063 - accuracy: 0.8557 -  
  val_loss: 0.3276 - val_accuracy: 0.8516  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3033 - accuracy: 0.8555 -  
  val_loss: 0.3232 - val_accuracy: 0.8525  
300/300 [=====] - 0s 913us/step - loss: 0.3237 - accuracy: 0.8593  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4200 - accuracy: 0.8078 -  
  val_loss: 0.3447 - val_accuracy: 0.8430  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3351 - accuracy: 0.8404 -  
  val_loss: 0.3313 - val_accuracy: 0.8501  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3297 - accuracy: 0.8434 -  
  val_loss: 0.3314 - val_accuracy: 0.8499  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3182 - accuracy: 0.8510 -
```

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val_loss: 0.3256 - val_accuracy: 0.8486
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3109 - accuracy: 0.8574 -
val_loss: 0.3268 - val_accuracy: 0.8502
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3095 - accuracy: 0.8571 -
val_loss: 0.3391 - val_accuracy: 0.8366
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3089 - accuracy: 0.8553 -
val_loss: 0.3259 - val_accuracy: 0.8509
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3074 - accuracy: 0.8598 -
val_loss: 0.3539 - val_accuracy: 0.8405
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2998 - accuracy: 0.8596 -
val_loss: 0.3301 - val_accuracy: 0.8487
300/300 [=====] - 0s 925us/step - loss: 0.3416 - accuracy: 0.8420
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4322 - accuracy: 0.7931 -
val_loss: 0.3570 - val_accuracy: 0.8348
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3444 - accuracy: 0.8365 -
val_loss: 0.3281 - val_accuracy: 0.8507
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3314 - accuracy: 0.8438 -
val_loss: 0.3324 - val_accuracy: 0.8450
Epoch 4/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3168 - accuracy: 0.8477 -
val_loss: 0.3234 - val_accuracy: 0.8540
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3176 - accuracy: 0.8492 -
val_loss: 0.3255 - val_accuracy: 0.8505
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3141 - accuracy: 0.8504 -
val_loss: 0.3288 - val_accuracy: 0.8507
Epoch 7/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3063 - accuracy: 0.8575 -
val_loss: 0.3264 - val_accuracy: 0.8523
Epoch 8/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3061 - accuracy: 0.8550 -
val_loss: 0.3239 - val_accuracy: 0.8534
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2986 - accuracy: 0.8616 -
val_loss: 0.3253 - val_accuracy: 0.8510
300/300 [=====] - 0s 966us/step - loss: 0.3225 - accuracy: 0.8580
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4266 - accuracy: 0.8013 -
val_loss: 0.3475 - val_accuracy: 0.8364
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3459 - accuracy: 0.8365 -
val_loss: 0.3421 - val_accuracy: 0.8363
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3294 - accuracy: 0.8434 -
val_loss: 0.3212 - val_accuracy: 0.8561
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3226 - accuracy: 0.8499 -
val_loss: 0.3238 - val_accuracy: 0.8517
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3130 - accuracy: 0.8534 -
val_loss: 0.3230 - val_accuracy: 0.8545
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3043 - accuracy: 0.8575 -
val_loss: 0.3262 - val_accuracy: 0.8476
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3148 - accuracy: 0.8517 -
val_loss: 0.3239 - val_accuracy: 0.8550
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3070 - accuracy: 0.8536 -
val_loss: 0.3245 - val_accuracy: 0.8541
300/300 [=====] - 0s 937us/step - loss: 0.3267 - accuracy: 0.8493
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4325 - accuracy: 0.7973 -
```

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val_loss: 0.3500 - val_accuracy: 0.8368
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3361 - accuracy: 0.8434 -
val_loss: 0.3304 - val_accuracy: 0.8487
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3223 - accuracy: 0.8449 -
val_loss: 0.3236 - val_accuracy: 0.8539
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3259 - accuracy: 0.8496 -
val_loss: 0.3245 - val_accuracy: 0.8523
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3125 - accuracy: 0.8544 -
val_loss: 0.3232 - val_accuracy: 0.8526
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3067 - accuracy: 0.8571 -
val_loss: 0.3285 - val_accuracy: 0.8479
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3088 - accuracy: 0.8528 -
val_loss: 0.3222 - val_accuracy: 0.8531
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3014 - accuracy: 0.8603 -
val_loss: 0.3300 - val_accuracy: 0.8473
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2983 - accuracy: 0.8602 -
val_loss: 0.3270 - val_accuracy: 0.8515
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3036 - accuracy: 0.8569 -
val_loss: 0.3278 - val_accuracy: 0.8508
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2976 - accuracy: 0.8591 -
val_loss: 0.3301 - val_accuracy: 0.8475
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3029 - accuracy: 0.8577 -
val_loss: 0.3279 - val_accuracy: 0.8508
300/300 [=====] - 0s 873us/step - loss: 0.3295 - accuracy: 0.8467
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4197 - accuracy: 0.8050 -
val_loss: 0.3413 - val_accuracy: 0.8425
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3391 - accuracy: 0.8354 -
val_loss: 0.3291 - val_accuracy: 0.8495
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3283 - accuracy: 0.8431 -
val_loss: 0.3256 - val_accuracy: 0.8502
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3223 - accuracy: 0.8470 -
val_loss: 0.3315 - val_accuracy: 0.8457
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3197 - accuracy: 0.8498 -
val_loss: 0.3279 - val_accuracy: 0.8509
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3119 - accuracy: 0.8565 -
val_loss: 0.3203 - val_accuracy: 0.8523
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3196 - accuracy: 0.8489 -
val_loss: 0.3255 - val_accuracy: 0.8493
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3063 - accuracy: 0.8579 -
val_loss: 0.3216 - val_accuracy: 0.8539
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2978 - accuracy: 0.8618 -
val_loss: 0.3248 - val_accuracy: 0.8539
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2974 - accuracy: 0.8615 -
val_loss: 0.3271 - val_accuracy: 0.8500
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2942 - accuracy: 0.8622 -
val_loss: 0.3234 - val_accuracy: 0.8530
300/300 [=====] - 0s 914us/step - loss: 0.3126 - accuracy: 0.8527
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4204 - accuracy: 0.8020 -
val_loss: 0.3455 - val_accuracy: 0.8443
```

Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3425 - accuracy: 0.8397 -
val_loss: 0.3263 - val_accuracy: 0.8513
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3259 - accuracy: 0.8466 -
val_loss: 0.3286 - val_accuracy: 0.8471
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3244 - accuracy: 0.8467 -
val_loss: 0.3222 - val_accuracy: 0.8520
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3137 - accuracy: 0.8548 -
val_loss: 0.3290 - val_accuracy: 0.8500
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3074 - accuracy: 0.8589 -
val_loss: 0.3218 - val_accuracy: 0.8519
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3083 - accuracy: 0.8543 -
val_loss: 0.3249 - val_accuracy: 0.8520
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3137 - accuracy: 0.8484 -
val_loss: 0.3247 - val_accuracy: 0.8521
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3015 - accuracy: 0.8623 -
val_loss: 0.3240 - val_accuracy: 0.8532
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2939 - accuracy: 0.8628 -
val_loss: 0.3245 - val_accuracy: 0.8545
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2909 - accuracy: 0.8641 -
val_loss: 0.3275 - val_accuracy: 0.8502
300/300 [=====] - 0s 969us/step - loss: 0.3263 - accuracy: 0.8420
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4067 - accuracy: 0.7987 -
val_loss: 0.3516 - val_accuracy: 0.8434
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3475 - accuracy: 0.8374 -
val_loss: 0.3317 - val_accuracy: 0.8505
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3338 - accuracy: 0.8408 -
val_loss: 0.3353 - val_accuracy: 0.8458
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3304 - accuracy: 0.8406 -
val_loss: 0.3386 - val_accuracy: 0.8462
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3182 - accuracy: 0.8542 -
val_loss: 0.3267 - val_accuracy: 0.8525
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3199 - accuracy: 0.8489 -
val_loss: 0.3366 - val_accuracy: 0.8460
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3200 - accuracy: 0.8470 -
val_loss: 0.3416 - val_accuracy: 0.8432
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3141 - accuracy: 0.8500 -
val_loss: 0.3397 - val_accuracy: 0.8428
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3131 - accuracy: 0.8508 -
val_loss: 0.3406 - val_accuracy: 0.8489
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3023 - accuracy: 0.8577 -
val_loss: 0.3461 - val_accuracy: 0.8391
300/300 [=====] - 0s 921us/step - loss: 0.3471 - accuracy: 0.8387
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4109 - accuracy: 0.7995 -
val_loss: 0.3522 - val_accuracy: 0.8395
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3457 - accuracy: 0.8374 -
val_loss: 0.3424 - val_accuracy: 0.8433
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3254 - accuracy: 0.8465 -
val_loss: 0.3344 - val_accuracy: 0.8450
Epoch 4/100


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2700/2700 [=====] - 5s 2ms/step - loss: 0.3229 - accuracy: 0.8429 -  
  val_loss: 0.3394 - val_accuracy: 0.8432  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3210 - accuracy: 0.8500 -  
  val_loss: 0.3304 - val_accuracy: 0.8514  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3210 - accuracy: 0.8515 -  
  val_loss: 0.3355 - val_accuracy: 0.8456  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3165 - accuracy: 0.8494 -  
  val_loss: 0.3363 - val_accuracy: 0.8442  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3136 - accuracy: 0.8521 -  
  val_loss: 0.3320 - val_accuracy: 0.8531  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3061 - accuracy: 0.8554 -  
  val_loss: 0.3361 - val_accuracy: 0.8468  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3066 - accuracy: 0.8559 -  
  val_loss: 0.3338 - val_accuracy: 0.8551  
300/300 [=====] - 0s 1ms/step - loss: 0.3279 - accuracy: 0.8580  
Epoch 1/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.4090 - accuracy: 0.7973 -  
  val_loss: 0.3452 - val_accuracy: 0.8455  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3423 - accuracy: 0.8412 -  
  val_loss: 0.3375 - val_accuracy: 0.8510  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3368 - accuracy: 0.8458 -  
  val_loss: 0.3315 - val_accuracy: 0.8457  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3286 - accuracy: 0.8520 -  
  val_loss: 0.3300 - val_accuracy: 0.8508  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3275 - accuracy: 0.8448 -  
  val_loss: 0.3328 - val_accuracy: 0.8511  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3272 - accuracy: 0.8469 -  
  val_loss: 0.3287 - val_accuracy: 0.8498  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3179 - accuracy: 0.8483 -  
  val_loss: 0.3295 - val_accuracy: 0.8495  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3140 - accuracy: 0.8553 -  
  val_loss: 0.3415 - val_accuracy: 0.8440  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3204 - accuracy: 0.8515 -  
  val_loss: 0.3320 - val_accuracy: 0.8493  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3109 - accuracy: 0.8532 -  
  val_loss: 0.3523 - val_accuracy: 0.8461  
Epoch 11/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3047 - accuracy: 0.8568 -  
  val_loss: 0.3399 - val_accuracy: 0.8453  
300/300 [=====] - 0s 905us/step - loss: 0.3228 - accuracy: 0.8493  
Epoch 1/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.4022 - accuracy: 0.8055 -  
  val_loss: 0.3438 - val_accuracy: 0.8445  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3456 - accuracy: 0.8376 -  
  val_loss: 0.3542 - val_accuracy: 0.8368  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3380 - accuracy: 0.8356 -  
  val_loss: 0.3297 - val_accuracy: 0.8528  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3273 - accuracy: 0.8427 -  
  val_loss: 0.3334 - val_accuracy: 0.8518  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3233 - accuracy: 0.8445 -  
  val_loss: 0.3386 - val_accuracy: 0.8467  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3124 - accuracy: 0.8527 -
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val_loss: 0.3343 - val_accuracy: 0.8481
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3113 - accuracy: 0.8496 -
val_loss: 0.3290 - val_accuracy: 0.8526
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3123 - accuracy: 0.8540 -
val_loss: 0.3396 - val_accuracy: 0.8496
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3160 - accuracy: 0.8483 -
val_loss: 0.3362 - val_accuracy: 0.8511
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3154 - accuracy: 0.8518 -
val_loss: 0.3338 - val_accuracy: 0.8488
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3069 - accuracy: 0.8581 -
val_loss: 0.3347 - val_accuracy: 0.8478
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3034 - accuracy: 0.8533 -
val_loss: 0.3388 - val_accuracy: 0.8428
300/300 [=====] - 0s 898us/step - loss: 0.3444 - accuracy: 0.8520
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4127 - accuracy: 0.7932 -
val_loss: 0.3380 - val_accuracy: 0.8414
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3406 - accuracy: 0.8411 -
val_loss: 0.3646 - val_accuracy: 0.8099
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3281 - accuracy: 0.8447 -
val_loss: 0.3430 - val_accuracy: 0.8374
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3235 - accuracy: 0.8472 -
val_loss: 0.3319 - val_accuracy: 0.8458
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3222 - accuracy: 0.8468 -
val_loss: 0.3255 - val_accuracy: 0.8508
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3179 - accuracy: 0.8480 -
val_loss: 0.3385 - val_accuracy: 0.8520
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3105 - accuracy: 0.8535 -
val_loss: 0.3302 - val_accuracy: 0.8515
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3145 - accuracy: 0.8516 -
val_loss: 0.3325 - val_accuracy: 0.8542
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3045 - accuracy: 0.8575 -
val_loss: 0.3537 - val_accuracy: 0.8450
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3173 - accuracy: 0.8501 -
val_loss: 0.3539 - val_accuracy: 0.8492
300/300 [=====] - 0s 915us/step - loss: 0.3735 - accuracy: 0.8447
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4214 - accuracy: 0.7855 -
val_loss: 0.3416 - val_accuracy: 0.8434
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3418 - accuracy: 0.8351 -
val_loss: 0.3474 - val_accuracy: 0.8372
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3300 - accuracy: 0.8497 -
val_loss: 0.3370 - val_accuracy: 0.8472
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3225 - accuracy: 0.8455 -
val_loss: 0.3353 - val_accuracy: 0.8501
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3215 - accuracy: 0.8537 -
val_loss: 0.3276 - val_accuracy: 0.8509
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3189 - accuracy: 0.8459 -
val_loss: 0.3339 - val_accuracy: 0.8484
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3195 - accuracy: 0.8491 -
val_loss: 0.3505 - val_accuracy: 0.8436
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Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3065 - accuracy: 0.8508 -
val_loss: 0.3459 - val_accuracy: 0.8472
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3033 - accuracy: 0.8599 -
val_loss: 0.3384 - val_accuracy: 0.8503
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3023 - accuracy: 0.8567 -
val_loss: 0.3557 - val_accuracy: 0.8406
300/300 [=====] - 0s 868us/step - loss: 0.3578 - accuracy: 0.8453
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4055 - accuracy: 0.8047 -
val_loss: 0.3552 - val_accuracy: 0.8224
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3420 - accuracy: 0.8372 -
val_loss: 0.3453 - val_accuracy: 0.8489
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3296 - accuracy: 0.8470 -
val_loss: 0.4158 - val_accuracy: 0.8448
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3341 - accuracy: 0.8433 -
val_loss: 0.3310 - val_accuracy: 0.8458
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3218 - accuracy: 0.8484 -
val_loss: 0.3332 - val_accuracy: 0.8504
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3190 - accuracy: 0.8494 -
val_loss: 0.3415 - val_accuracy: 0.8471
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3141 - accuracy: 0.8537 -
val_loss: 0.3315 - val_accuracy: 0.8496
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3087 - accuracy: 0.8552 -
val_loss: 0.3287 - val_accuracy: 0.8519
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3077 - accuracy: 0.8534 -
val_loss: 0.3368 - val_accuracy: 0.8523
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3052 - accuracy: 0.8580 -
val_loss: 0.3372 - val_accuracy: 0.8490
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3002 - accuracy: 0.8559 -
val_loss: 0.3529 - val_accuracy: 0.8502
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3069 - accuracy: 0.8555 -
val_loss: 0.3497 - val_accuracy: 0.8491
Epoch 13/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3054 - accuracy: 0.8597 -
val_loss: 0.3418 - val_accuracy: 0.8507
300/300 [=====] - 0s 949us/step - loss: 0.3423 - accuracy: 0.8527
Epoch 1/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.4011 - accuracy: 0.8112 -
val_loss: 0.3467 - val_accuracy: 0.8376
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3391 - accuracy: 0.8413 -
val_loss: 0.3523 - val_accuracy: 0.8453
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3326 - accuracy: 0.8464 -
val_loss: 0.3465 - val_accuracy: 0.8357
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3254 - accuracy: 0.8450 -
val_loss: 0.3220 - val_accuracy: 0.8540
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3243 - accuracy: 0.8441 -
val_loss: 0.3420 - val_accuracy: 0.8489
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3171 - accuracy: 0.8508 -
val_loss: 0.3310 - val_accuracy: 0.8466
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3064 - accuracy: 0.8591 -
val_loss: 0.3443 - val_accuracy: 0.8444
Epoch 8/100
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2700/2700 [=====] - 5s 2ms/step - loss: 0.3151 - accuracy: 0.8535 -  
  val_loss: 0.3402 - val_accuracy: 0.8456  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3112 - accuracy: 0.8566 -  
  val_loss: 0.3450 - val_accuracy: 0.8464  
300/300 [=====] - 0s 875us/step - loss: 0.3367 - accuracy: 0.8420  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4171 - accuracy: 0.7932 -  
  val_loss: 0.3525 - val_accuracy: 0.8342  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3536 - accuracy: 0.8316 -  
  val_loss: 0.3324 - val_accuracy: 0.8491  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3409 - accuracy: 0.8364 -  
  val_loss: 0.3508 - val_accuracy: 0.8124  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3319 - accuracy: 0.8433 -  
  val_loss: 0.3287 - val_accuracy: 0.8393  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3313 - accuracy: 0.8367 -  
  val_loss: 0.3406 - val_accuracy: 0.8456  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3148 - accuracy: 0.8557 -  
  val_loss: 0.3387 - val_accuracy: 0.8447  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3216 - accuracy: 0.8491 -  
  val_loss: 0.3322 - val_accuracy: 0.8541  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3218 - accuracy: 0.8494 -  
  val_loss: 0.3335 - val_accuracy: 0.8453  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3078 - accuracy: 0.8546 -  
  val_loss: 0.3299 - val_accuracy: 0.8529  
300/300 [=====] - 0s 892us/step - loss: 0.3179 - accuracy: 0.8507  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4003 - accuracy: 0.8059 -  
  val_loss: 0.3615 - val_accuracy: 0.8405  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3489 - accuracy: 0.8366 -  
  val_loss: 0.3328 - val_accuracy: 0.8489  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3383 - accuracy: 0.8432 -  
  val_loss: 0.3329 - val_accuracy: 0.8487  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3272 - accuracy: 0.8428 -  
  val_loss: 0.3313 - val_accuracy: 0.8477  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3164 - accuracy: 0.8541 -  
  val_loss: 0.3349 - val_accuracy: 0.8510  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3161 - accuracy: 0.8527 -  
  val_loss: 0.3357 - val_accuracy: 0.8440  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3079 - accuracy: 0.8552 -  
  val_loss: 0.3315 - val_accuracy: 0.8499  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3084 - accuracy: 0.8591 -  
  val_loss: 0.3354 - val_accuracy: 0.8442  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3155 - accuracy: 0.8521 -  
  val_loss: 0.3850 - val_accuracy: 0.8352  
300/300 [=====] - 0s 926us/step - loss: 0.3859 - accuracy: 0.8300  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4112 - accuracy: 0.7942 -  
  val_loss: 0.3445 - val_accuracy: 0.8413  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3547 - accuracy: 0.8295 -  
  val_loss: 0.3294 - val_accuracy: 0.8470  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3254 - accuracy: 0.8449 -  
  val_loss: 0.3297 - val_accuracy: 0.8490  
Epoch 4/100
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2700/2700 [=====] - 5s 2ms/step - loss: 0.3286 - accuracy: 0.8495 -  
  val_loss: 0.3320 - val_accuracy: 0.8446  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3221 - accuracy: 0.8451 -  
  val_loss: 0.3252 - val_accuracy: 0.8508  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3074 - accuracy: 0.8590 -  
  val_loss: 0.3307 - val_accuracy: 0.8492  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3103 - accuracy: 0.8528 -  
  val_loss: 0.3401 - val_accuracy: 0.8489  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3044 - accuracy: 0.8559 -  
  val_loss: 0.3334 - val_accuracy: 0.8469  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3133 - accuracy: 0.8541 -  
  val_loss: 0.3391 - val_accuracy: 0.8464  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3034 - accuracy: 0.8596 -  
  val_loss: 0.3623 - val_accuracy: 0.8498  
300/300 [=====] - 0s 943us/step - loss: 0.3517 - accuracy: 0.8480  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4052 - accuracy: 0.7976 -  
  val_loss: 0.3604 - val_accuracy: 0.8309  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3532 - accuracy: 0.8374 -  
  val_loss: 0.3474 - val_accuracy: 0.8406  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3395 - accuracy: 0.8376 -  
  val_loss: 0.3411 - val_accuracy: 0.8438  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3302 - accuracy: 0.8397 -  
  val_loss: 0.3409 - val_accuracy: 0.8384  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3228 - accuracy: 0.8445 -  
  val_loss: 0.3334 - val_accuracy: 0.8444  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3146 - accuracy: 0.8531 -  
  val_loss: 0.3400 - val_accuracy: 0.8487  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3166 - accuracy: 0.8470 -  
  val_loss: 0.3439 - val_accuracy: 0.8317  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3193 - accuracy: 0.8485 -  
  val_loss: 0.3428 - val_accuracy: 0.8371  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3139 - accuracy: 0.8458 -  
  val_loss: 0.3417 - val_accuracy: 0.8423  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.2999 - accuracy: 0.8588 -  
  val_loss: 0.3498 - val_accuracy: 0.8476  
300/300 [=====] - 0s 943us/step - loss: 0.3347 - accuracy: 0.8533  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4139 - accuracy: 0.7941 -  
  val_loss: 0.3518 - val_accuracy: 0.8351  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3470 - accuracy: 0.8346 -  
  val_loss: 0.3488 - val_accuracy: 0.8442  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3348 - accuracy: 0.8487 -  
  val_loss: 0.3779 - val_accuracy: 0.8155  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3358 - accuracy: 0.8356 -  
  val_loss: 0.3450 - val_accuracy: 0.8450  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3240 - accuracy: 0.8485 -  
  val_loss: 0.3524 - val_accuracy: 0.8356  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3137 - accuracy: 0.8518 -  
  val_loss: 0.3474 - val_accuracy: 0.8338  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3086 - accuracy: 0.8553 -
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val_loss: 0.3387 - val_accuracy: 0.8515
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3024 - accuracy: 0.8597 -
val_loss: 0.3601 - val_accuracy: 0.8284
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3162 - accuracy: 0.8471 -
val_loss: 0.3438 - val_accuracy: 0.8440
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3019 - accuracy: 0.8565 -
val_loss: 0.3578 - val_accuracy: 0.8331
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3011 - accuracy: 0.8600 -
val_loss: 0.3571 - val_accuracy: 0.8355
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3080 - accuracy: 0.8559 -
val_loss: 0.3490 - val_accuracy: 0.8432
300/300 [=====] - 0s 901us/step - loss: 0.3467 - accuracy: 0.8320
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4072 - accuracy: 0.8013 -
val_loss: 0.3736 - val_accuracy: 0.8361
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3492 - accuracy: 0.8333 -
val_loss: 0.3386 - val_accuracy: 0.8450
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3354 - accuracy: 0.8450 -
val_loss: 0.3274 - val_accuracy: 0.8533
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3306 - accuracy: 0.8404 -
val_loss: 0.3280 - val_accuracy: 0.8501
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3207 - accuracy: 0.8514 -
val_loss: 0.3418 - val_accuracy: 0.8368
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3186 - accuracy: 0.8497 -
val_loss: 0.3263 - val_accuracy: 0.8523
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3153 - accuracy: 0.8541 -
val_loss: 0.3358 - val_accuracy: 0.8473
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3158 - accuracy: 0.8536 -
val_loss: 0.3369 - val_accuracy: 0.8498
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3049 - accuracy: 0.8567 -
val_loss: 0.3467 - val_accuracy: 0.8457
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3033 - accuracy: 0.8577 -
val_loss: 0.3592 - val_accuracy: 0.8309
Epoch 11/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.2996 - accuracy: 0.8589 -
val_loss: 0.3498 - val_accuracy: 0.8481
300/300 [=====] - 0s 960us/step - loss: 0.3630 - accuracy: 0.8513
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4132 - accuracy: 0.8014 -
val_loss: 0.3488 - val_accuracy: 0.8422
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3570 - accuracy: 0.8356 -
val_loss: 0.3398 - val_accuracy: 0.8374
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3239 - accuracy: 0.8496 -
val_loss: 0.3303 - val_accuracy: 0.8519
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3207 - accuracy: 0.8481 -
val_loss: 0.3315 - val_accuracy: 0.8506
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3182 - accuracy: 0.8499 -
val_loss: 0.3252 - val_accuracy: 0.8493
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3193 - accuracy: 0.8502 -
val_loss: 0.3304 - val_accuracy: 0.8485
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3092 - accuracy: 0.8576 -
val_loss: 0.3470 - val_accuracy: 0.8509
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Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3144 - accuracy: 0.8493 -
val_loss: 0.3353 - val_accuracy: 0.8458
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3025 - accuracy: 0.8543 -
val_loss: 0.3415 - val_accuracy: 0.8506
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3018 - accuracy: 0.8592 -
val_loss: 0.3330 - val_accuracy: 0.8460
300/300 [=====] - 0s 967us/step - loss: 0.3494 - accuracy: 0.8413
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4201 - accuracy: 0.7872 -
val_loss: 0.3425 - val_accuracy: 0.8447
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3430 - accuracy: 0.8382 -
val_loss: 0.3287 - val_accuracy: 0.8495
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3303 - accuracy: 0.8448 -
val_loss: 0.3258 - val_accuracy: 0.8546
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3253 - accuracy: 0.8470 -
val_loss: 0.3267 - val_accuracy: 0.8525
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3282 - accuracy: 0.8449 -
val_loss: 0.3300 - val_accuracy: 0.8496
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3245 - accuracy: 0.8490 -
val_loss: 0.3294 - val_accuracy: 0.8511
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3161 - accuracy: 0.8539 -
val_loss: 0.3381 - val_accuracy: 0.8466
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3162 - accuracy: 0.8507 -
val_loss: 0.3386 - val_accuracy: 0.8460
300/300 [=====] - 0s 960us/step - loss: 0.3360 - accuracy: 0.8473
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4168 - accuracy: 0.7916 -
val_loss: 0.3583 - val_accuracy: 0.8270
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3432 - accuracy: 0.8371 -
val_loss: 0.3515 - val_accuracy: 0.8283
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3261 - accuracy: 0.8458 -
val_loss: 0.3357 - val_accuracy: 0.8496
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3356 - accuracy: 0.8438 -
val_loss: 0.3300 - val_accuracy: 0.8481
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3268 - accuracy: 0.8435 -
val_loss: 0.3489 - val_accuracy: 0.8495
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3217 - accuracy: 0.8507 -
val_loss: 0.3326 - val_accuracy: 0.8517
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3215 - accuracy: 0.8494 -
val_loss: 0.3414 - val_accuracy: 0.8466
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3050 - accuracy: 0.8562 -
val_loss: 0.3305 - val_accuracy: 0.8529
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3124 - accuracy: 0.8568 -
val_loss: 0.3346 - val_accuracy: 0.8517
300/300 [=====] - 0s 946us/step - loss: 0.3296 - accuracy: 0.8507
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4130 - accuracy: 0.7978 -
val_loss: 0.3580 - val_accuracy: 0.8294
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3518 - accuracy: 0.8332 -
val_loss: 0.3434 - val_accuracy: 0.8487
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3307 - accuracy: 0.8465 -
val_loss: 0.3352 - val_accuracy: 0.8482

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Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3256 - accuracy: 0.8470 -
val_loss: 0.3301 - val_accuracy: 0.8505
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3235 - accuracy: 0.8485 -
val_loss: 0.3403 - val_accuracy: 0.8472
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3231 - accuracy: 0.8487 -
val_loss: 0.3354 - val_accuracy: 0.8481
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3188 - accuracy: 0.8532 -
val_loss: 0.3341 - val_accuracy: 0.8502
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3101 - accuracy: 0.8559 -
val_loss: 0.3676 - val_accuracy: 0.8406
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3144 - accuracy: 0.8511 -
val_loss: 0.3578 - val_accuracy: 0.8475
300/300 [=====] - 0s 894us/step - loss: 0.3605 - accuracy: 0.8353
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4087 - accuracy: 0.7969 -
val_loss: 0.3463 - val_accuracy: 0.8409
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3433 - accuracy: 0.8388 -
val_loss: 0.3308 - val_accuracy: 0.8501
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3435 - accuracy: 0.8407 -
val_loss: 0.3341 - val_accuracy: 0.8494
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3242 - accuracy: 0.8491 -
val_loss: 0.3354 - val_accuracy: 0.8495
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3216 - accuracy: 0.8510 -
val_loss: 0.3290 - val_accuracy: 0.8487
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3178 - accuracy: 0.8522 -
val_loss: 0.3292 - val_accuracy: 0.8519
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3133 - accuracy: 0.8513 -
val_loss: 0.3264 - val_accuracy: 0.8519
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2969 - accuracy: 0.8566 -
val_loss: 0.3243 - val_accuracy: 0.8533
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3137 - accuracy: 0.8508 -
val_loss: 0.3355 - val_accuracy: 0.8470
Epoch 10/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3093 - accuracy: 0.8574 -
val_loss: 0.3323 - val_accuracy: 0.8524
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2992 - accuracy: 0.8621 -
val_loss: 0.3406 - val_accuracy: 0.8534
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3010 - accuracy: 0.8561 -
val_loss: 0.3489 - val_accuracy: 0.8423
Epoch 13/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3006 - accuracy: 0.8630 -
val_loss: 0.3435 - val_accuracy: 0.8504
300/300 [=====] - 0s 960us/step - loss: 0.3436 - accuracy: 0.8527
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4078 - accuracy: 0.7972 -
val_loss: 0.3449 - val_accuracy: 0.8455
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3365 - accuracy: 0.8428 -
val_loss: 0.3280 - val_accuracy: 0.8527
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3356 - accuracy: 0.8388 -
val_loss: 0.3320 - val_accuracy: 0.8478
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3245 - accuracy: 0.8495 -
val_loss: 0.3289 - val_accuracy: 0.8509
Epoch 5/100
```



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2700/2700 [=====] - 5s 2ms/step - loss: 0.3209 - accuracy: 0.8459 -  
  val_loss: 0.3524 - val_accuracy: 0.8176  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3176 - accuracy: 0.8512 -  
  val_loss: 0.3509 - val_accuracy: 0.8342  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3054 - accuracy: 0.8560 -  
  val_loss: 0.3361 - val_accuracy: 0.8486  
300/300 [=====] - 0s 941us/step - loss: 0.3362 - accuracy: 0.8447  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4199 - accuracy: 0.7943 -  
  val_loss: 0.3458 - val_accuracy: 0.8425  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3536 - accuracy: 0.8333 -  
  val_loss: 0.3393 - val_accuracy: 0.8432  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3383 - accuracy: 0.8424 -  
  val_loss: 0.3346 - val_accuracy: 0.8465  
Epoch 4/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3252 - accuracy: 0.8430 -  
  val_loss: 0.3270 - val_accuracy: 0.8491  
Epoch 5/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3153 - accuracy: 0.8483 -  
  val_loss: 0.3270 - val_accuracy: 0.8496  
Epoch 6/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3178 - accuracy: 0.8502 -  
  val_loss: 0.3340 - val_accuracy: 0.8522  
Epoch 7/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.3219 - accuracy: 0.8499 -  
  val_loss: 0.3352 - val_accuracy: 0.8459  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3197 - accuracy: 0.8471 -  
  val_loss: 0.3365 - val_accuracy: 0.8453  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3122 - accuracy: 0.8499 -  
  val_loss: 0.3682 - val_accuracy: 0.8491  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3121 - accuracy: 0.8565 -  
  val_loss: 0.3442 - val_accuracy: 0.8472  
300/300 [=====] - 0s 891us/step - loss: 0.3391 - accuracy: 0.8527  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4030 - accuracy: 0.8067 -  
  val_loss: 0.3419 - val_accuracy: 0.8430  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3484 - accuracy: 0.8411 -  
  val_loss: 0.3374 - val_accuracy: 0.8479  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3279 - accuracy: 0.8439 -  
  val_loss: 0.3271 - val_accuracy: 0.8545  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3292 - accuracy: 0.8401 -  
  val_loss: 0.3457 - val_accuracy: 0.8384  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3217 - accuracy: 0.8455 -  
  val_loss: 0.3308 - val_accuracy: 0.8477  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3149 - accuracy: 0.8543 -  
  val_loss: 0.3440 - val_accuracy: 0.8347  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3149 - accuracy: 0.8557 -  
  val_loss: 0.3353 - val_accuracy: 0.8482  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3153 - accuracy: 0.8531 -  
  val_loss: 0.3383 - val_accuracy: 0.8443  
300/300 [=====] - 0s 868us/step - loss: 0.3284 - accuracy: 0.8500  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4063 - accuracy: 0.8015 -  
  val_loss: 0.4207 - val_accuracy: 0.8247  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3443 - accuracy: 0.8405 -  
  val_loss: 0.3631 - val_accuracy: 0.8388  
Epoch 3/100
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2700/2700 [=====] - 5s 2ms/step - loss: 0.3413 - accuracy: 0.8406 -  
  val_loss: 0.3350 - val_accuracy: 0.8473  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3273 - accuracy: 0.8455 -  
  val_loss: 0.3314 - val_accuracy: 0.8508  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3293 - accuracy: 0.8474 -  
  val_loss: 0.3236 - val_accuracy: 0.8505  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3136 - accuracy: 0.8560 -  
  val_loss: 0.3315 - val_accuracy: 0.8510  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3102 - accuracy: 0.8546 -  
  val_loss: 0.3255 - val_accuracy: 0.8502  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3031 - accuracy: 0.8569 -  
  val_loss: 0.3440 - val_accuracy: 0.8516  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3075 - accuracy: 0.8579 -  
  val_loss: 0.3407 - val_accuracy: 0.8441  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3027 - accuracy: 0.8602 -  
  val_loss: 0.3387 - val_accuracy: 0.8485  
300/300 [=====] - 0s 932us/step - loss: 0.3324 - accuracy: 0.8440  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4094 - accuracy: 0.8012 -  
  val_loss: 0.3967 - val_accuracy: 0.8190  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3463 - accuracy: 0.8380 -  
  val_loss: 0.3286 - val_accuracy: 0.8528  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3306 - accuracy: 0.8465 -  
  val_loss: 0.3403 - val_accuracy: 0.8468  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3218 - accuracy: 0.8483 -  
  val_loss: 0.3305 - val_accuracy: 0.8460  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3236 - accuracy: 0.8509 -  
  val_loss: 0.3279 - val_accuracy: 0.8523  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3251 - accuracy: 0.8451 -  
  val_loss: 0.3483 - val_accuracy: 0.8359  
Epoch 7/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3094 - accuracy: 0.8512 -  
  val_loss: 0.3516 - val_accuracy: 0.8292  
Epoch 8/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3073 - accuracy: 0.8564 -  
  val_loss: 0.3342 - val_accuracy: 0.8514  
Epoch 9/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3086 - accuracy: 0.8551 -  
  val_loss: 0.3354 - val_accuracy: 0.8512  
Epoch 10/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3064 - accuracy: 0.8557 -  
  val_loss: 0.3424 - val_accuracy: 0.8511  
300/300 [=====] - 0s 920us/step - loss: 0.3692 - accuracy: 0.8413  
Epoch 1/100  
2700/2700 [=====] - 6s 2ms/step - loss: 0.4041 - accuracy: 0.8030 -  
  val_loss: 0.3435 - val_accuracy: 0.8442  
Epoch 2/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3468 - accuracy: 0.8383 -  
  val_loss: 0.3341 - val_accuracy: 0.8454  
Epoch 3/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3343 - accuracy: 0.8416 -  
  val_loss: 0.3295 - val_accuracy: 0.8523  
Epoch 4/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3225 - accuracy: 0.8465 -  
  val_loss: 0.3335 - val_accuracy: 0.8481  
Epoch 5/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3122 - accuracy: 0.8577 -  
  val_loss: 0.3517 - val_accuracy: 0.8413  
Epoch 6/100  
2700/2700 [=====] - 5s 2ms/step - loss: 0.3245 - accuracy: 0.8440 -
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val_loss: 0.3378 - val_accuracy: 0.8497
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3086 - accuracy: 0.8550 -
val_loss: 0.3460 - val_accuracy: 0.8442
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3102 - accuracy: 0.8561 -
val_loss: 0.3365 - val_accuracy: 0.8497
300/300 [=====] - 0s 935us/step - loss: 0.3501 - accuracy: 0.8360
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4098 - accuracy: 0.8061 -
val_loss: 0.3361 - val_accuracy: 0.8458
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3465 - accuracy: 0.8331 -
val_loss: 0.3335 - val_accuracy: 0.8463
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3268 - accuracy: 0.8465 -
val_loss: 0.3362 - val_accuracy: 0.8455
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3264 - accuracy: 0.8442 -
val_loss: 0.3268 - val_accuracy: 0.8502
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3210 - accuracy: 0.8547 -
val_loss: 0.3305 - val_accuracy: 0.8480
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3153 - accuracy: 0.8523 -
val_loss: 0.3304 - val_accuracy: 0.8483
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3099 - accuracy: 0.8546 -
val_loss: 0.3471 - val_accuracy: 0.8459
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3061 - accuracy: 0.8596 -
val_loss: 0.3443 - val_accuracy: 0.8466
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3060 - accuracy: 0.8597 -
val_loss: 0.3508 - val_accuracy: 0.8434
300/300 [=====] - 0s 910us/step - loss: 0.3518 - accuracy: 0.8527
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4034 - accuracy: 0.8034 -
val_loss: 0.3478 - val_accuracy: 0.8421
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3489 - accuracy: 0.8346 -
val_loss: 0.3338 - val_accuracy: 0.8438
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3277 - accuracy: 0.8453 -
val_loss: 0.3721 - val_accuracy: 0.8424
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3228 - accuracy: 0.8541 -
val_loss: 0.3303 - val_accuracy: 0.8511
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3226 - accuracy: 0.8499 -
val_loss: 0.3349 - val_accuracy: 0.8481
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3147 - accuracy: 0.8519 -
val_loss: 0.3578 - val_accuracy: 0.8441
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3081 - accuracy: 0.8531 -
val_loss: 0.3378 - val_accuracy: 0.8494
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3080 - accuracy: 0.8539 -
val_loss: 0.3404 - val_accuracy: 0.8523
Epoch 9/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3028 - accuracy: 0.8624 -
val_loss: 0.3599 - val_accuracy: 0.8344
300/300 [=====] - 0s 951us/step - loss: 0.3557 - accuracy: 0.8413
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4097 - accuracy: 0.8028 -
val_loss: 0.3445 - val_accuracy: 0.8459
Epoch 2/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3520 - accuracy: 0.8338 -
val_loss: 0.3334 - val_accuracy: 0.8460
Epoch 3/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.3314 - accuracy: 0.8430 -
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val_loss: 0.3321 - val_accuracy: 0.8527
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3220 - accuracy: 0.8522 -
val_loss: 0.3337 - val_accuracy: 0.8477
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3325 - accuracy: 0.8443 -
val_loss: 0.3348 - val_accuracy: 0.8494
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3131 - accuracy: 0.8545 -
val_loss: 0.3308 - val_accuracy: 0.8486
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3139 - accuracy: 0.8557 -
val_loss: 0.3293 - val_accuracy: 0.8505
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3136 - accuracy: 0.8536 -
val_loss: 0.3424 - val_accuracy: 0.8522
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3066 - accuracy: 0.8571 -
val_loss: 0.3363 - val_accuracy: 0.8465
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3060 - accuracy: 0.8580 -
val_loss: 0.3418 - val_accuracy: 0.8445
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2977 - accuracy: 0.8619 -
val_loss: 0.3473 - val_accuracy: 0.8450
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2970 - accuracy: 0.8623 -
val_loss: 0.3605 - val_accuracy: 0.8261
300/300 [=====] - 0s 923us/step - loss: 0.3545 - accuracy: 0.8273
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4103 - accuracy: 0.7983 -
val_loss: 0.3519 - val_accuracy: 0.8417
Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3541 - accuracy: 0.8367 -
val_loss: 0.3368 - val_accuracy: 0.8508
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3412 - accuracy: 0.8401 -
val_loss: 0.3341 - val_accuracy: 0.8491
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3333 - accuracy: 0.8475 -
val_loss: 0.3379 - val_accuracy: 0.8501
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3260 - accuracy: 0.8441 -
val_loss: 0.3346 - val_accuracy: 0.8484
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3167 - accuracy: 0.8505 -
val_loss: 0.3369 - val_accuracy: 0.8440
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3145 - accuracy: 0.8520 -
val_loss: 0.3348 - val_accuracy: 0.8476
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3162 - accuracy: 0.8534 -
val_loss: 0.3325 - val_accuracy: 0.8503
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3149 - accuracy: 0.8534 -
val_loss: 0.3571 - val_accuracy: 0.8480
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3076 - accuracy: 0.8622 -
val_loss: 0.3401 - val_accuracy: 0.8493
Epoch 11/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3066 - accuracy: 0.8569 -
val_loss: 0.3544 - val_accuracy: 0.8342
Epoch 12/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3012 - accuracy: 0.8531 -
val_loss: 0.3549 - val_accuracy: 0.8483
Epoch 13/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.2946 - accuracy: 0.8630 -
val_loss: 0.3655 - val_accuracy: 0.8504
300/300 [=====] - 0s 937us/step - loss: 0.3693 - accuracy: 0.8507
Epoch 1/100
2700/2700 [=====] - 6s 2ms/step - loss: 0.4028 - accuracy: 0.8063 -
val_loss: 0.3879 - val_accuracy: 0.8260
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Epoch 2/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3403 - accuracy: 0.8434 -
val_loss: 0.3370 - val_accuracy: 0.8501
Epoch 3/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3298 - accuracy: 0.8480 -
val_loss: 0.3292 - val_accuracy: 0.8513
Epoch 4/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3217 - accuracy: 0.8520 -
val_loss: 0.3332 - val_accuracy: 0.8490
Epoch 5/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3262 - accuracy: 0.8460 -
val_loss: 0.3267 - val_accuracy: 0.8499
Epoch 6/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3209 - accuracy: 0.8455 -
val_loss: 0.3363 - val_accuracy: 0.8487
Epoch 7/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3198 - accuracy: 0.8464 -
val_loss: 0.3336 - val_accuracy: 0.8470
Epoch 8/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3090 - accuracy: 0.8540 -
val_loss: 0.3325 - val_accuracy: 0.8510
Epoch 9/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3033 - accuracy: 0.8544 -
val_loss: 0.3555 - val_accuracy: 0.8315
Epoch 10/100
2700/2700 [=====] - 5s 2ms/step - loss: 0.3026 - accuracy: 0.8553 -
val_loss: 0.3447 - val_accuracy: 0.8467
300/300 [=====] - 0s 895us/step - loss: 0.3405 - accuracy: 0.8400
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4467 - accuracy: 0.7944 -
val_loss: 0.3519 - val_accuracy: 0.8371
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3478 - accuracy: 0.8357 -
val_loss: 0.3414 - val_accuracy: 0.8456
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3323 - accuracy: 0.8462 -
val_loss: 0.3286 - val_accuracy: 0.8501
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3257 - accuracy: 0.8415 -
val_loss: 0.3240 - val_accuracy: 0.8495
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3298 - accuracy: 0.8452 -
val_loss: 0.3202 - val_accuracy: 0.8535
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3150 - accuracy: 0.8441 -
val_loss: 0.3407 - val_accuracy: 0.8428
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3110 - accuracy: 0.8533 -
val_loss: 0.3221 - val_accuracy: 0.8524
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3081 - accuracy: 0.8541 -
val_loss: 0.3205 - val_accuracy: 0.8521
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3177 - accuracy: 0.8525 -
val_loss: 0.3219 - val_accuracy: 0.8526
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3071 - accuracy: 0.8624 -
val_loss: 0.3266 - val_accuracy: 0.8501
150/150 [=====] - 0s 991us/step - loss: 0.3175 - accuracy: 0.8547
Epoch 1/50
1350/1350 [=====] - 4s 2ms/step - loss: 0.4603 - accuracy: 0.7852 -
val_loss: 0.3619 - val_accuracy: 0.8332
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3478 - accuracy: 0.8315 -
val_loss: 0.3303 - val_accuracy: 0.8478
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3260 - accuracy: 0.8455 -
val_loss: 0.3506 - val_accuracy: 0.8272
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3209 - accuracy: 0.8463 -
val_loss: 0.3257 - val_accuracy: 0.8492
Epoch 5/50

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1350/1350 [=====] - 3s 2ms/step - loss: 0.3179 - accuracy: 0.8485 -  
  val_loss: 0.3222 - val_accuracy: 0.8542  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3133 - accuracy: 0.8510 -  
  val_loss: 0.3253 - val_accuracy: 0.8468  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3079 - accuracy: 0.8521 -  
  val_loss: 0.3214 - val_accuracy: 0.8539  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3049 - accuracy: 0.8567 -  
  val_loss: 0.3256 - val_accuracy: 0.8476  
Epoch 9/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3052 - accuracy: 0.8534 -  
  val_loss: 0.3245 - val_accuracy: 0.8509  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3018 - accuracy: 0.8598 -  
  val_loss: 0.3286 - val_accuracy: 0.8502  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3032 - accuracy: 0.8578 -  
  val_loss: 0.3248 - val_accuracy: 0.8514  
Epoch 12/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2964 - accuracy: 0.8626 -  
  val_loss: 0.3303 - val_accuracy: 0.8473  
150/150 [=====] - 0s 930us/step - loss: 0.3200 - accuracy: 0.8560  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4709 - accuracy: 0.7877 -  
  val_loss: 0.3593 - val_accuracy: 0.8325  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3514 - accuracy: 0.8323 -  
  val_loss: 0.3380 - val_accuracy: 0.8434  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3317 - accuracy: 0.8422 -  
  val_loss: 0.3244 - val_accuracy: 0.8505  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3239 - accuracy: 0.8505 -  
  val_loss: 0.3252 - val_accuracy: 0.8496  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3146 - accuracy: 0.8524 -  
  val_loss: 0.3231 - val_accuracy: 0.8549  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3093 - accuracy: 0.8534 -  
  val_loss: 0.3215 - val_accuracy: 0.8526  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3252 - accuracy: 0.8450 -  
  val_loss: 0.3215 - val_accuracy: 0.8534  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3146 - accuracy: 0.8515 -  
  val_loss: 0.3275 - val_accuracy: 0.8531  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3130 - accuracy: 0.8554 -  
  val_loss: 0.3239 - val_accuracy: 0.8547  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3190 - accuracy: 0.8484 -  
  val_loss: 0.3228 - val_accuracy: 0.8533  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3206 - accuracy: 0.8524 -  
  val_loss: 0.3237 - val_accuracy: 0.8511  
Epoch 12/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8527 -  
  val_loss: 0.3247 - val_accuracy: 0.8518  
150/150 [=====] - 0s 1ms/step - loss: 0.3225 - accuracy: 0.8393  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4441 - accuracy: 0.7846 -  
  val_loss: 0.3516 - val_accuracy: 0.8370  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3460 - accuracy: 0.8376 -  
  val_loss: 0.3290 - val_accuracy: 0.8484  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3265 - accuracy: 0.8436 -  
  val_loss: 0.3279 - val_accuracy: 0.8498  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3241 - accuracy: 0.8501 -
```

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val_loss: 0.3268 - val_accuracy: 0.8449
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3196 - accuracy: 0.8512 -
val_loss: 0.3207 - val_accuracy: 0.8541
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2981 - accuracy: 0.8602 -
val_loss: 0.3279 - val_accuracy: 0.8517
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3054 - accuracy: 0.8499 -
val_loss: 0.3199 - val_accuracy: 0.8517
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3038 - accuracy: 0.8560 -
val_loss: 0.3218 - val_accuracy: 0.8523
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3018 - accuracy: 0.8562 -
val_loss: 0.3225 - val_accuracy: 0.8484
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3074 - accuracy: 0.8552 -
val_loss: 0.3240 - val_accuracy: 0.8519
Epoch 11/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3086 - accuracy: 0.8511 -
val_loss: 0.3211 - val_accuracy: 0.8519
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3023 - accuracy: 0.8546 -
val_loss: 0.3246 - val_accuracy: 0.8530
150/150 [=====] - 0s 952us/step - loss: 0.3269 - accuracy: 0.8547
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4474 - accuracy: 0.8018 -
val_loss: 0.3459 - val_accuracy: 0.8361
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3399 - accuracy: 0.8401 -
val_loss: 0.3292 - val_accuracy: 0.8513
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3298 - accuracy: 0.8442 -
val_loss: 0.3266 - val_accuracy: 0.8480
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3093 - accuracy: 0.8575 -
val_loss: 0.3216 - val_accuracy: 0.8538
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3121 - accuracy: 0.8538 -
val_loss: 0.3258 - val_accuracy: 0.8526
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3179 - accuracy: 0.8530 -
val_loss: 0.3204 - val_accuracy: 0.8544
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3092 - accuracy: 0.8571 -
val_loss: 0.3229 - val_accuracy: 0.8523
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3110 - accuracy: 0.8526 -
val_loss: 0.3231 - val_accuracy: 0.8515
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3061 - accuracy: 0.8573 -
val_loss: 0.3232 - val_accuracy: 0.8526
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3019 - accuracy: 0.8602 -
val_loss: 0.3284 - val_accuracy: 0.8487
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3074 - accuracy: 0.8523 -
val_loss: 0.3224 - val_accuracy: 0.8532
150/150 [=====] - 0s 919us/step - loss: 0.3432 - accuracy: 0.8387
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4587 - accuracy: 0.7911 -
val_loss: 0.3564 - val_accuracy: 0.8373
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3493 - accuracy: 0.8305 -
val_loss: 0.3284 - val_accuracy: 0.8482
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3296 - accuracy: 0.8454 -
val_loss: 0.3224 - val_accuracy: 0.8523
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3196 - accuracy: 0.8492 -
val_loss: 0.3245 - val_accuracy: 0.8485
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Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8525 -
val_loss: 0.3193 - val_accuracy: 0.8558
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3068 - accuracy: 0.8558 -
val_loss: 0.3240 - val_accuracy: 0.8530
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3127 - accuracy: 0.8460 -
val_loss: 0.3221 - val_accuracy: 0.8547
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3051 - accuracy: 0.8563 -
val_loss: 0.3208 - val_accuracy: 0.8551
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3044 - accuracy: 0.8557 -
val_loss: 0.3215 - val_accuracy: 0.8530
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2968 - accuracy: 0.8605 -
val_loss: 0.3407 - val_accuracy: 0.8457
150/150 [=====] - 0s 1ms/step - loss: 0.3380 - accuracy: 0.8433
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4548 - accuracy: 0.7861 -
val_loss: 0.3564 - val_accuracy: 0.8356
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3498 - accuracy: 0.8364 -
val_loss: 0.3333 - val_accuracy: 0.8475
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3289 - accuracy: 0.8469 -
val_loss: 0.3269 - val_accuracy: 0.8495
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3144 - accuracy: 0.8571 -
val_loss: 0.3317 - val_accuracy: 0.8526
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3207 - accuracy: 0.8471 -
val_loss: 0.3241 - val_accuracy: 0.8543
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3135 - accuracy: 0.8516 -
val_loss: 0.3252 - val_accuracy: 0.8465
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3120 - accuracy: 0.8525 -
val_loss: 0.3248 - val_accuracy: 0.8542
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3074 - accuracy: 0.8568 -
val_loss: 0.3218 - val_accuracy: 0.8564
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3064 - accuracy: 0.8593 -
val_loss: 0.3234 - val_accuracy: 0.8523
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3068 - accuracy: 0.8549 -
val_loss: 0.3224 - val_accuracy: 0.8533
Epoch 11/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.2960 - accuracy: 0.8613 -
val_loss: 0.3244 - val_accuracy: 0.8540
Epoch 12/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.2978 - accuracy: 0.8587 -
val_loss: 0.3254 - val_accuracy: 0.8491
Epoch 13/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2985 - accuracy: 0.8562 -
val_loss: 0.3240 - val_accuracy: 0.8521
150/150 [=====] - 0s 898us/step - loss: 0.3224 - accuracy: 0.8513
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4628 - accuracy: 0.7899 -
val_loss: 0.3535 - val_accuracy: 0.8379
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3489 - accuracy: 0.8396 -
val_loss: 0.3329 - val_accuracy: 0.8443
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3329 - accuracy: 0.8436 -
val_loss: 0.3329 - val_accuracy: 0.8491
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3169 - accuracy: 0.8497 -
val_loss: 0.3260 - val_accuracy: 0.8483
Epoch 5/50


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1350/1350 [=====] - 3s 2ms/step - loss: 0.3206 - accuracy: 0.8488 -  
  val_loss: 0.3202 - val_accuracy: 0.8531  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3129 - accuracy: 0.8545 -  
  val_loss: 0.3240 - val_accuracy: 0.8516  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3085 - accuracy: 0.8602 -  
  val_loss: 0.3235 - val_accuracy: 0.8523  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3126 - accuracy: 0.8536 -  
  val_loss: 0.3211 - val_accuracy: 0.8506  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3035 - accuracy: 0.8600 -  
  val_loss: 0.3227 - val_accuracy: 0.8535  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3035 - accuracy: 0.8575 -  
  val_loss: 0.3223 - val_accuracy: 0.8504  
150/150 [=====] - 0s 929us/step - loss: 0.3267 - accuracy: 0.8393  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4489 - accuracy: 0.7944 -  
  val_loss: 0.3535 - val_accuracy: 0.8364  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3486 - accuracy: 0.8356 -  
  val_loss: 0.3309 - val_accuracy: 0.8483  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3295 - accuracy: 0.8454 -  
  val_loss: 0.3255 - val_accuracy: 0.8482  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3199 - accuracy: 0.8532 -  
  val_loss: 0.3185 - val_accuracy: 0.8551  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3151 - accuracy: 0.8501 -  
  val_loss: 0.3282 - val_accuracy: 0.8466  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3112 - accuracy: 0.8527 -  
  val_loss: 0.3222 - val_accuracy: 0.8515  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3153 - accuracy: 0.8482 -  
  val_loss: 0.3200 - val_accuracy: 0.8511  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3111 - accuracy: 0.8537 -  
  val_loss: 0.3275 - val_accuracy: 0.8498  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3067 - accuracy: 0.8559 -  
  val_loss: 0.3306 - val_accuracy: 0.8427  
150/150 [=====] - 0s 890us/step - loss: 0.3263 - accuracy: 0.8467  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4481 - accuracy: 0.7946 -  
  val_loss: 0.3479 - val_accuracy: 0.8386  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3413 - accuracy: 0.8404 -  
  val_loss: 0.3288 - val_accuracy: 0.8483  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3360 - accuracy: 0.8433 -  
  val_loss: 0.3272 - val_accuracy: 0.8502  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3234 - accuracy: 0.8501 -  
  val_loss: 0.3230 - val_accuracy: 0.8531  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3184 - accuracy: 0.8488 -  
  val_loss: 0.3218 - val_accuracy: 0.8511  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3105 - accuracy: 0.8512 -  
  val_loss: 0.3240 - val_accuracy: 0.8510  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3143 - accuracy: 0.8530 -  
  val_loss: 0.3195 - val_accuracy: 0.8540  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3056 - accuracy: 0.8548 -  
  val_loss: 0.3238 - val_accuracy: 0.8509  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3042 - accuracy: 0.8566 -
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val_loss: 0.3217 - val_accuracy: 0.8509
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3023 - accuracy: 0.8587 -
val_loss: 0.3229 - val_accuracy: 0.8541
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2924 - accuracy: 0.8620 -
val_loss: 0.3223 - val_accuracy: 0.8547
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2917 - accuracy: 0.8614 -
val_loss: 0.3218 - val_accuracy: 0.8532
150/150 [=====] - 0s 936us/step - loss: 0.3253 - accuracy: 0.8507
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4402 - accuracy: 0.7968 -
val_loss: 0.3522 - val_accuracy: 0.8369
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3523 - accuracy: 0.8331 -
val_loss: 0.3280 - val_accuracy: 0.8508
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3259 - accuracy: 0.8447 -
val_loss: 0.3272 - val_accuracy: 0.8472
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3148 - accuracy: 0.8528 -
val_loss: 0.3234 - val_accuracy: 0.8510
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3247 - accuracy: 0.8445 -
val_loss: 0.3252 - val_accuracy: 0.8534
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3140 - accuracy: 0.8507 -
val_loss: 0.3253 - val_accuracy: 0.8507
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3045 - accuracy: 0.8599 -
val_loss: 0.3297 - val_accuracy: 0.8481
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3055 - accuracy: 0.8538 -
val_loss: 0.3229 - val_accuracy: 0.8524
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2943 - accuracy: 0.8655 -
val_loss: 0.3447 - val_accuracy: 0.8319
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2979 - accuracy: 0.8574 -
val_loss: 0.3325 - val_accuracy: 0.8532
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2947 - accuracy: 0.8632 -
val_loss: 0.3242 - val_accuracy: 0.8525
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2948 - accuracy: 0.8605 -
val_loss: 0.3262 - val_accuracy: 0.8524
Epoch 13/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2937 - accuracy: 0.8638 -
val_loss: 0.3357 - val_accuracy: 0.8404
150/150 [=====] - 0s 986us/step - loss: 0.3286 - accuracy: 0.8380
Epoch 1/50
1350/1350 [=====] - 4s 2ms/step - loss: 0.4388 - accuracy: 0.7961 -
val_loss: 0.3536 - val_accuracy: 0.8385
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3400 - accuracy: 0.8382 -
val_loss: 0.3290 - val_accuracy: 0.8516
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3219 - accuracy: 0.8478 -
val_loss: 0.3245 - val_accuracy: 0.8500
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3235 - accuracy: 0.8479 -
val_loss: 0.3279 - val_accuracy: 0.8489
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3225 - accuracy: 0.8486 -
val_loss: 0.3225 - val_accuracy: 0.8488
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8571 -
val_loss: 0.3263 - val_accuracy: 0.8515
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8500 -
val_loss: 0.3227 - val_accuracy: 0.8513
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Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3132 - accuracy: 0.8525 -
val_loss: 0.3227 - val_accuracy: 0.8524
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3052 - accuracy: 0.8551 -
val_loss: 0.3293 - val_accuracy: 0.8510
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3140 - accuracy: 0.8532 -
val_loss: 0.3237 - val_accuracy: 0.8524
150/150 [=====] - 0s 952us/step - loss: 0.3189 - accuracy: 0.8473
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4440 - accuracy: 0.7905 -
val_loss: 0.3482 - val_accuracy: 0.8406
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3467 - accuracy: 0.8389 -
val_loss: 0.3322 - val_accuracy: 0.8477
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3262 - accuracy: 0.8497 -
val_loss: 0.3233 - val_accuracy: 0.8504
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3223 - accuracy: 0.8457 -
val_loss: 0.3204 - val_accuracy: 0.8512
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8519 -
val_loss: 0.3254 - val_accuracy: 0.8503
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3122 - accuracy: 0.8544 -
val_loss: 0.3261 - val_accuracy: 0.8491
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3065 - accuracy: 0.8580 -
val_loss: 0.3256 - val_accuracy: 0.8475
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3013 - accuracy: 0.8607 -
val_loss: 0.3220 - val_accuracy: 0.8537
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3002 - accuracy: 0.8600 -
val_loss: 0.3232 - val_accuracy: 0.8518
150/150 [=====] - 0s 948us/step - loss: 0.3258 - accuracy: 0.8433
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4443 - accuracy: 0.7938 -
val_loss: 0.3511 - val_accuracy: 0.8373
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3498 - accuracy: 0.8358 -
val_loss: 0.3326 - val_accuracy: 0.8483
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3203 - accuracy: 0.8516 -
val_loss: 0.3257 - val_accuracy: 0.8501
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3245 - accuracy: 0.8437 -
val_loss: 0.3251 - val_accuracy: 0.8497
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3185 - accuracy: 0.8484 -
val_loss: 0.3258 - val_accuracy: 0.8518
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3126 - accuracy: 0.8546 -
val_loss: 0.3219 - val_accuracy: 0.8500
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3088 - accuracy: 0.8538 -
val_loss: 0.3242 - val_accuracy: 0.8499
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3089 - accuracy: 0.8547 -
val_loss: 0.3248 - val_accuracy: 0.8505
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3006 - accuracy: 0.8565 -
val_loss: 0.3201 - val_accuracy: 0.8528
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3052 - accuracy: 0.8566 -
val_loss: 0.3259 - val_accuracy: 0.8482
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2968 - accuracy: 0.8583 -
val_loss: 0.3259 - val_accuracy: 0.8506
Epoch 12/50

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1350/1350 [=====] - 3s 2ms/step - loss: 0.2992 - accuracy: 0.8589 -  
  val_loss: 0.3270 - val_accuracy: 0.8520  
Epoch 13/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2875 - accuracy: 0.8645 -  
  val_loss: 0.3282 - val_accuracy: 0.8518  
Epoch 14/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2930 - accuracy: 0.8571 -  
  val_loss: 0.3308 - val_accuracy: 0.8474  
150/150 [=====] - 0s 896us/step - loss: 0.3367 - accuracy: 0.8500  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4533 - accuracy: 0.7897 -  
  val_loss: 0.3495 - val_accuracy: 0.8376  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3497 - accuracy: 0.8381 -  
  val_loss: 0.3287 - val_accuracy: 0.8464  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3194 - accuracy: 0.8455 -  
  val_loss: 0.3252 - val_accuracy: 0.8515  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3183 - accuracy: 0.8487 -  
  val_loss: 0.3433 - val_accuracy: 0.8375  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3121 - accuracy: 0.8516 -  
  val_loss: 0.3208 - val_accuracy: 0.8540  
Epoch 6/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3132 - accuracy: 0.8525 -  
  val_loss: 0.3236 - val_accuracy: 0.8494  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3109 - accuracy: 0.8538 -  
  val_loss: 0.3300 - val_accuracy: 0.8440  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8558 -  
  val_loss: 0.3218 - val_accuracy: 0.8535  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3019 - accuracy: 0.8540 -  
  val_loss: 0.3232 - val_accuracy: 0.8518  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3056 - accuracy: 0.8538 -  
  val_loss: 0.3254 - val_accuracy: 0.8521  
150/150 [=====] - 0s 935us/step - loss: 0.3438 - accuracy: 0.8420  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4424 - accuracy: 0.7899 -  
  val_loss: 0.3618 - val_accuracy: 0.8321  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3527 - accuracy: 0.8352 -  
  val_loss: 0.3416 - val_accuracy: 0.8423  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3351 - accuracy: 0.8437 -  
  val_loss: 0.3380 - val_accuracy: 0.8442  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8519 -  
  val_loss: 0.3369 - val_accuracy: 0.8369  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3184 - accuracy: 0.8505 -  
  val_loss: 0.3271 - val_accuracy: 0.8498  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3115 - accuracy: 0.8520 -  
  val_loss: 0.3257 - val_accuracy: 0.8493  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3149 - accuracy: 0.8508 -  
  val_loss: 0.3201 - val_accuracy: 0.8543  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3059 - accuracy: 0.8592 -  
  val_loss: 0.3245 - val_accuracy: 0.8513  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3110 - accuracy: 0.8545 -  
  val_loss: 0.3233 - val_accuracy: 0.8525  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8531 -  
  val_loss: 0.3312 - val_accuracy: 0.8471  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3026 - accuracy: 0.8587 -
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val_loss: 0.3241 - val_accuracy: 0.8529
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2923 - accuracy: 0.8637 -
val_loss: 0.3286 - val_accuracy: 0.8506
150/150 [=====] - 0s 952us/step - loss: 0.3208 - accuracy: 0.8527
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4443 - accuracy: 0.7948 -
val_loss: 0.3466 - val_accuracy: 0.8397
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3438 - accuracy: 0.8389 -
val_loss: 0.3305 - val_accuracy: 0.8487
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3309 - accuracy: 0.8421 -
val_loss: 0.3206 - val_accuracy: 0.8545
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3260 - accuracy: 0.8478 -
val_loss: 0.3279 - val_accuracy: 0.8504
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3243 - accuracy: 0.8471 -
val_loss: 0.3197 - val_accuracy: 0.8514
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3147 - accuracy: 0.8538 -
val_loss: 0.3232 - val_accuracy: 0.8503
Epoch 7/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3121 - accuracy: 0.8517 -
val_loss: 0.3232 - val_accuracy: 0.8534
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3119 - accuracy: 0.8547 -
val_loss: 0.3212 - val_accuracy: 0.8547
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3088 - accuracy: 0.8578 -
val_loss: 0.3266 - val_accuracy: 0.8513
Epoch 10/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3017 - accuracy: 0.8607 -
val_loss: 0.3249 - val_accuracy: 0.8518
150/150 [=====] - 0s 943us/step - loss: 0.3229 - accuracy: 0.8527
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4528 - accuracy: 0.7899 -
val_loss: 0.3480 - val_accuracy: 0.8367
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3348 - accuracy: 0.8417 -
val_loss: 0.3322 - val_accuracy: 0.8442
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3276 - accuracy: 0.8445 -
val_loss: 0.3255 - val_accuracy: 0.8534
Epoch 4/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3256 - accuracy: 0.8474 -
val_loss: 0.3247 - val_accuracy: 0.8533
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3131 - accuracy: 0.8530 -
val_loss: 0.3269 - val_accuracy: 0.8511
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3105 - accuracy: 0.8529 -
val_loss: 0.3312 - val_accuracy: 0.8417
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3075 - accuracy: 0.8552 -
val_loss: 0.3277 - val_accuracy: 0.8502
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3098 - accuracy: 0.8546 -
val_loss: 0.3245 - val_accuracy: 0.8496
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3083 - accuracy: 0.8558 -
val_loss: 0.3232 - val_accuracy: 0.8532
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3105 - accuracy: 0.8565 -
val_loss: 0.3268 - val_accuracy: 0.8495
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3048 - accuracy: 0.8582 -
val_loss: 0.3402 - val_accuracy: 0.8482
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2986 - accuracy: 0.8604 -
val_loss: 0.3256 - val_accuracy: 0.8519
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Epoch 13/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2901 - accuracy: 0.8655 -
val_loss: 0.3291 - val_accuracy: 0.8487
Epoch 14/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2982 - accuracy: 0.8546 -
val_loss: 0.3264 - val_accuracy: 0.8488
150/150 [=====] - 0s 1ms/step - loss: 0.3262 - accuracy: 0.8413
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4501 - accuracy: 0.7813 -
val_loss: 0.3503 - val_accuracy: 0.8402
Epoch 2/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3572 - accuracy: 0.8278 -
val_loss: 0.3346 - val_accuracy: 0.8459
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3290 - accuracy: 0.8446 -
val_loss: 0.3540 - val_accuracy: 0.8356
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3252 - accuracy: 0.8452 -
val_loss: 0.3223 - val_accuracy: 0.8541
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3125 - accuracy: 0.8496 -
val_loss: 0.3201 - val_accuracy: 0.8520
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8534 -
val_loss: 0.3227 - val_accuracy: 0.8502
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3051 - accuracy: 0.8582 -
val_loss: 0.3234 - val_accuracy: 0.8506
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3087 - accuracy: 0.8575 -
val_loss: 0.3214 - val_accuracy: 0.8536
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3073 - accuracy: 0.8517 -
val_loss: 0.3221 - val_accuracy: 0.8542
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3047 - accuracy: 0.8538 -
val_loss: 0.3255 - val_accuracy: 0.8529
150/150 [=====] - 0s 908us/step - loss: 0.3085 - accuracy: 0.8500
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4455 - accuracy: 0.7980 -
val_loss: 0.3483 - val_accuracy: 0.8410
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3456 - accuracy: 0.8343 -
val_loss: 0.3276 - val_accuracy: 0.8483
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3258 - accuracy: 0.8456 -
val_loss: 0.3255 - val_accuracy: 0.8494
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3091 - accuracy: 0.8560 -
val_loss: 0.3333 - val_accuracy: 0.8423
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3037 - accuracy: 0.8573 -
val_loss: 0.3346 - val_accuracy: 0.8470
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3091 - accuracy: 0.8515 -
val_loss: 0.3206 - val_accuracy: 0.8519
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3028 - accuracy: 0.8579 -
val_loss: 0.3224 - val_accuracy: 0.8510
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3070 - accuracy: 0.8558 -
val_loss: 0.3230 - val_accuracy: 0.8508
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3090 - accuracy: 0.8530 -
val_loss: 0.3238 - val_accuracy: 0.8493
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8533 -
val_loss: 0.3409 - val_accuracy: 0.8484
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2984 - accuracy: 0.8600 -
val_loss: 0.3346 - val_accuracy: 0.8414
150/150 [=====] - 0s 923us/step - loss: 0.3370 - accuracy: 0.8347

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Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4423 - accuracy: 0.7938 -
val_loss: 0.3450 - val_accuracy: 0.8394
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3440 - accuracy: 0.8386 -
val_loss: 0.3453 - val_accuracy: 0.8348
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3300 - accuracy: 0.8429 -
val_loss: 0.3248 - val_accuracy: 0.8520
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3227 - accuracy: 0.8492 -
val_loss: 0.3241 - val_accuracy: 0.8510
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3070 - accuracy: 0.8594 -
val_loss: 0.3225 - val_accuracy: 0.8527
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8512 -
val_loss: 0.3224 - val_accuracy: 0.8554
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3115 - accuracy: 0.8628 -
val_loss: 0.3225 - val_accuracy: 0.8517
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3092 - accuracy: 0.8563 -
val_loss: 0.3250 - val_accuracy: 0.8509
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3033 - accuracy: 0.8568 -
val_loss: 0.3397 - val_accuracy: 0.8411
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2930 - accuracy: 0.8588 -
val_loss: 0.3230 - val_accuracy: 0.8511
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3000 - accuracy: 0.8609 -
val_loss: 0.3254 - val_accuracy: 0.8501
150/150 [=====] - 0s 916us/step - loss: 0.3199 - accuracy: 0.8533
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4433 - accuracy: 0.7957 -
val_loss: 0.3525 - val_accuracy: 0.8405
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3460 - accuracy: 0.8376 -
val_loss: 0.3416 - val_accuracy: 0.8444
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3266 - accuracy: 0.8443 -
val_loss: 0.3246 - val_accuracy: 0.8520
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3228 - accuracy: 0.8458 -
val_loss: 0.3253 - val_accuracy: 0.8486
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3183 - accuracy: 0.8494 -
val_loss: 0.3201 - val_accuracy: 0.8552
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8537 -
val_loss: 0.3209 - val_accuracy: 0.8532
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3070 - accuracy: 0.8541 -
val_loss: 0.3322 - val_accuracy: 0.8514
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3010 - accuracy: 0.8601 -
val_loss: 0.3257 - val_accuracy: 0.8482
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3027 - accuracy: 0.8577 -
val_loss: 0.3295 - val_accuracy: 0.8481
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3015 - accuracy: 0.8528 -
val_loss: 0.3242 - val_accuracy: 0.8524
150/150 [=====] - 0s 962us/step - loss: 0.3141 - accuracy: 0.8567
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4449 - accuracy: 0.7891 -
val_loss: 0.3762 - val_accuracy: 0.8114
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3396 - accuracy: 0.8399 -
val_loss: 0.3319 - val_accuracy: 0.8480
Epoch 3/50
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1350/1350 [=====] - 3s 2ms/step - loss: 0.3400 - accuracy: 0.8406 -  
  val_loss: 0.3260 - val_accuracy: 0.8484  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3123 - accuracy: 0.8554 -  
  val_loss: 0.3267 - val_accuracy: 0.8531  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3135 - accuracy: 0.8538 -  
  val_loss: 0.3208 - val_accuracy: 0.8526  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3139 - accuracy: 0.8515 -  
  val_loss: 0.3248 - val_accuracy: 0.8500  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3003 - accuracy: 0.8619 -  
  val_loss: 0.3322 - val_accuracy: 0.8434  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3067 - accuracy: 0.8545 -  
  val_loss: 0.3239 - val_accuracy: 0.8500  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3003 - accuracy: 0.8581 -  
  val_loss: 0.3228 - val_accuracy: 0.8516  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3109 - accuracy: 0.8578 -  
  val_loss: 0.3366 - val_accuracy: 0.8390  
150/150 [=====] - 0s 891us/step - loss: 0.3342 - accuracy: 0.8347  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4418 - accuracy: 0.7974 -  
  val_loss: 0.3505 - val_accuracy: 0.8324  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3422 - accuracy: 0.8377 -  
  val_loss: 0.3316 - val_accuracy: 0.8490  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3264 - accuracy: 0.8469 -  
  val_loss: 0.3288 - val_accuracy: 0.8446  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3244 - accuracy: 0.8443 -  
  val_loss: 0.3510 - val_accuracy: 0.8404  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3066 - accuracy: 0.8581 -  
  val_loss: 0.3256 - val_accuracy: 0.8494  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3130 - accuracy: 0.8498 -  
  val_loss: 0.3194 - val_accuracy: 0.8536  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3083 - accuracy: 0.8514 -  
  val_loss: 0.3235 - val_accuracy: 0.8530  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3087 - accuracy: 0.8562 -  
  val_loss: 0.3217 - val_accuracy: 0.8535  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3139 - accuracy: 0.8520 -  
  val_loss: 0.3331 - val_accuracy: 0.8501  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3017 - accuracy: 0.8601 -  
  val_loss: 0.3249 - val_accuracy: 0.8548  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2981 - accuracy: 0.8580 -  
  val_loss: 0.3267 - val_accuracy: 0.8507  
150/150 [=====] - 0s 969us/step - loss: 0.3286 - accuracy: 0.8520  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4535 - accuracy: 0.7838 -  
  val_loss: 0.3538 - val_accuracy: 0.8365  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3421 - accuracy: 0.8395 -  
  val_loss: 0.3314 - val_accuracy: 0.8503  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8455 -  
  val_loss: 0.3239 - val_accuracy: 0.8513  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8524 -  
  val_loss: 0.3405 - val_accuracy: 0.8388  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3089 - accuracy: 0.8532 -
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val_loss: 0.3260 - val_accuracy: 0.8529
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3085 - accuracy: 0.8572 -
val_loss: 0.3239 - val_accuracy: 0.8517
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3026 - accuracy: 0.8566 -
val_loss: 0.3263 - val_accuracy: 0.8495
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3055 - accuracy: 0.8523 -
val_loss: 0.3234 - val_accuracy: 0.8498
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2921 - accuracy: 0.8627 -
val_loss: 0.3242 - val_accuracy: 0.8516
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2979 - accuracy: 0.8596 -
val_loss: 0.3247 - val_accuracy: 0.8522
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2896 - accuracy: 0.8602 -
val_loss: 0.3297 - val_accuracy: 0.8498
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2927 - accuracy: 0.8605 -
val_loss: 0.3304 - val_accuracy: 0.8489
Epoch 13/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2958 - accuracy: 0.8609 -
val_loss: 0.3330 - val_accuracy: 0.8480
150/150 [=====] - 0s 919us/step - loss: 0.3560 - accuracy: 0.8407
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4476 - accuracy: 0.7879 -
val_loss: 0.3477 - val_accuracy: 0.8378
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3413 - accuracy: 0.8378 -
val_loss: 0.3310 - val_accuracy: 0.8474
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3248 - accuracy: 0.8510 -
val_loss: 0.3246 - val_accuracy: 0.8525
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3243 - accuracy: 0.8459 -
val_loss: 0.3247 - val_accuracy: 0.8509
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3118 - accuracy: 0.8535 -
val_loss: 0.3245 - val_accuracy: 0.8488
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3140 - accuracy: 0.8524 -
val_loss: 0.3250 - val_accuracy: 0.8498
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3060 - accuracy: 0.8547 -
val_loss: 0.3325 - val_accuracy: 0.8442
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2989 - accuracy: 0.8598 -
val_loss: 0.3393 - val_accuracy: 0.8457
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3024 - accuracy: 0.8596 -
val_loss: 0.3224 - val_accuracy: 0.8522
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2976 - accuracy: 0.8624 -
val_loss: 0.3284 - val_accuracy: 0.8506
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3023 - accuracy: 0.8595 -
val_loss: 0.3280 - val_accuracy: 0.8498
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2946 - accuracy: 0.8631 -
val_loss: 0.3306 - val_accuracy: 0.8484
Epoch 13/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2886 - accuracy: 0.8666 -
val_loss: 0.3307 - val_accuracy: 0.8500
Epoch 14/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2845 - accuracy: 0.8667 -
val_loss: 0.3324 - val_accuracy: 0.8477
150/150 [=====] - 0s 925us/step - loss: 0.3299 - accuracy: 0.8520
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4418 - accuracy: 0.7978 -
val_loss: 0.3484 - val_accuracy: 0.8403
```

Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3453 - accuracy: 0.8322 -
val_loss: 0.3351 - val_accuracy: 0.8455
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3318 - accuracy: 0.8433 -
val_loss: 0.3259 - val_accuracy: 0.8546
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3184 - accuracy: 0.8484 -
val_loss: 0.3228 - val_accuracy: 0.8512
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3255 - accuracy: 0.8464 -
val_loss: 0.3207 - val_accuracy: 0.8517
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8543 -
val_loss: 0.3326 - val_accuracy: 0.8433
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3154 - accuracy: 0.8548 -
val_loss: 0.3242 - val_accuracy: 0.8545
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8537 -
val_loss: 0.3269 - val_accuracy: 0.8533
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3063 - accuracy: 0.8564 -
val_loss: 0.3225 - val_accuracy: 0.8549
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3045 - accuracy: 0.8568 -
val_loss: 0.3221 - val_accuracy: 0.8546
150/150 [=====] - 0s 907us/step - loss: 0.3203 - accuracy: 0.8527
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4408 - accuracy: 0.7933 -
val_loss: 0.3504 - val_accuracy: 0.8361
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3461 - accuracy: 0.8369 -
val_loss: 0.3398 - val_accuracy: 0.8420
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3336 - accuracy: 0.8406 -
val_loss: 0.3266 - val_accuracy: 0.8526
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3148 - accuracy: 0.8512 -
val_loss: 0.3451 - val_accuracy: 0.8356
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3124 - accuracy: 0.8532 -
val_loss: 0.3272 - val_accuracy: 0.8465
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8567 -
val_loss: 0.3243 - val_accuracy: 0.8512
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3143 - accuracy: 0.8518 -
val_loss: 0.3217 - val_accuracy: 0.8521
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3095 - accuracy: 0.8520 -
val_loss: 0.3259 - val_accuracy: 0.8459
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3124 - accuracy: 0.8493 -
val_loss: 0.3389 - val_accuracy: 0.8357
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3043 - accuracy: 0.8548 -
val_loss: 0.3276 - val_accuracy: 0.8480
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3054 - accuracy: 0.8572 -
val_loss: 0.3234 - val_accuracy: 0.8503
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8544 -
val_loss: 0.3283 - val_accuracy: 0.8528
150/150 [=====] - 0s 909us/step - loss: 0.3337 - accuracy: 0.8380
Epoch 1/50
1350/1350 [=====] - 4s 2ms/step - loss: 0.4477 - accuracy: 0.7880 -
val_loss: 0.3454 - val_accuracy: 0.8405
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3459 - accuracy: 0.8335 -
val_loss: 0.3608 - val_accuracy: 0.8381
Epoch 3/50

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1350/1350 [=====] - 3s 2ms/step - loss: 0.3280 - accuracy: 0.8494 -  
  val_loss: 0.3277 - val_accuracy: 0.8497  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3189 - accuracy: 0.8520 -  
  val_loss: 0.3275 - val_accuracy: 0.8493  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3139 - accuracy: 0.8523 -  
  val_loss: 0.3201 - val_accuracy: 0.8533  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3033 - accuracy: 0.8607 -  
  val_loss: 0.3248 - val_accuracy: 0.8512  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3143 - accuracy: 0.8580 -  
  val_loss: 0.3292 - val_accuracy: 0.8476  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3065 - accuracy: 0.8587 -  
  val_loss: 0.3289 - val_accuracy: 0.8502  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3067 - accuracy: 0.8561 -  
  val_loss: 0.3283 - val_accuracy: 0.8479  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3025 - accuracy: 0.8561 -  
  val_loss: 0.3212 - val_accuracy: 0.8539  
150/150 [=====] - 0s 989us/step - loss: 0.3083 - accuracy: 0.8547  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4472 - accuracy: 0.7973 -  
  val_loss: 0.3489 - val_accuracy: 0.8389  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3467 - accuracy: 0.8359 -  
  val_loss: 0.3298 - val_accuracy: 0.8465  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3289 - accuracy: 0.8456 -  
  val_loss: 0.3264 - val_accuracy: 0.8471  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3195 - accuracy: 0.8454 -  
  val_loss: 0.3225 - val_accuracy: 0.8501  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3176 - accuracy: 0.8479 -  
  val_loss: 0.3278 - val_accuracy: 0.8500  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3085 - accuracy: 0.8593 -  
  val_loss: 0.3213 - val_accuracy: 0.8522  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3145 - accuracy: 0.8526 -  
  val_loss: 0.3386 - val_accuracy: 0.8344  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3081 - accuracy: 0.8572 -  
  val_loss: 0.3198 - val_accuracy: 0.8523  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3072 - accuracy: 0.8525 -  
  val_loss: 0.3203 - val_accuracy: 0.8509  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3061 - accuracy: 0.8545 -  
  val_loss: 0.3257 - val_accuracy: 0.8528  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2960 - accuracy: 0.8626 -  
  val_loss: 0.3257 - val_accuracy: 0.8501  
Epoch 12/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3026 - accuracy: 0.8587 -  
  val_loss: 0.3242 - val_accuracy: 0.8521  
Epoch 13/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2938 - accuracy: 0.8593 -  
  val_loss: 0.3279 - val_accuracy: 0.8507  
150/150 [=====] - 0s 972us/step - loss: 0.3326 - accuracy: 0.8480  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4199 - accuracy: 0.7912 -  
  val_loss: 0.3741 - val_accuracy: 0.8350  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3481 - accuracy: 0.8359 -  
  val_loss: 0.3350 - val_accuracy: 0.8481  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3352 - accuracy: 0.8451 -
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val_loss: 0.3264 - val_accuracy: 0.8519
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3249 - accuracy: 0.8499 -
val_loss: 0.3289 - val_accuracy: 0.8516
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3186 - accuracy: 0.8525 -
val_loss: 0.3284 - val_accuracy: 0.8509
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3234 - accuracy: 0.8489 -
val_loss: 0.3477 - val_accuracy: 0.8291
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3113 - accuracy: 0.8517 -
val_loss: 0.3323 - val_accuracy: 0.8503
Epoch 8/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3173 - accuracy: 0.8460 -
val_loss: 0.3338 - val_accuracy: 0.8475
150/150 [=====] - 0s 985us/step - loss: 0.3300 - accuracy: 0.8553
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4070 - accuracy: 0.8050 -
val_loss: 0.3442 - val_accuracy: 0.8383
Epoch 2/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3571 - accuracy: 0.8284 -
val_loss: 0.3358 - val_accuracy: 0.8493
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3304 - accuracy: 0.8450 -
val_loss: 0.3429 - val_accuracy: 0.8411
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3193 - accuracy: 0.8490 -
val_loss: 0.3319 - val_accuracy: 0.8510
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3281 - accuracy: 0.8403 -
val_loss: 0.3385 - val_accuracy: 0.8449
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3096 - accuracy: 0.8568 -
val_loss: 0.3360 - val_accuracy: 0.8485
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3157 - accuracy: 0.8523 -
val_loss: 0.3394 - val_accuracy: 0.8406
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3119 - accuracy: 0.8516 -
val_loss: 0.3318 - val_accuracy: 0.8484
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3054 - accuracy: 0.8510 -
val_loss: 0.3408 - val_accuracy: 0.8450
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3050 - accuracy: 0.8557 -
val_loss: 0.3395 - val_accuracy: 0.8488
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3005 - accuracy: 0.8577 -
val_loss: 0.3484 - val_accuracy: 0.8485
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3010 - accuracy: 0.8536 -
val_loss: 0.3382 - val_accuracy: 0.8485
Epoch 13/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2925 - accuracy: 0.8621 -
val_loss: 0.3595 - val_accuracy: 0.8469
150/150 [=====] - 0s 988us/step - loss: 0.3380 - accuracy: 0.8547
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4041 - accuracy: 0.8013 -
val_loss: 0.3563 - val_accuracy: 0.8117
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3452 - accuracy: 0.8360 -
val_loss: 0.3391 - val_accuracy: 0.8473
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3334 - accuracy: 0.8471 -
val_loss: 0.3730 - val_accuracy: 0.8331
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3298 - accuracy: 0.8463 -
val_loss: 0.3254 - val_accuracy: 0.8521
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3225 - accuracy: 0.8464 -
val_loss: 0.3653 - val_accuracy: 0.8375
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Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8571 -
val_loss: 0.3452 - val_accuracy: 0.8401
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3125 - accuracy: 0.8524 -
val_loss: 0.3295 - val_accuracy: 0.8501
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3160 - accuracy: 0.8480 -
val_loss: 0.3411 - val_accuracy: 0.8414
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3098 - accuracy: 0.8540 -
val_loss: 0.3358 - val_accuracy: 0.8405
150/150 [=====] - 0s 930us/step - loss: 0.3347 - accuracy: 0.8387
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4155 - accuracy: 0.7967 -
val_loss: 0.3532 - val_accuracy: 0.8399
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3411 - accuracy: 0.8450 -
val_loss: 0.3419 - val_accuracy: 0.8377
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3312 - accuracy: 0.8474 -
val_loss: 0.3292 - val_accuracy: 0.8485
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3322 - accuracy: 0.8476 -
val_loss: 0.3454 - val_accuracy: 0.8510
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3256 - accuracy: 0.8453 -
val_loss: 0.3425 - val_accuracy: 0.8341
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3166 - accuracy: 0.8530 -
val_loss: 0.3309 - val_accuracy: 0.8498
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3120 - accuracy: 0.8539 -
val_loss: 0.3391 - val_accuracy: 0.8488
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3047 - accuracy: 0.8551 -
val_loss: 0.3338 - val_accuracy: 0.8467
150/150 [=====] - 0s 932us/step - loss: 0.3355 - accuracy: 0.8560
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4110 - accuracy: 0.7974 -
val_loss: 0.3655 - val_accuracy: 0.8269
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3524 - accuracy: 0.8352 -
val_loss: 0.3367 - val_accuracy: 0.8469
Epoch 3/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3365 - accuracy: 0.8432 -
val_loss: 0.3353 - val_accuracy: 0.8483
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3273 - accuracy: 0.8500 -
val_loss: 0.3351 - val_accuracy: 0.8475
Epoch 5/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3188 - accuracy: 0.8499 -
val_loss: 0.3447 - val_accuracy: 0.8354
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3182 - accuracy: 0.8536 -
val_loss: 0.3315 - val_accuracy: 0.8478
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3149 - accuracy: 0.8535 -
val_loss: 0.3379 - val_accuracy: 0.8482
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3082 - accuracy: 0.8550 -
val_loss: 0.3406 - val_accuracy: 0.8387
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3082 - accuracy: 0.8531 -
val_loss: 0.3430 - val_accuracy: 0.8453
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3047 - accuracy: 0.8561 -
val_loss: 0.3504 - val_accuracy: 0.8472
Epoch 11/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.2959 - accuracy: 0.8611 -
val_loss: 0.3439 - val_accuracy: 0.8523
150/150 [=====] - 0s 994us/step - loss: 0.3616 - accuracy: 0.8413

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Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4015 - accuracy: 0.8113 -
val_loss: 0.4026 - val_accuracy: 0.8177
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3392 - accuracy: 0.8435 -
val_loss: 0.3335 - val_accuracy: 0.8431
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3333 - accuracy: 0.8445 -
val_loss: 0.3521 - val_accuracy: 0.8202
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3211 - accuracy: 0.8502 -
val_loss: 0.3392 - val_accuracy: 0.8433
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3243 - accuracy: 0.8471 -
val_loss: 0.3275 - val_accuracy: 0.8486
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3167 - accuracy: 0.8556 -
val_loss: 0.3429 - val_accuracy: 0.8510
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3236 - accuracy: 0.8473 -
val_loss: 0.3298 - val_accuracy: 0.8494
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3099 - accuracy: 0.8562 -
val_loss: 0.3353 - val_accuracy: 0.8470
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3074 - accuracy: 0.8524 -
val_loss: 0.3306 - val_accuracy: 0.8486
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3022 - accuracy: 0.8582 -
val_loss: 0.3490 - val_accuracy: 0.8417
150/150 [=====] - 0s 913us/step - loss: 0.3474 - accuracy: 0.8493
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4166 - accuracy: 0.7922 -
val_loss: 0.3451 - val_accuracy: 0.8420
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3439 - accuracy: 0.8358 -
val_loss: 0.3295 - val_accuracy: 0.8539
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3296 - accuracy: 0.8429 -
val_loss: 0.3308 - val_accuracy: 0.8492
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3295 - accuracy: 0.8433 -
val_loss: 0.3287 - val_accuracy: 0.8511
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3132 - accuracy: 0.8549 -
val_loss: 0.3319 - val_accuracy: 0.8474
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3243 - accuracy: 0.8486 -
val_loss: 0.3303 - val_accuracy: 0.8512
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3160 - accuracy: 0.8529 -
val_loss: 0.3301 - val_accuracy: 0.8527
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3100 - accuracy: 0.8544 -
val_loss: 0.3308 - val_accuracy: 0.8513
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8576 -
val_loss: 0.3372 - val_accuracy: 0.8516
150/150 [=====] - 0s 932us/step - loss: 0.3403 - accuracy: 0.8500
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4076 - accuracy: 0.7992 -
val_loss: 0.3731 - val_accuracy: 0.8360
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3501 - accuracy: 0.8376 -
val_loss: 0.3359 - val_accuracy: 0.8482
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3329 - accuracy: 0.8437 -
val_loss: 0.3304 - val_accuracy: 0.8504
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3255 - accuracy: 0.8502 -
val_loss: 0.3379 - val_accuracy: 0.8346
Epoch 5/50
```

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1350/1350 [=====] - 3s 2ms/step - loss: 0.3225 - accuracy: 0.8459 -  
  val_loss: 0.3307 - val_accuracy: 0.8476  
Epoch 6/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3116 - accuracy: 0.8540 -  
  val_loss: 0.3549 - val_accuracy: 0.8317  
Epoch 7/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3065 - accuracy: 0.8556 -  
  val_loss: 0.3327 - val_accuracy: 0.8407  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3066 - accuracy: 0.8564 -  
  val_loss: 0.3477 - val_accuracy: 0.8378  
150/150 [=====] - 0s 889us/step - loss: 0.3426 - accuracy: 0.8367  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4157 - accuracy: 0.7902 -  
  val_loss: 0.3466 - val_accuracy: 0.8442  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3493 - accuracy: 0.8378 -  
  val_loss: 0.3525 - val_accuracy: 0.8376  
Epoch 3/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3408 - accuracy: 0.8385 -  
  val_loss: 0.3540 - val_accuracy: 0.8346  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3263 - accuracy: 0.8451 -  
  val_loss: 0.3320 - val_accuracy: 0.8476  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3257 - accuracy: 0.8447 -  
  val_loss: 0.3239 - val_accuracy: 0.8498  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3156 - accuracy: 0.8488 -  
  val_loss: 0.3245 - val_accuracy: 0.8491  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3108 - accuracy: 0.8530 -  
  val_loss: 0.3500 - val_accuracy: 0.8416  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3101 - accuracy: 0.8485 -  
  val_loss: 0.3367 - val_accuracy: 0.8477  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2933 - accuracy: 0.8608 -  
  val_loss: 0.3276 - val_accuracy: 0.8530  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3071 - accuracy: 0.8565 -  
  val_loss: 0.3308 - val_accuracy: 0.8534  
150/150 [=====] - 0s 930us/step - loss: 0.3149 - accuracy: 0.8560  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4054 - accuracy: 0.7996 -  
  val_loss: 0.3781 - val_accuracy: 0.8242  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3612 - accuracy: 0.8308 -  
  val_loss: 0.3314 - val_accuracy: 0.8505  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3396 - accuracy: 0.8419 -  
  val_loss: 0.3264 - val_accuracy: 0.8538  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3292 - accuracy: 0.8426 -  
  val_loss: 0.3392 - val_accuracy: 0.8507  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3179 - accuracy: 0.8545 -  
  val_loss: 0.3642 - val_accuracy: 0.8448  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3245 - accuracy: 0.8421 -  
  val_loss: 0.3314 - val_accuracy: 0.8490  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3069 - accuracy: 0.8572 -  
  val_loss: 0.3265 - val_accuracy: 0.8538  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3107 - accuracy: 0.8547 -  
  val_loss: 0.3365 - val_accuracy: 0.8506  
150/150 [=====] - 0s 878us/step - loss: 0.3371 - accuracy: 0.8400  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4117 - accuracy: 0.7967 -  
  val_loss: 0.3473 - val_accuracy: 0.8398  
Epoch 2/50
```

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1350/1350 [=====] - 3s 2ms/step - loss: 0.3503 - accuracy: 0.8375 -  
val_loss: 0.3513 - val_accuracy: 0.8314  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3397 - accuracy: 0.8434 -  
val_loss: 0.3369 - val_accuracy: 0.8510  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3215 - accuracy: 0.8505 -  
val_loss: 0.3384 - val_accuracy: 0.8426  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3136 - accuracy: 0.8545 -  
val_loss: 0.3349 - val_accuracy: 0.8475  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3123 - accuracy: 0.8522 -  
val_loss: 0.3295 - val_accuracy: 0.8491  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3066 - accuracy: 0.8541 -  
val_loss: 0.3339 - val_accuracy: 0.8483  
Epoch 8/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.2990 - accuracy: 0.8627 -  
val_loss: 0.3413 - val_accuracy: 0.8451  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3043 - accuracy: 0.8545 -  
val_loss: 0.3370 - val_accuracy: 0.8458  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3013 - accuracy: 0.8608 -  
val_loss: 0.3362 - val_accuracy: 0.8493  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3035 - accuracy: 0.8606 -  
val_loss: 0.3518 - val_accuracy: 0.8442  
150/150 [=====] - 0s 932us/step - loss: 0.3506 - accuracy: 0.8480  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4132 - accuracy: 0.7982 -  
val_loss: 0.3543 - val_accuracy: 0.8404  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3412 - accuracy: 0.8379 -  
val_loss: 0.3461 - val_accuracy: 0.8417  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3322 - accuracy: 0.8405 -  
val_loss: 0.3291 - val_accuracy: 0.8527  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3229 - accuracy: 0.8451 -  
val_loss: 0.3351 - val_accuracy: 0.8481  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3273 - accuracy: 0.8460 -  
val_loss: 0.3280 - val_accuracy: 0.8508  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3122 - accuracy: 0.8556 -  
val_loss: 0.3256 - val_accuracy: 0.8474  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3162 - accuracy: 0.8530 -  
val_loss: 0.3401 - val_accuracy: 0.8402  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3079 - accuracy: 0.8522 -  
val_loss: 0.3385 - val_accuracy: 0.8496  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3247 - accuracy: 0.8445 -  
val_loss: 0.3365 - val_accuracy: 0.8513  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3016 - accuracy: 0.8544 -  
val_loss: 0.3433 - val_accuracy: 0.8387  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3039 - accuracy: 0.8528 -  
val_loss: 0.3363 - val_accuracy: 0.8489  
150/150 [=====] - 0s 970us/step - loss: 0.3241 - accuracy: 0.8500  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4161 - accuracy: 0.7971 -  
val_loss: 0.3672 - val_accuracy: 0.8318  
Epoch 2/50  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3511 - accuracy: 0.8309 -  
val_loss: 0.3359 - val_accuracy: 0.8488  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3338 - accuracy: 0.8433 -
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val_loss: 0.3440 - val_accuracy: 0.8447
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3298 - accuracy: 0.8442 -
val_loss: 0.3449 - val_accuracy: 0.8481
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3196 - accuracy: 0.8491 -
val_loss: 0.3291 - val_accuracy: 0.8502
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3096 - accuracy: 0.8533 -
val_loss: 0.3317 - val_accuracy: 0.8499
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3144 - accuracy: 0.8558 -
val_loss: 0.3370 - val_accuracy: 0.8468
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3058 - accuracy: 0.8554 -
val_loss: 0.3447 - val_accuracy: 0.8325
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8590 -
val_loss: 0.3395 - val_accuracy: 0.8456
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3021 - accuracy: 0.8586 -
val_loss: 0.3460 - val_accuracy: 0.8504
150/150 [=====] - 0s 977us/step - loss: 0.3402 - accuracy: 0.8473
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4182 - accuracy: 0.7948 -
val_loss: 0.3449 - val_accuracy: 0.8427
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3419 - accuracy: 0.8408 -
val_loss: 0.3347 - val_accuracy: 0.8466
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3224 - accuracy: 0.8501 -
val_loss: 0.3357 - val_accuracy: 0.8418
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3153 - accuracy: 0.8529 -
val_loss: 0.3300 - val_accuracy: 0.8498
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3177 - accuracy: 0.8532 -
val_loss: 0.3328 - val_accuracy: 0.8482
Epoch 6/50
1350/1350 [=====] - 2s 2ms/step - loss: 0.3173 - accuracy: 0.8501 -
val_loss: 0.3290 - val_accuracy: 0.8514
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8466 -
val_loss: 0.3324 - val_accuracy: 0.8515
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3136 - accuracy: 0.8488 -
val_loss: 0.3349 - val_accuracy: 0.8492
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3067 - accuracy: 0.8554 -
val_loss: 0.3369 - val_accuracy: 0.8531
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2986 - accuracy: 0.8592 -
val_loss: 0.3353 - val_accuracy: 0.8487
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2998 - accuracy: 0.8575 -
val_loss: 0.3420 - val_accuracy: 0.8449
150/150 [=====] - 0s 919us/step - loss: 0.3484 - accuracy: 0.8493
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4064 - accuracy: 0.8027 -
val_loss: 0.3440 - val_accuracy: 0.8391
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3399 - accuracy: 0.8393 -
val_loss: 0.3318 - val_accuracy: 0.8502
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3259 - accuracy: 0.8496 -
val_loss: 0.3268 - val_accuracy: 0.8520
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3204 - accuracy: 0.8448 -
val_loss: 0.3373 - val_accuracy: 0.8462
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3232 - accuracy: 0.8452 -
val_loss: 0.3290 - val_accuracy: 0.8472
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Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3126 - accuracy: 0.8518 -
val_loss: 0.3435 - val_accuracy: 0.8479
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3002 - accuracy: 0.8582 -
val_loss: 0.3351 - val_accuracy: 0.8492
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3078 - accuracy: 0.8566 -
val_loss: 0.3331 - val_accuracy: 0.8533
150/150 [=====] - 0s 996us/step - loss: 0.3415 - accuracy: 0.8427
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4155 - accuracy: 0.7957 -
val_loss: 0.3464 - val_accuracy: 0.8459
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3404 - accuracy: 0.8399 -
val_loss: 0.3359 - val_accuracy: 0.8498
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3340 - accuracy: 0.8458 -
val_loss: 0.3377 - val_accuracy: 0.8499
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3200 - accuracy: 0.8457 -
val_loss: 0.3303 - val_accuracy: 0.8477
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3145 - accuracy: 0.8525 -
val_loss: 0.3444 - val_accuracy: 0.8475
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3165 - accuracy: 0.8538 -
val_loss: 0.3392 - val_accuracy: 0.8408
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3127 - accuracy: 0.8517 -
val_loss: 0.3324 - val_accuracy: 0.8460
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3055 - accuracy: 0.8552 -
val_loss: 0.3345 - val_accuracy: 0.8502
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8588 -
val_loss: 0.3409 - val_accuracy: 0.8454
150/150 [=====] - 0s 977us/step - loss: 0.3288 - accuracy: 0.8513
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4143 - accuracy: 0.7979 -
val_loss: 0.3518 - val_accuracy: 0.8385
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3527 - accuracy: 0.8352 -
val_loss: 0.3469 - val_accuracy: 0.8475
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3355 - accuracy: 0.8417 -
val_loss: 0.3320 - val_accuracy: 0.8523
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3294 - accuracy: 0.8454 -
val_loss: 0.3305 - val_accuracy: 0.8498
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3265 - accuracy: 0.8461 -
val_loss: 0.3285 - val_accuracy: 0.8500
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3108 - accuracy: 0.8539 -
val_loss: 0.3322 - val_accuracy: 0.8509
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3124 - accuracy: 0.8528 -
val_loss: 0.3431 - val_accuracy: 0.8424
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3168 - accuracy: 0.8475 -
val_loss: 0.3694 - val_accuracy: 0.8158
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3081 - accuracy: 0.8531 -
val_loss: 0.3307 - val_accuracy: 0.8486
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3014 - accuracy: 0.8553 -
val_loss: 0.3499 - val_accuracy: 0.8496
150/150 [=====] - 0s 975us/step - loss: 0.3532 - accuracy: 0.8493
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4129 - accuracy: 0.7908 -
val_loss: 0.3520 - val_accuracy: 0.8414
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Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3542 - accuracy: 0.8362 -
val_loss: 0.3566 - val_accuracy: 0.8375
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3387 - accuracy: 0.8397 -
val_loss: 0.3378 - val_accuracy: 0.8424
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3225 - accuracy: 0.8518 -
val_loss: 0.3338 - val_accuracy: 0.8481
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3242 - accuracy: 0.8438 -
val_loss: 0.3276 - val_accuracy: 0.8461
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3233 - accuracy: 0.8404 -
val_loss: 0.3326 - val_accuracy: 0.8485
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3093 - accuracy: 0.8569 -
val_loss: 0.3329 - val_accuracy: 0.8454
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3047 - accuracy: 0.8610 -
val_loss: 0.3317 - val_accuracy: 0.8493
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8541 -
val_loss: 0.3387 - val_accuracy: 0.8465
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2904 - accuracy: 0.8697 -
val_loss: 0.3353 - val_accuracy: 0.8505
150/150 [=====] - 0s 988us/step - loss: 0.3380 - accuracy: 0.8380
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4214 - accuracy: 0.7901 -
val_loss: 0.3528 - val_accuracy: 0.8354
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3545 - accuracy: 0.8332 -
val_loss: 0.3399 - val_accuracy: 0.8409
Epoch 3/50
1350/1350 [=====] - 5s 3ms/step - loss: 0.3417 - accuracy: 0.8360 -
val_loss: 0.3483 - val_accuracy: 0.8375
Epoch 4/50
1350/1350 [=====] - 4s 3ms/step - loss: 0.3227 - accuracy: 0.8496 -
val_loss: 0.3292 - val_accuracy: 0.8501
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3239 - accuracy: 0.8470 -
val_loss: 0.3287 - val_accuracy: 0.8467
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3091 - accuracy: 0.8566 -
val_loss: 0.3316 - val_accuracy: 0.8462
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3126 - accuracy: 0.8550 -
val_loss: 0.3271 - val_accuracy: 0.8494
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3136 - accuracy: 0.8526 -
val_loss: 0.3294 - val_accuracy: 0.8511
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3062 - accuracy: 0.8585 -
val_loss: 0.3391 - val_accuracy: 0.8395
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2999 - accuracy: 0.8580 -
val_loss: 0.3419 - val_accuracy: 0.8509
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8521 -
val_loss: 0.3329 - val_accuracy: 0.8503
Epoch 12/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2963 - accuracy: 0.8581 -
val_loss: 0.3361 - val_accuracy: 0.8487
150/150 [=====] - 0s 1ms/step - loss: 0.3205 - accuracy: 0.8547
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4112 - accuracy: 0.7986 -
val_loss: 0.3473 - val_accuracy: 0.8405
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3521 - accuracy: 0.8352 -
val_loss: 0.3376 - val_accuracy: 0.8491
Epoch 3/50

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1350/1350 [=====] - 3s 2ms/step - loss: 0.3320 - accuracy: 0.8465 -  
  val_loss: 0.3328 - val_accuracy: 0.8427  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3209 - accuracy: 0.8485 -  
  val_loss: 0.3319 - val_accuracy: 0.8518  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3166 - accuracy: 0.8528 -  
  val_loss: 0.3264 - val_accuracy: 0.8494  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3236 - accuracy: 0.8481 -  
  val_loss: 0.3489 - val_accuracy: 0.8520  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3117 - accuracy: 0.8541 -  
  val_loss: 0.3308 - val_accuracy: 0.8484  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3076 - accuracy: 0.8522 -  
  val_loss: 0.3289 - val_accuracy: 0.8493  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3037 - accuracy: 0.8569 -  
  val_loss: 0.3277 - val_accuracy: 0.8509  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2935 - accuracy: 0.8645 -  
  val_loss: 0.3320 - val_accuracy: 0.8527  
150/150 [=====] - 0s 922us/step - loss: 0.3317 - accuracy: 0.8493  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4019 - accuracy: 0.8011 -  
  val_loss: 0.3360 - val_accuracy: 0.8426  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3299 - accuracy: 0.8481 -  
  val_loss: 0.3446 - val_accuracy: 0.8412  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3238 - accuracy: 0.8468 -  
  val_loss: 0.3375 - val_accuracy: 0.8399  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3246 - accuracy: 0.8436 -  
  val_loss: 0.3289 - val_accuracy: 0.8522  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3201 - accuracy: 0.8477 -  
  val_loss: 0.3291 - val_accuracy: 0.8480  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3111 - accuracy: 0.8538 -  
  val_loss: 0.3351 - val_accuracy: 0.8443  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3010 - accuracy: 0.8554 -  
  val_loss: 0.3396 - val_accuracy: 0.8514  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3116 - accuracy: 0.8539 -  
  val_loss: 0.3351 - val_accuracy: 0.8483  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3070 - accuracy: 0.8550 -  
  val_loss: 0.3551 - val_accuracy: 0.8518  
150/150 [=====] - 0s 975us/step - loss: 0.3379 - accuracy: 0.8593  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4156 - accuracy: 0.7886 -  
  val_loss: 0.3443 - val_accuracy: 0.8448  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3487 - accuracy: 0.8373 -  
  val_loss: 0.3320 - val_accuracy: 0.8492  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3318 - accuracy: 0.8473 -  
  val_loss: 0.3240 - val_accuracy: 0.8485  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3154 - accuracy: 0.8488 -  
  val_loss: 0.3341 - val_accuracy: 0.8511  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3199 - accuracy: 0.8487 -  
  val_loss: 0.3334 - val_accuracy: 0.8424  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8485 -  
  val_loss: 0.3319 - val_accuracy: 0.8442  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3234 - accuracy: 0.8478 -
```

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val_loss: 0.3342 - val_accuracy: 0.8432
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3180 - accuracy: 0.8458 -
val_loss: 0.3430 - val_accuracy: 0.8439
150/150 [=====] - 0s 979us/step - loss: 0.3375 - accuracy: 0.8553
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4017 - accuracy: 0.8029 -
val_loss: 0.3642 - val_accuracy: 0.8250
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3445 - accuracy: 0.8389 -
val_loss: 0.3361 - val_accuracy: 0.8448
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3279 - accuracy: 0.8464 -
val_loss: 0.3300 - val_accuracy: 0.8492
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3242 - accuracy: 0.8484 -
val_loss: 0.3295 - val_accuracy: 0.8507
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3156 - accuracy: 0.8526 -
val_loss: 0.3262 - val_accuracy: 0.8514
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3123 - accuracy: 0.8544 -
val_loss: 0.3301 - val_accuracy: 0.8434
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8552 -
val_loss: 0.3304 - val_accuracy: 0.8507
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3032 - accuracy: 0.8568 -
val_loss: 0.3343 - val_accuracy: 0.8499
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2946 - accuracy: 0.8592 -
val_loss: 0.3324 - val_accuracy: 0.8523
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2999 - accuracy: 0.8562 -
val_loss: 0.3436 - val_accuracy: 0.8482
150/150 [=====] - 0s 933us/step - loss: 0.3448 - accuracy: 0.8400
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3989 - accuracy: 0.8073 -
val_loss: 0.3463 - val_accuracy: 0.8434
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3361 - accuracy: 0.8402 -
val_loss: 0.3395 - val_accuracy: 0.8474
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3250 - accuracy: 0.8453 -
val_loss: 0.3366 - val_accuracy: 0.8374
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3230 - accuracy: 0.8456 -
val_loss: 0.3359 - val_accuracy: 0.8464
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3183 - accuracy: 0.8501 -
val_loss: 0.3260 - val_accuracy: 0.8517
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3085 - accuracy: 0.8562 -
val_loss: 0.3269 - val_accuracy: 0.8497
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3038 - accuracy: 0.8571 -
val_loss: 0.3337 - val_accuracy: 0.8500
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3086 - accuracy: 0.8516 -
val_loss: 0.3570 - val_accuracy: 0.8473
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3027 - accuracy: 0.8587 -
val_loss: 0.3442 - val_accuracy: 0.8472
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2951 - accuracy: 0.8602 -
val_loss: 0.3356 - val_accuracy: 0.8508
150/150 [=====] - 0s 925us/step - loss: 0.3397 - accuracy: 0.8487
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4060 - accuracy: 0.8022 -
val_loss: 0.3761 - val_accuracy: 0.8211
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3539 - accuracy: 0.8339 -
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val_loss: 0.3403 - val_accuracy: 0.8467
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3266 - accuracy: 0.8443 -
val_loss: 0.3500 - val_accuracy: 0.8346
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3268 - accuracy: 0.8492 -
val_loss: 0.3313 - val_accuracy: 0.8506
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3178 - accuracy: 0.8486 -
val_loss: 0.3319 - val_accuracy: 0.8529
Epoch 6/50
1350/1350 [=====] - 4s 3ms/step - loss: 0.3061 - accuracy: 0.8564 -
val_loss: 0.3391 - val_accuracy: 0.8368
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8545 -
val_loss: 0.3330 - val_accuracy: 0.8447
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3007 - accuracy: 0.8587 -
val_loss: 0.3397 - val_accuracy: 0.8406
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3068 - accuracy: 0.8508 -
val_loss: 0.3533 - val_accuracy: 0.8486
150/150 [=====] - 0s 909us/step - loss: 0.3623 - accuracy: 0.8440
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4101 - accuracy: 0.7973 -
val_loss: 0.3738 - val_accuracy: 0.8343
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3507 - accuracy: 0.8343 -
val_loss: 0.3361 - val_accuracy: 0.8504
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3337 - accuracy: 0.8448 -
val_loss: 0.3377 - val_accuracy: 0.8433
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3271 - accuracy: 0.8486 -
val_loss: 0.3270 - val_accuracy: 0.8507
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3177 - accuracy: 0.8484 -
val_loss: 0.3317 - val_accuracy: 0.8491
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3165 - accuracy: 0.8588 -
val_loss: 0.3466 - val_accuracy: 0.8511
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3089 - accuracy: 0.8549 -
val_loss: 0.3399 - val_accuracy: 0.8454
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3030 - accuracy: 0.8547 -
val_loss: 0.3353 - val_accuracy: 0.8481
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3051 - accuracy: 0.8559 -
val_loss: 0.3350 - val_accuracy: 0.8489
150/150 [=====] - 0s 951us/step - loss: 0.3358 - accuracy: 0.8487
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4086 - accuracy: 0.7967 -
val_loss: 0.3527 - val_accuracy: 0.8394
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3495 - accuracy: 0.8352 -
val_loss: 0.3357 - val_accuracy: 0.8487
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3364 - accuracy: 0.8393 -
val_loss: 0.3294 - val_accuracy: 0.8518
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3267 - accuracy: 0.8472 -
val_loss: 0.3317 - val_accuracy: 0.8476
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3213 - accuracy: 0.8518 -
val_loss: 0.3231 - val_accuracy: 0.8524
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8560 -
val_loss: 0.3495 - val_accuracy: 0.8313
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3107 - accuracy: 0.8524 -
val_loss: 0.3282 - val_accuracy: 0.8516
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Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3066 - accuracy: 0.8559 -
val_loss: 0.3352 - val_accuracy: 0.8439
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3024 - accuracy: 0.8562 -
val_loss: 0.3330 - val_accuracy: 0.8502
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3119 - accuracy: 0.8504 -
val_loss: 0.3321 - val_accuracy: 0.8483
150/150 [=====] - 0s 989us/step - loss: 0.3328 - accuracy: 0.8440
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4046 - accuracy: 0.8025 -
val_loss: 0.3531 - val_accuracy: 0.8379
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3603 - accuracy: 0.8307 -
val_loss: 0.3454 - val_accuracy: 0.8391
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3391 - accuracy: 0.8417 -
val_loss: 0.3358 - val_accuracy: 0.8531
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3302 - accuracy: 0.8418 -
val_loss: 0.3473 - val_accuracy: 0.8340
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3112 - accuracy: 0.8557 -
val_loss: 0.3354 - val_accuracy: 0.8493
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3163 - accuracy: 0.8520 -
val_loss: 0.3323 - val_accuracy: 0.8510
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3175 - accuracy: 0.8548 -
val_loss: 0.3439 - val_accuracy: 0.8485
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3100 - accuracy: 0.8488 -
val_loss: 0.3359 - val_accuracy: 0.8488
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3107 - accuracy: 0.8519 -
val_loss: 0.3385 - val_accuracy: 0.8507
Epoch 10/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3065 - accuracy: 0.8543 -
val_loss: 0.3408 - val_accuracy: 0.8445
Epoch 11/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.2858 - accuracy: 0.8635 -
val_loss: 0.3471 - val_accuracy: 0.8478
150/150 [=====] - 0s 986us/step - loss: 0.3378 - accuracy: 0.8427
Epoch 1/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.4209 - accuracy: 0.7896 -
val_loss: 0.3568 - val_accuracy: 0.8394
Epoch 2/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3458 - accuracy: 0.8380 -
val_loss: 0.3388 - val_accuracy: 0.8466
Epoch 3/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3425 - accuracy: 0.8356 -
val_loss: 0.3334 - val_accuracy: 0.8491
Epoch 4/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3360 - accuracy: 0.8415 -
val_loss: 0.3404 - val_accuracy: 0.8495
Epoch 5/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3150 - accuracy: 0.8474 -
val_loss: 0.3318 - val_accuracy: 0.8497
Epoch 6/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3209 - accuracy: 0.8454 -
val_loss: 0.3273 - val_accuracy: 0.8502
Epoch 7/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3125 - accuracy: 0.8574 -
val_loss: 0.3307 - val_accuracy: 0.8508
Epoch 8/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3064 - accuracy: 0.8565 -
val_loss: 0.3443 - val_accuracy: 0.8508
Epoch 9/50
1350/1350 [=====] - 3s 2ms/step - loss: 0.3153 - accuracy: 0.8507 -
val_loss: 0.3365 - val_accuracy: 0.8465
Epoch 10/50
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1350/1350 [=====] - 3s 2ms/step - loss: 0.3007 - accuracy: 0.8603 -  
  val_loss: 0.3426 - val_accuracy: 0.8495  
Epoch 11/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3000 - accuracy: 0.8561 -  
  val_loss: 0.3393 - val_accuracy: 0.8464  
150/150 [=====] - 0s 928us/step - loss: 0.3245 - accuracy: 0.8587  
Epoch 1/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4093 - accuracy: 0.7998 -  
  val_loss: 0.3407 - val_accuracy: 0.8423  
Epoch 2/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3390 - accuracy: 0.8426 -  
  val_loss: 0.3346 - val_accuracy: 0.8476  
Epoch 3/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3363 - accuracy: 0.8389 -  
  val_loss: 0.3282 - val_accuracy: 0.8548  
Epoch 4/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3271 - accuracy: 0.8470 -  
  val_loss: 0.3349 - val_accuracy: 0.8462  
Epoch 5/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3134 - accuracy: 0.8536 -  
  val_loss: 0.3269 - val_accuracy: 0.8499  
Epoch 6/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3239 - accuracy: 0.8420 -  
  val_loss: 0.3365 - val_accuracy: 0.8418  
Epoch 7/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3103 - accuracy: 0.8507 -  
  val_loss: 0.3973 - val_accuracy: 0.8380  
Epoch 8/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3094 - accuracy: 0.8511 -  
  val_loss: 0.3328 - val_accuracy: 0.8514  
Epoch 9/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3065 - accuracy: 0.8581 -  
  val_loss: 0.3409 - val_accuracy: 0.8492  
Epoch 10/50  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3024 - accuracy: 0.8534 -  
  val_loss: 0.3417 - val_accuracy: 0.8512  
150/150 [=====] - 0s 926us/step - loss: 0.3347 - accuracy: 0.8400  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4523 - accuracy: 0.7824 -  
  val_loss: 0.3710 - val_accuracy: 0.8328  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3684 - accuracy: 0.8273 -  
  val_loss: 0.3523 - val_accuracy: 0.8452  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3441 - accuracy: 0.8389 -  
  val_loss: 0.3371 - val_accuracy: 0.8500  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3281 - accuracy: 0.8495 -  
  val_loss: 0.3473 - val_accuracy: 0.8455  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3282 - accuracy: 0.8506 -  
  val_loss: 0.3315 - val_accuracy: 0.8536  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3245 - accuracy: 0.8509 -  
  val_loss: 0.3312 - val_accuracy: 0.8503  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3147 - accuracy: 0.8548 -  
  val_loss: 0.3345 - val_accuracy: 0.8530  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3127 - accuracy: 0.8535 -  
  val_loss: 0.3273 - val_accuracy: 0.8497  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3080 - accuracy: 0.8600 -  
  val_loss: 0.3372 - val_accuracy: 0.8449  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3048 - accuracy: 0.8574 -  
  val_loss: 0.3266 - val_accuracy: 0.8526  
Epoch 11/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3094 - accuracy: 0.8582 -  
  val_loss: 0.3296 - val_accuracy: 0.8525  
Epoch 12/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3045 - accuracy: 0.8568 -
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val_loss: 0.3280 - val_accuracy: 0.8502
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3052 - accuracy: 0.8570 -
val_loss: 0.3286 - val_accuracy: 0.8541
Epoch 14/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2974 - accuracy: 0.8606 -
val_loss: 0.3309 - val_accuracy: 0.8484
Epoch 15/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2968 - accuracy: 0.8607 -
val_loss: 0.3279 - val_accuracy: 0.8533
150/150 [=====] - 0s 925us/step - loss: 0.3201 - accuracy: 0.8580
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4493 - accuracy: 0.7939 -
val_loss: 0.3668 - val_accuracy: 0.8294
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3540 - accuracy: 0.8298 -
val_loss: 0.3377 - val_accuracy: 0.8400
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3328 - accuracy: 0.8422 -
val_loss: 0.3212 - val_accuracy: 0.8522
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3165 - accuracy: 0.8452 -
val_loss: 0.3222 - val_accuracy: 0.8508
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3122 - accuracy: 0.8511 -
val_loss: 0.3223 - val_accuracy: 0.8499
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3171 - accuracy: 0.8420 -
val_loss: 0.3280 - val_accuracy: 0.8528
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3139 - accuracy: 0.8554 -
val_loss: 0.3228 - val_accuracy: 0.8493
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3065 - accuracy: 0.8529 -
val_loss: 0.3230 - val_accuracy: 0.8510
150/150 [=====] - 0s 927us/step - loss: 0.3200 - accuracy: 0.8587
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4559 - accuracy: 0.7825 -
val_loss: 0.3560 - val_accuracy: 0.8387
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3537 - accuracy: 0.8349 -
val_loss: 0.3297 - val_accuracy: 0.8458
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3251 - accuracy: 0.8456 -
val_loss: 0.3490 - val_accuracy: 0.8339
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3193 - accuracy: 0.8489 -
val_loss: 0.3227 - val_accuracy: 0.8518
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3178 - accuracy: 0.8514 -
val_loss: 0.3233 - val_accuracy: 0.8496
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3113 - accuracy: 0.8552 -
val_loss: 0.3230 - val_accuracy: 0.8558
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3097 - accuracy: 0.8547 -
val_loss: 0.3261 - val_accuracy: 0.8474
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3117 - accuracy: 0.8539 -
val_loss: 0.3304 - val_accuracy: 0.8460
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3022 - accuracy: 0.8584 -
val_loss: 0.3227 - val_accuracy: 0.8516
150/150 [=====] - 0s 962us/step - loss: 0.3229 - accuracy: 0.8407
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4501 - accuracy: 0.7845 -
val_loss: 0.3506 - val_accuracy: 0.8327
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3459 - accuracy: 0.8315 -
val_loss: 0.3287 - val_accuracy: 0.8475
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3224 - accuracy: 0.8500 -
```

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val_loss: 0.3275 - val_accuracy: 0.8473
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3157 - accuracy: 0.8455 -
val_loss: 0.3274 - val_accuracy: 0.8517
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3204 - accuracy: 0.8503 -
val_loss: 0.3253 - val_accuracy: 0.8511
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8569 -
val_loss: 0.3286 - val_accuracy: 0.8467
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3096 - accuracy: 0.8502 -
val_loss: 0.3207 - val_accuracy: 0.8520
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3029 - accuracy: 0.8605 -
val_loss: 0.3270 - val_accuracy: 0.8504
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3025 - accuracy: 0.8562 -
val_loss: 0.3249 - val_accuracy: 0.8491
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3029 - accuracy: 0.8549 -
val_loss: 0.3308 - val_accuracy: 0.8503
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3011 - accuracy: 0.8608 -
val_loss: 0.3298 - val_accuracy: 0.8524
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3020 - accuracy: 0.8580 -
val_loss: 0.3299 - val_accuracy: 0.8526
150/150 [=====] - 0s 916us/step - loss: 0.3389 - accuracy: 0.8513
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4447 - accuracy: 0.7923 -
val_loss: 0.3575 - val_accuracy: 0.8349
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3496 - accuracy: 0.8345 -
val_loss: 0.3346 - val_accuracy: 0.8454
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3297 - accuracy: 0.8430 -
val_loss: 0.3250 - val_accuracy: 0.8515
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3151 - accuracy: 0.8508 -
val_loss: 0.3362 - val_accuracy: 0.8487
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8572 -
val_loss: 0.3248 - val_accuracy: 0.8504
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3207 - accuracy: 0.8445 -
val_loss: 0.3215 - val_accuracy: 0.8540
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3075 - accuracy: 0.8556 -
val_loss: 0.3254 - val_accuracy: 0.8530
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3058 - accuracy: 0.8573 -
val_loss: 0.3289 - val_accuracy: 0.8452
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3088 - accuracy: 0.8561 -
val_loss: 0.3230 - val_accuracy: 0.8525
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3090 - accuracy: 0.8519 -
val_loss: 0.3214 - val_accuracy: 0.8528
Epoch 11/100
1350/1350 [=====] - 3s 3ms/step - loss: 0.2890 - accuracy: 0.8608 -
val_loss: 0.3263 - val_accuracy: 0.8503
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3010 - accuracy: 0.8575 -
val_loss: 0.3246 - val_accuracy: 0.8499
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2996 - accuracy: 0.8579 -
val_loss: 0.3245 - val_accuracy: 0.8533
Epoch 14/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2938 - accuracy: 0.8612 -
val_loss: 0.3246 - val_accuracy: 0.8519
Epoch 15/100
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1350/1350 [=====] - 3s 2ms/step - loss: 0.2905 - accuracy: 0.8640 -  
  val_loss: 0.3367 - val_accuracy: 0.8481  
150/150 [=====] - 0s 918us/step - loss: 0.3523 - accuracy: 0.8447  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4535 - accuracy: 0.7823 -  
  val_loss: 0.3519 - val_accuracy: 0.8362  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3501 - accuracy: 0.8332 -  
  val_loss: 0.3385 - val_accuracy: 0.8413  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3280 - accuracy: 0.8456 -  
  val_loss: 0.3240 - val_accuracy: 0.8529  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3262 - accuracy: 0.8442 -  
  val_loss: 0.3236 - val_accuracy: 0.8548  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3159 - accuracy: 0.8520 -  
  val_loss: 0.3243 - val_accuracy: 0.8536  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8493 -  
  val_loss: 0.3225 - val_accuracy: 0.8512  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3130 - accuracy: 0.8550 -  
  val_loss: 0.3211 - val_accuracy: 0.8510  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3073 - accuracy: 0.8576 -  
  val_loss: 0.3264 - val_accuracy: 0.8480  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3117 - accuracy: 0.8538 -  
  val_loss: 0.3216 - val_accuracy: 0.8542  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2907 - accuracy: 0.8625 -  
  val_loss: 0.3335 - val_accuracy: 0.8435  
Epoch 11/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2980 - accuracy: 0.8557 -  
  val_loss: 0.3254 - val_accuracy: 0.8534  
Epoch 12/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3037 - accuracy: 0.8613 -  
  val_loss: 0.3258 - val_accuracy: 0.8490  
150/150 [=====] - 0s 970us/step - loss: 0.3214 - accuracy: 0.8500  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4617 - accuracy: 0.7874 -  
  val_loss: 0.3512 - val_accuracy: 0.8348  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3453 - accuracy: 0.8348 -  
  val_loss: 0.3295 - val_accuracy: 0.8487  
Epoch 3/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3212 - accuracy: 0.8472 -  
  val_loss: 0.3427 - val_accuracy: 0.8380  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3206 - accuracy: 0.8465 -  
  val_loss: 0.3255 - val_accuracy: 0.8483  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3112 - accuracy: 0.8531 -  
  val_loss: 0.3198 - val_accuracy: 0.8527  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3184 - accuracy: 0.8523 -  
  val_loss: 0.3198 - val_accuracy: 0.8526  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8533 -  
  val_loss: 0.3213 - val_accuracy: 0.8504  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3150 - accuracy: 0.8536 -  
  val_loss: 0.3238 - val_accuracy: 0.8480  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3035 - accuracy: 0.8575 -  
  val_loss: 0.3197 - val_accuracy: 0.8511  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3035 - accuracy: 0.8592 -  
  val_loss: 0.3256 - val_accuracy: 0.8523  
Epoch 11/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.2960 - accuracy: 0.8638 -
```

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val_loss: 0.3212 - val_accuracy: 0.8531
Epoch 12/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2956 - accuracy: 0.8588 -
val_loss: 0.3226 - val_accuracy: 0.8510
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3073 - accuracy: 0.8541 -
val_loss: 0.3300 - val_accuracy: 0.8468
Epoch 14/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2925 - accuracy: 0.8617 -
val_loss: 0.3352 - val_accuracy: 0.8474
150/150 [=====] - 0s 918us/step - loss: 0.3337 - accuracy: 0.8487
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4510 - accuracy: 0.7925 -
val_loss: 0.3523 - val_accuracy: 0.8360
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3521 - accuracy: 0.8347 -
val_loss: 0.3324 - val_accuracy: 0.8427
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3227 - accuracy: 0.8475 -
val_loss: 0.3261 - val_accuracy: 0.8520
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3113 - accuracy: 0.8536 -
val_loss: 0.3219 - val_accuracy: 0.8530
Epoch 5/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3152 - accuracy: 0.8496 -
val_loss: 0.3237 - val_accuracy: 0.8544
Epoch 6/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3136 - accuracy: 0.8539 -
val_loss: 0.3202 - val_accuracy: 0.8528
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3100 - accuracy: 0.8556 -
val_loss: 0.3209 - val_accuracy: 0.8544
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3112 - accuracy: 0.8548 -
val_loss: 0.3237 - val_accuracy: 0.8477
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3017 - accuracy: 0.8604 -
val_loss: 0.3226 - val_accuracy: 0.8528
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3001 - accuracy: 0.8598 -
val_loss: 0.3370 - val_accuracy: 0.8465
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3053 - accuracy: 0.8575 -
val_loss: 0.3283 - val_accuracy: 0.8493
150/150 [=====] - 0s 893us/step - loss: 0.3338 - accuracy: 0.8400
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4567 - accuracy: 0.7824 -
val_loss: 0.3512 - val_accuracy: 0.8384
Epoch 2/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3499 - accuracy: 0.8367 -
val_loss: 0.3395 - val_accuracy: 0.8417
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3374 - accuracy: 0.8395 -
val_loss: 0.3214 - val_accuracy: 0.8516
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3289 - accuracy: 0.8466 -
val_loss: 0.3259 - val_accuracy: 0.8517
Epoch 5/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3165 - accuracy: 0.8495 -
val_loss: 0.3269 - val_accuracy: 0.8527
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3104 - accuracy: 0.8597 -
val_loss: 0.3212 - val_accuracy: 0.8547
Epoch 7/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3262 - accuracy: 0.8452 -
val_loss: 0.3215 - val_accuracy: 0.8521
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3177 - accuracy: 0.8501 -
val_loss: 0.3204 - val_accuracy: 0.8525
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3147 - accuracy: 0.8535 -
val_loss: 0.3312 - val_accuracy: 0.8501
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Epoch 10/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3097 - accuracy: 0.8542 -
val_loss: 0.3199 - val_accuracy: 0.8518
Epoch 11/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3075 - accuracy: 0.8566 -
val_loss: 0.3189 - val_accuracy: 0.8538
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3080 - accuracy: 0.8541 -
val_loss: 0.3247 - val_accuracy: 0.8493
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2970 - accuracy: 0.8570 -
val_loss: 0.3224 - val_accuracy: 0.8517
Epoch 14/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3020 - accuracy: 0.8566 -
val_loss: 0.3254 - val_accuracy: 0.8519
Epoch 15/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3018 - accuracy: 0.8593 -
val_loss: 0.3254 - val_accuracy: 0.8519
Epoch 16/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3001 - accuracy: 0.8612 -
val_loss: 0.3265 - val_accuracy: 0.8495
150/150 [=====] - 0s 889us/step - loss: 0.3191 - accuracy: 0.8560
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4485 - accuracy: 0.7911 -
val_loss: 0.3518 - val_accuracy: 0.8370
Epoch 2/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3508 - accuracy: 0.8347 -
val_loss: 0.3392 - val_accuracy: 0.8407
Epoch 3/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3218 - accuracy: 0.8508 -
val_loss: 0.3305 - val_accuracy: 0.8478
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3177 - accuracy: 0.8515 -
val_loss: 0.3314 - val_accuracy: 0.8497
Epoch 5/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3192 - accuracy: 0.8542 -
val_loss: 0.3280 - val_accuracy: 0.8521
Epoch 6/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3197 - accuracy: 0.8517 -
val_loss: 0.3221 - val_accuracy: 0.8518
Epoch 7/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3162 - accuracy: 0.8530 -
val_loss: 0.3344 - val_accuracy: 0.8418
Epoch 8/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3038 - accuracy: 0.8550 -
val_loss: 0.3202 - val_accuracy: 0.8553
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3148 - accuracy: 0.8525 -
val_loss: 0.3260 - val_accuracy: 0.8497
Epoch 10/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3048 - accuracy: 0.8541 -
val_loss: 0.3245 - val_accuracy: 0.8517
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2987 - accuracy: 0.8568 -
val_loss: 0.3224 - val_accuracy: 0.8532
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2985 - accuracy: 0.8588 -
val_loss: 0.3260 - val_accuracy: 0.8515
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3022 - accuracy: 0.8557 -
val_loss: 0.3224 - val_accuracy: 0.8530
150/150 [=====] - 0s 1ms/step - loss: 0.3219 - accuracy: 0.8453
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4555 - accuracy: 0.7903 -
val_loss: 0.3467 - val_accuracy: 0.8393
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3542 - accuracy: 0.8278 -
val_loss: 0.3287 - val_accuracy: 0.8481
Epoch 3/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3258 - accuracy: 0.8436 -
val_loss: 0.3237 - val_accuracy: 0.8512
Epoch 4/100

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1350/1350 [=====] - 2s 2ms/step - loss: 0.3115 - accuracy: 0.8523 -  
  val_loss: 0.3290 - val_accuracy: 0.8477  
Epoch 5/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3126 - accuracy: 0.8546 -  
  val_loss: 0.3287 - val_accuracy: 0.8439  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3095 - accuracy: 0.8544 -  
  val_loss: 0.3280 - val_accuracy: 0.8468  
Epoch 7/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3233 - accuracy: 0.8473 -  
  val_loss: 0.3210 - val_accuracy: 0.8527  
Epoch 8/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3084 - accuracy: 0.8527 -  
  val_loss: 0.3215 - val_accuracy: 0.8515  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3095 - accuracy: 0.8547 -  
  val_loss: 0.3205 - val_accuracy: 0.8513  
Epoch 10/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3043 - accuracy: 0.8573 -  
  val_loss: 0.3244 - val_accuracy: 0.8483  
Epoch 11/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3061 - accuracy: 0.8554 -  
  val_loss: 0.3246 - val_accuracy: 0.8514  
Epoch 12/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3012 - accuracy: 0.8565 -  
  val_loss: 0.3236 - val_accuracy: 0.8511  
Epoch 13/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2930 - accuracy: 0.8600 -  
  val_loss: 0.3252 - val_accuracy: 0.8499  
Epoch 14/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.2931 - accuracy: 0.8619 -  
  val_loss: 0.3293 - val_accuracy: 0.8508  
150/150 [=====] - 0s 996us/step - loss: 0.3184 - accuracy: 0.8580  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4502 - accuracy: 0.7954 -  
  val_loss: 0.3487 - val_accuracy: 0.8350  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3401 - accuracy: 0.8437 -  
  val_loss: 0.3270 - val_accuracy: 0.8482  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3248 - accuracy: 0.8445 -  
  val_loss: 0.3252 - val_accuracy: 0.8526  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3203 - accuracy: 0.8513 -  
  val_loss: 0.3291 - val_accuracy: 0.8459  
Epoch 5/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3288 - accuracy: 0.8415 -  
  val_loss: 0.3282 - val_accuracy: 0.8495  
Epoch 6/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3142 - accuracy: 0.8504 -  
  val_loss: 0.3279 - val_accuracy: 0.8449  
Epoch 7/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3123 - accuracy: 0.8537 -  
  val_loss: 0.3242 - val_accuracy: 0.8490  
Epoch 8/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3085 - accuracy: 0.8515 -  
  val_loss: 0.3261 - val_accuracy: 0.8461  
Epoch 9/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3023 - accuracy: 0.8554 -  
  val_loss: 0.3267 - val_accuracy: 0.8506  
Epoch 10/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3128 - accuracy: 0.8507 -  
  val_loss: 0.3307 - val_accuracy: 0.8458  
Epoch 11/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3056 - accuracy: 0.8553 -  
  val_loss: 0.3303 - val_accuracy: 0.8539  
Epoch 12/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3012 - accuracy: 0.8562 -  
  val_loss: 0.3306 - val_accuracy: 0.8517  
150/150 [=====] - 0s 920us/step - loss: 0.3200 - accuracy: 0.8573  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4402 - accuracy: 0.7911 -
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val_loss: 0.3480 - val_accuracy: 0.8359
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3506 - accuracy: 0.8349 -
val_loss: 0.3312 - val_accuracy: 0.8488
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3348 - accuracy: 0.8428 -
val_loss: 0.3230 - val_accuracy: 0.8511
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3225 - accuracy: 0.8479 -
val_loss: 0.3329 - val_accuracy: 0.8492
Epoch 5/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3188 - accuracy: 0.8523 -
val_loss: 0.3221 - val_accuracy: 0.8489
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3081 - accuracy: 0.8565 -
val_loss: 0.3401 - val_accuracy: 0.8454
Epoch 7/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3127 - accuracy: 0.8542 -
val_loss: 0.3231 - val_accuracy: 0.8552
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3120 - accuracy: 0.8484 -
val_loss: 0.3270 - val_accuracy: 0.8495
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3089 - accuracy: 0.8602 -
val_loss: 0.3215 - val_accuracy: 0.8514
Epoch 10/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3075 - accuracy: 0.8557 -
val_loss: 0.3220 - val_accuracy: 0.8519
Epoch 11/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2995 - accuracy: 0.8597 -
val_loss: 0.3339 - val_accuracy: 0.8450
Epoch 12/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2992 - accuracy: 0.8617 -
val_loss: 0.3266 - val_accuracy: 0.8503
Epoch 13/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2963 - accuracy: 0.8610 -
val_loss: 0.3245 - val_accuracy: 0.8490
Epoch 14/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2942 - accuracy: 0.8617 -
val_loss: 0.3305 - val_accuracy: 0.8525
150/150 [=====] - 0s 1ms/step - loss: 0.3270 - accuracy: 0.8507
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4448 - accuracy: 0.7940 -
val_loss: 0.3477 - val_accuracy: 0.8379
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3500 - accuracy: 0.8364 -
val_loss: 0.3365 - val_accuracy: 0.8419
Epoch 3/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3231 - accuracy: 0.8478 -
val_loss: 0.3342 - val_accuracy: 0.8463
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3213 - accuracy: 0.8489 -
val_loss: 0.3206 - val_accuracy: 0.8554
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3215 - accuracy: 0.8455 -
val_loss: 0.3228 - val_accuracy: 0.8537
Epoch 6/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3134 - accuracy: 0.8516 -
val_loss: 0.3258 - val_accuracy: 0.8501
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3137 - accuracy: 0.8506 -
val_loss: 0.3232 - val_accuracy: 0.8512
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3143 - accuracy: 0.8497 -
val_loss: 0.3238 - val_accuracy: 0.8507
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3067 - accuracy: 0.8539 -
val_loss: 0.3285 - val_accuracy: 0.8478
150/150 [=====] - 0s 955us/step - loss: 0.3333 - accuracy: 0.8480
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4505 - accuracy: 0.7891 -
val_loss: 0.3600 - val_accuracy: 0.8369
```

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Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3505 - accuracy: 0.8331 -
val_loss: 0.3258 - val_accuracy: 0.8518
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3256 - accuracy: 0.8438 -
val_loss: 0.3269 - val_accuracy: 0.8475
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3272 - accuracy: 0.8472 -
val_loss: 0.3265 - val_accuracy: 0.8494
Epoch 5/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3146 - accuracy: 0.8544 -
val_loss: 0.3308 - val_accuracy: 0.8495
Epoch 6/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3109 - accuracy: 0.8496 -
val_loss: 0.3365 - val_accuracy: 0.8471
Epoch 7/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3026 - accuracy: 0.8581 -
val_loss: 0.3223 - val_accuracy: 0.8520
Epoch 8/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3050 - accuracy: 0.8568 -
val_loss: 0.3216 - val_accuracy: 0.8508
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2993 - accuracy: 0.8604 -
val_loss: 0.3219 - val_accuracy: 0.8520
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2967 - accuracy: 0.8630 -
val_loss: 0.3386 - val_accuracy: 0.8457
Epoch 11/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2959 - accuracy: 0.8616 -
val_loss: 0.3255 - val_accuracy: 0.8503
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2926 - accuracy: 0.8628 -
val_loss: 0.3267 - val_accuracy: 0.8504
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2875 - accuracy: 0.8668 -
val_loss: 0.3348 - val_accuracy: 0.8505
150/150 [=====] - 0s 946us/step - loss: 0.3535 - accuracy: 0.8427
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4414 - accuracy: 0.7936 -
val_loss: 0.3490 - val_accuracy: 0.8376
Epoch 2/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3614 - accuracy: 0.8279 -
val_loss: 0.3376 - val_accuracy: 0.8420
Epoch 3/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3177 - accuracy: 0.8487 -
val_loss: 0.3262 - val_accuracy: 0.8483
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3176 - accuracy: 0.8511 -
val_loss: 0.3249 - val_accuracy: 0.8530
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3158 - accuracy: 0.8509 -
val_loss: 0.3231 - val_accuracy: 0.8505
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3148 - accuracy: 0.8501 -
val_loss: 0.3257 - val_accuracy: 0.8518
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3124 - accuracy: 0.8556 -
val_loss: 0.3313 - val_accuracy: 0.8503
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3093 - accuracy: 0.8540 -
val_loss: 0.3249 - val_accuracy: 0.8528
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3039 - accuracy: 0.8578 -
val_loss: 0.3266 - val_accuracy: 0.8512
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3046 - accuracy: 0.8559 -
val_loss: 0.3280 - val_accuracy: 0.8511
150/150 [=====] - 0s 902us/step - loss: 0.3248 - accuracy: 0.8540
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4458 - accuracy: 0.7915 -
val_loss: 0.3548 - val_accuracy: 0.8344
Epoch 2/100
```



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1350/1350 [=====] - 3s 2ms/step - loss: 0.3498 - accuracy: 0.8332 -  
  val_loss: 0.3362 - val_accuracy: 0.8482  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3340 - accuracy: 0.8425 -  
  val_loss: 0.3319 - val_accuracy: 0.8495  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3201 - accuracy: 0.8497 -  
  val_loss: 0.3222 - val_accuracy: 0.8528  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3233 - accuracy: 0.8484 -  
  val_loss: 0.3250 - val_accuracy: 0.8475  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3136 - accuracy: 0.8523 -  
  val_loss: 0.3244 - val_accuracy: 0.8500  
Epoch 7/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3151 - accuracy: 0.8501 -  
  val_loss: 0.3215 - val_accuracy: 0.8518  
Epoch 8/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3080 - accuracy: 0.8544 -  
  val_loss: 0.3351 - val_accuracy: 0.8471  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3031 - accuracy: 0.8588 -  
  val_loss: 0.3240 - val_accuracy: 0.8537  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2999 - accuracy: 0.8598 -  
  val_loss: 0.3242 - val_accuracy: 0.8510  
Epoch 11/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3038 - accuracy: 0.8568 -  
  val_loss: 0.3259 - val_accuracy: 0.8530  
Epoch 12/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.2958 - accuracy: 0.8651 -  
  val_loss: 0.3256 - val_accuracy: 0.8528  
150/150 [=====] - 0s 940us/step - loss: 0.3214 - accuracy: 0.8547  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4514 - accuracy: 0.7905 -  
  val_loss: 0.3515 - val_accuracy: 0.8362  
Epoch 2/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3557 - accuracy: 0.8290 -  
  val_loss: 0.3293 - val_accuracy: 0.8470  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3293 - accuracy: 0.8446 -  
  val_loss: 0.3229 - val_accuracy: 0.8521  
Epoch 4/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.3235 - accuracy: 0.8462 -  
  val_loss: 0.3221 - val_accuracy: 0.8524  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3191 - accuracy: 0.8456 -  
  val_loss: 0.3243 - val_accuracy: 0.8545  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3144 - accuracy: 0.8515 -  
  val_loss: 0.3207 - val_accuracy: 0.8514  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8515 -  
  val_loss: 0.3211 - val_accuracy: 0.8516  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3118 - accuracy: 0.8509 -  
  val_loss: 0.3232 - val_accuracy: 0.8499  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3031 - accuracy: 0.8576 -  
  val_loss: 0.3228 - val_accuracy: 0.8521  
Epoch 10/100  
1350/1350 [=====] - 2s 2ms/step - loss: 0.2988 - accuracy: 0.8633 -  
  val_loss: 0.3332 - val_accuracy: 0.8423  
Epoch 11/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3039 - accuracy: 0.8550 -  
  val_loss: 0.3254 - val_accuracy: 0.8516  
150/150 [=====] - 0s 926us/step - loss: 0.3286 - accuracy: 0.8453  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4521 - accuracy: 0.7908 -  
  val_loss: 0.3536 - val_accuracy: 0.8397  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3530 - accuracy: 0.8345 -
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val_loss: 0.3311 - val_accuracy: 0.8453
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3337 - accuracy: 0.8434 -
val_loss: 0.3276 - val_accuracy: 0.8466
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3228 - accuracy: 0.8467 -
val_loss: 0.3304 - val_accuracy: 0.8431
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3153 - accuracy: 0.8507 -
val_loss: 0.3209 - val_accuracy: 0.8536
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8526 -
val_loss: 0.3216 - val_accuracy: 0.8511
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3191 - accuracy: 0.8516 -
val_loss: 0.3322 - val_accuracy: 0.8438
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3068 - accuracy: 0.8547 -
val_loss: 0.3259 - val_accuracy: 0.8505
Epoch 9/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3106 - accuracy: 0.8562 -
val_loss: 0.3260 - val_accuracy: 0.8469
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3058 - accuracy: 0.8546 -
val_loss: 0.3279 - val_accuracy: 0.8480
150/150 [=====] - 0s 981us/step - loss: 0.3224 - accuracy: 0.8427
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4566 - accuracy: 0.7873 -
val_loss: 0.3612 - val_accuracy: 0.8368
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3521 - accuracy: 0.8380 -
val_loss: 0.3359 - val_accuracy: 0.8489
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3290 - accuracy: 0.8448 -
val_loss: 0.3283 - val_accuracy: 0.8465
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3233 - accuracy: 0.8511 -
val_loss: 0.3302 - val_accuracy: 0.8427
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3128 - accuracy: 0.8527 -
val_loss: 0.3213 - val_accuracy: 0.8518
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3122 - accuracy: 0.8526 -
val_loss: 0.3216 - val_accuracy: 0.8535
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3049 - accuracy: 0.8553 -
val_loss: 0.3213 - val_accuracy: 0.8517
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2998 - accuracy: 0.8625 -
val_loss: 0.3244 - val_accuracy: 0.8532
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3040 - accuracy: 0.8573 -
val_loss: 0.3236 - val_accuracy: 0.8501
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2917 - accuracy: 0.8647 -
val_loss: 0.3267 - val_accuracy: 0.8486
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3000 - accuracy: 0.8636 -
val_loss: 0.3242 - val_accuracy: 0.8541
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2921 - accuracy: 0.8633 -
val_loss: 0.3248 - val_accuracy: 0.8514
150/150 [=====] - 0s 1ms/step - loss: 0.3279 - accuracy: 0.8467
Epoch 1/100
1350/1350 [=====] - 4s 2ms/step - loss: 0.4422 - accuracy: 0.7926 -
val_loss: 0.3491 - val_accuracy: 0.8397
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3473 - accuracy: 0.8388 -
val_loss: 0.3280 - val_accuracy: 0.8489
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3192 - accuracy: 0.8473 -
val_loss: 0.3238 - val_accuracy: 0.8501
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Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3191 - accuracy: 0.8520 -
val_loss: 0.3230 - val_accuracy: 0.8516
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3224 - accuracy: 0.8463 -
val_loss: 0.3293 - val_accuracy: 0.8463
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3170 - accuracy: 0.8500 -
val_loss: 0.3203 - val_accuracy: 0.8523
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3082 - accuracy: 0.8551 -
val_loss: 0.3242 - val_accuracy: 0.8505
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2981 - accuracy: 0.8606 -
val_loss: 0.3265 - val_accuracy: 0.8522
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3048 - accuracy: 0.8540 -
val_loss: 0.3281 - val_accuracy: 0.8460
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3108 - accuracy: 0.8518 -
val_loss: 0.3239 - val_accuracy: 0.8524
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2947 - accuracy: 0.8616 -
val_loss: 0.3378 - val_accuracy: 0.8503
150/150 [=====] - 0s 964us/step - loss: 0.3269 - accuracy: 0.8580
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4453 - accuracy: 0.7924 -
val_loss: 0.3528 - val_accuracy: 0.8379
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3460 - accuracy: 0.8369 -
val_loss: 0.3307 - val_accuracy: 0.8478
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3392 - accuracy: 0.8409 -
val_loss: 0.3247 - val_accuracy: 0.8523
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3187 - accuracy: 0.8527 -
val_loss: 0.3229 - val_accuracy: 0.8521
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3110 - accuracy: 0.8507 -
val_loss: 0.3255 - val_accuracy: 0.8473
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3099 - accuracy: 0.8513 -
val_loss: 0.3253 - val_accuracy: 0.8493
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3123 - accuracy: 0.8498 -
val_loss: 0.3287 - val_accuracy: 0.8470
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3051 - accuracy: 0.8549 -
val_loss: 0.3271 - val_accuracy: 0.8482
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3106 - accuracy: 0.8541 -
val_loss: 0.3435 - val_accuracy: 0.8468
150/150 [=====] - 0s 913us/step - loss: 0.3372 - accuracy: 0.8533
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4469 - accuracy: 0.7945 -
val_loss: 0.3503 - val_accuracy: 0.8383
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3511 - accuracy: 0.8325 -
val_loss: 0.3322 - val_accuracy: 0.8489
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3282 - accuracy: 0.8455 -
val_loss: 0.3307 - val_accuracy: 0.8475
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3229 - accuracy: 0.8495 -
val_loss: 0.3233 - val_accuracy: 0.8531
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3166 - accuracy: 0.8510 -
val_loss: 0.3306 - val_accuracy: 0.8423
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3157 - accuracy: 0.8506 -
val_loss: 0.3202 - val_accuracy: 0.8521
Epoch 7/100
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1350/1350 [=====] - 3s 2ms/step - loss: 0.3111 - accuracy: 0.8539 -  
  val_loss: 0.3235 - val_accuracy: 0.8539  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3127 - accuracy: 0.8531 -  
  val_loss: 0.3212 - val_accuracy: 0.8511  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3008 - accuracy: 0.8585 -  
  val_loss: 0.3259 - val_accuracy: 0.8520  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3046 - accuracy: 0.8562 -  
  val_loss: 0.3309 - val_accuracy: 0.8425  
Epoch 11/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3088 - accuracy: 0.8565 -  
  val_loss: 0.3268 - val_accuracy: 0.8514  
150/150 [=====] - 0s 899us/step - loss: 0.3243 - accuracy: 0.8487  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4514 - accuracy: 0.7902 -  
  val_loss: 0.3563 - val_accuracy: 0.8325  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3494 - accuracy: 0.8303 -  
  val_loss: 0.3274 - val_accuracy: 0.8480  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3265 - accuracy: 0.8508 -  
  val_loss: 0.3276 - val_accuracy: 0.8485  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3155 - accuracy: 0.8499 -  
  val_loss: 0.3241 - val_accuracy: 0.8508  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3234 - accuracy: 0.8442 -  
  val_loss: 0.3277 - val_accuracy: 0.8502  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3096 - accuracy: 0.8554 -  
  val_loss: 0.3271 - val_accuracy: 0.8499  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8562 -  
  val_loss: 0.3262 - val_accuracy: 0.8469  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3091 - accuracy: 0.8498 -  
  val_loss: 0.3256 - val_accuracy: 0.8485  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2979 - accuracy: 0.8614 -  
  val_loss: 0.3230 - val_accuracy: 0.8501  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3015 - accuracy: 0.8563 -  
  val_loss: 0.3269 - val_accuracy: 0.8489  
Epoch 11/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2927 - accuracy: 0.8613 -  
  val_loss: 0.3261 - val_accuracy: 0.8523  
Epoch 12/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3001 - accuracy: 0.8567 -  
  val_loss: 0.3283 - val_accuracy: 0.8516  
Epoch 13/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2943 - accuracy: 0.8612 -  
  val_loss: 0.3295 - val_accuracy: 0.8483  
Epoch 14/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2866 - accuracy: 0.8652 -  
  val_loss: 0.3322 - val_accuracy: 0.8464  
150/150 [=====] - 0s 1ms/step - loss: 0.3336 - accuracy: 0.8573  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4435 - accuracy: 0.7971 -  
  val_loss: 0.3425 - val_accuracy: 0.8417  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3499 - accuracy: 0.8332 -  
  val_loss: 0.3261 - val_accuracy: 0.8497  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3207 - accuracy: 0.8498 -  
  val_loss: 0.3362 - val_accuracy: 0.8422  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3090 - accuracy: 0.8588 -  
  val_loss: 0.3233 - val_accuracy: 0.8517  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3165 - accuracy: 0.8529 -
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val_loss: 0.3254 - val_accuracy: 0.8456
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3149 - accuracy: 0.8505 -
val_loss: 0.3289 - val_accuracy: 0.8489
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3036 - accuracy: 0.8598 -
val_loss: 0.3277 - val_accuracy: 0.8454
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3043 - accuracy: 0.8572 -
val_loss: 0.3226 - val_accuracy: 0.8522
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3037 - accuracy: 0.8598 -
val_loss: 0.3220 - val_accuracy: 0.8519
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2983 - accuracy: 0.8621 -
val_loss: 0.3264 - val_accuracy: 0.8524
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2991 - accuracy: 0.8576 -
val_loss: 0.3309 - val_accuracy: 0.8528
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3013 - accuracy: 0.8591 -
val_loss: 0.3307 - val_accuracy: 0.8487
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2840 - accuracy: 0.8677 -
val_loss: 0.3323 - val_accuracy: 0.8519
Epoch 14/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2942 - accuracy: 0.8611 -
val_loss: 0.3301 - val_accuracy: 0.8527
150/150 [=====] - 0s 946us/step - loss: 0.3485 - accuracy: 0.8320
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4410 - accuracy: 0.8013 -
val_loss: 0.3598 - val_accuracy: 0.8349
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3424 - accuracy: 0.8371 -
val_loss: 0.3534 - val_accuracy: 0.8331
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8479 -
val_loss: 0.3378 - val_accuracy: 0.8431
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8454 -
val_loss: 0.3223 - val_accuracy: 0.8521
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3120 - accuracy: 0.8530 -
val_loss: 0.3377 - val_accuracy: 0.8460
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3142 - accuracy: 0.8518 -
val_loss: 0.3206 - val_accuracy: 0.8518
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3101 - accuracy: 0.8555 -
val_loss: 0.3277 - val_accuracy: 0.8479
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3056 - accuracy: 0.8568 -
val_loss: 0.3232 - val_accuracy: 0.8538
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3068 - accuracy: 0.8540 -
val_loss: 0.3298 - val_accuracy: 0.8467
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3028 - accuracy: 0.8571 -
val_loss: 0.3265 - val_accuracy: 0.8511
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2990 - accuracy: 0.8578 -
val_loss: 0.3254 - val_accuracy: 0.8517
150/150 [=====] - 0s 969us/step - loss: 0.3249 - accuracy: 0.8540
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4347 - accuracy: 0.8055 -
val_loss: 0.3475 - val_accuracy: 0.8375
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3463 - accuracy: 0.8347 -
val_loss: 0.3314 - val_accuracy: 0.8483
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3276 - accuracy: 0.8463 -
val_loss: 0.3256 - val_accuracy: 0.8505
```

Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3170 - accuracy: 0.8519 -
val_loss: 0.3293 - val_accuracy: 0.8433
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3095 - accuracy: 0.8539 -
val_loss: 0.3218 - val_accuracy: 0.8511
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3143 - accuracy: 0.8493 -
val_loss: 0.3221 - val_accuracy: 0.8497
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3127 - accuracy: 0.8529 -
val_loss: 0.3399 - val_accuracy: 0.8468
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3145 - accuracy: 0.8516 -
val_loss: 0.3276 - val_accuracy: 0.8478
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3078 - accuracy: 0.8537 -
val_loss: 0.3201 - val_accuracy: 0.8551
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8580 -
val_loss: 0.3198 - val_accuracy: 0.8548
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3024 - accuracy: 0.8579 -
val_loss: 0.3250 - val_accuracy: 0.8520
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3021 - accuracy: 0.8583 -
val_loss: 0.3257 - val_accuracy: 0.8518
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2995 - accuracy: 0.8588 -
val_loss: 0.3308 - val_accuracy: 0.8486
Epoch 14/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2889 - accuracy: 0.8688 -
val_loss: 0.3301 - val_accuracy: 0.8529
Epoch 15/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2904 - accuracy: 0.8639 -
val_loss: 0.3288 - val_accuracy: 0.8505
150/150 [=====] - 0s 917us/step - loss: 0.3313 - accuracy: 0.8500
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4350 - accuracy: 0.7988 -
val_loss: 0.3459 - val_accuracy: 0.8398
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3475 - accuracy: 0.8350 -
val_loss: 0.3349 - val_accuracy: 0.8456
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3228 - accuracy: 0.8495 -
val_loss: 0.3229 - val_accuracy: 0.8532
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3242 - accuracy: 0.8463 -
val_loss: 0.3253 - val_accuracy: 0.8504
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3112 - accuracy: 0.8526 -
val_loss: 0.3221 - val_accuracy: 0.8511
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3202 - accuracy: 0.8487 -
val_loss: 0.3222 - val_accuracy: 0.8509
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3028 - accuracy: 0.8587 -
val_loss: 0.3299 - val_accuracy: 0.8470
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3027 - accuracy: 0.8570 -
val_loss: 0.3244 - val_accuracy: 0.8521
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8566 -
val_loss: 0.3287 - val_accuracy: 0.8488
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3060 - accuracy: 0.8557 -
val_loss: 0.3264 - val_accuracy: 0.8485
150/150 [=====] - 0s 918us/step - loss: 0.3289 - accuracy: 0.8407
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4444 - accuracy: 0.7936 -
val_loss: 0.3471 - val_accuracy: 0.8398
Epoch 2/100

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1350/1350 [=====] - 3s 2ms/step - loss: 0.3544 - accuracy: 0.8319 -  
  val_loss: 0.3329 - val_accuracy: 0.8455  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3326 - accuracy: 0.8430 -  
  val_loss: 0.3302 - val_accuracy: 0.8470  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3219 - accuracy: 0.8479 -  
  val_loss: 0.3288 - val_accuracy: 0.8469  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3234 - accuracy: 0.8514 -  
  val_loss: 0.3198 - val_accuracy: 0.8531  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8509 -  
  val_loss: 0.3207 - val_accuracy: 0.8542  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3110 - accuracy: 0.8546 -  
  val_loss: 0.3209 - val_accuracy: 0.8552  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3118 - accuracy: 0.8555 -  
  val_loss: 0.3209 - val_accuracy: 0.8528  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3098 - accuracy: 0.8510 -  
  val_loss: 0.3207 - val_accuracy: 0.8559  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3053 - accuracy: 0.8586 -  
  val_loss: 0.3288 - val_accuracy: 0.8501  
150/150 [=====] - 0s 899us/step - loss: 0.3227 - accuracy: 0.8547  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4500 - accuracy: 0.7947 -  
  val_loss: 0.3695 - val_accuracy: 0.8277  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3521 - accuracy: 0.8340 -  
  val_loss: 0.3305 - val_accuracy: 0.8491  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3230 - accuracy: 0.8474 -  
  val_loss: 0.3251 - val_accuracy: 0.8506  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3221 - accuracy: 0.8503 -  
  val_loss: 0.3223 - val_accuracy: 0.8542  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3134 - accuracy: 0.8508 -  
  val_loss: 0.3205 - val_accuracy: 0.8566  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3072 - accuracy: 0.8517 -  
  val_loss: 0.3211 - val_accuracy: 0.8498  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3122 - accuracy: 0.8520 -  
  val_loss: 0.3242 - val_accuracy: 0.8522  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3156 - accuracy: 0.8501 -  
  val_loss: 0.3213 - val_accuracy: 0.8538  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3146 - accuracy: 0.8517 -  
  val_loss: 0.3216 - val_accuracy: 0.8530  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3029 - accuracy: 0.8618 -  
  val_loss: 0.3214 - val_accuracy: 0.8533  
150/150 [=====] - 0s 1ms/step - loss: 0.3201 - accuracy: 0.8513  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4134 - accuracy: 0.7988 -  
  val_loss: 0.3477 - val_accuracy: 0.8404  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3522 - accuracy: 0.8289 -  
  val_loss: 0.3456 - val_accuracy: 0.8317  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3305 - accuracy: 0.8434 -  
  val_loss: 0.3331 - val_accuracy: 0.8470  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3280 - accuracy: 0.8453 -  
  val_loss: 0.3405 - val_accuracy: 0.8397  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3220 - accuracy: 0.8444 -
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val_loss: 0.3498 - val_accuracy: 0.8264
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3130 - accuracy: 0.8481 -
val_loss: 0.3288 - val_accuracy: 0.8511
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8554 -
val_loss: 0.3285 - val_accuracy: 0.8505
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3140 - accuracy: 0.8506 -
val_loss: 0.3385 - val_accuracy: 0.8404
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3072 - accuracy: 0.8529 -
val_loss: 0.3313 - val_accuracy: 0.8500
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3043 - accuracy: 0.8603 -
val_loss: 0.3336 - val_accuracy: 0.8514
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3045 - accuracy: 0.8610 -
val_loss: 0.3341 - val_accuracy: 0.8514
Epoch 12/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3023 - accuracy: 0.8582 -
val_loss: 0.3708 - val_accuracy: 0.8477
150/150 [=====] - 0s 899us/step - loss: 0.3624 - accuracy: 0.8547
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4097 - accuracy: 0.7980 -
val_loss: 0.3616 - val_accuracy: 0.8365
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3562 - accuracy: 0.8290 -
val_loss: 0.3462 - val_accuracy: 0.8436
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3401 - accuracy: 0.8432 -
val_loss: 0.3473 - val_accuracy: 0.8359
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3293 - accuracy: 0.8477 -
val_loss: 0.3438 - val_accuracy: 0.8475
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8507 -
val_loss: 0.3280 - val_accuracy: 0.8527
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3177 - accuracy: 0.8507 -
val_loss: 0.3319 - val_accuracy: 0.8488
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3191 - accuracy: 0.8505 -
val_loss: 0.3306 - val_accuracy: 0.8495
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8527 -
val_loss: 0.3937 - val_accuracy: 0.8299
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3108 - accuracy: 0.8534 -
val_loss: 0.3397 - val_accuracy: 0.8407
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3105 - accuracy: 0.8509 -
val_loss: 0.3395 - val_accuracy: 0.8442
150/150 [=====] - 0s 956us/step - loss: 0.3342 - accuracy: 0.8520
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4132 - accuracy: 0.8022 -
val_loss: 0.3626 - val_accuracy: 0.8412
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3500 - accuracy: 0.8334 -
val_loss: 0.3353 - val_accuracy: 0.8499
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3382 - accuracy: 0.8432 -
val_loss: 0.3282 - val_accuracy: 0.8497
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3254 - accuracy: 0.8501 -
val_loss: 0.3393 - val_accuracy: 0.8415
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3248 - accuracy: 0.8482 -
val_loss: 0.3404 - val_accuracy: 0.8510
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3240 - accuracy: 0.8461 -
val_loss: 0.3325 - val_accuracy: 0.8405
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Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3196 - accuracy: 0.8496 -
val_loss: 0.3286 - val_accuracy: 0.8485
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3088 - accuracy: 0.8562 -
val_loss: 0.3324 - val_accuracy: 0.8471
150/150 [=====] - 0s 983us/step - loss: 0.3273 - accuracy: 0.8460
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4082 - accuracy: 0.8012 -
val_loss: 0.3429 - val_accuracy: 0.8407
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3471 - accuracy: 0.8352 -
val_loss: 0.3315 - val_accuracy: 0.8471
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3279 - accuracy: 0.8434 -
val_loss: 0.3269 - val_accuracy: 0.8494
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3226 - accuracy: 0.8505 -
val_loss: 0.3392 - val_accuracy: 0.8498
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3147 - accuracy: 0.8500 -
val_loss: 0.3269 - val_accuracy: 0.8512
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3089 - accuracy: 0.8543 -
val_loss: 0.3416 - val_accuracy: 0.8414
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3191 - accuracy: 0.8468 -
val_loss: 0.3360 - val_accuracy: 0.8438
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3067 - accuracy: 0.8502 -
val_loss: 0.3308 - val_accuracy: 0.8492
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3063 - accuracy: 0.8549 -
val_loss: 0.3671 - val_accuracy: 0.8461
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3131 - accuracy: 0.8540 -
val_loss: 0.3341 - val_accuracy: 0.8498
150/150 [=====] - 0s 1ms/step - loss: 0.3423 - accuracy: 0.8520
Epoch 1/100
1350/1350 [=====] - 4s 3ms/step - loss: 0.4039 - accuracy: 0.8088 -
val_loss: 0.3352 - val_accuracy: 0.8472
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3446 - accuracy: 0.8377 -
val_loss: 0.3401 - val_accuracy: 0.8431
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3239 - accuracy: 0.8470 -
val_loss: 0.3271 - val_accuracy: 0.8526
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3209 - accuracy: 0.8488 -
val_loss: 0.3418 - val_accuracy: 0.8388
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3176 - accuracy: 0.8546 -
val_loss: 0.3256 - val_accuracy: 0.8514
Epoch 6/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3201 - accuracy: 0.8512 -
val_loss: 0.3274 - val_accuracy: 0.8489
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3134 - accuracy: 0.8563 -
val_loss: 0.3438 - val_accuracy: 0.8447
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3069 - accuracy: 0.8555 -
val_loss: 0.3437 - val_accuracy: 0.8455
Epoch 9/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3057 - accuracy: 0.8572 -
val_loss: 0.3339 - val_accuracy: 0.8501
Epoch 10/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.2900 - accuracy: 0.8638 -
val_loss: 0.3341 - val_accuracy: 0.8473
150/150 [=====] - 0s 890us/step - loss: 0.3443 - accuracy: 0.8433
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4181 - accuracy: 0.7938 -
val_loss: 0.3504 - val_accuracy: 0.8404

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Epoch 2/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3504 - accuracy: 0.8379 -
val_loss: 0.3387 - val_accuracy: 0.8472
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3311 - accuracy: 0.8442 -
val_loss: 0.3310 - val_accuracy: 0.8459
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3196 - accuracy: 0.8501 -
val_loss: 0.3300 - val_accuracy: 0.8503
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3252 - accuracy: 0.8468 -
val_loss: 0.3279 - val_accuracy: 0.8521
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3131 - accuracy: 0.8525 -
val_loss: 0.3436 - val_accuracy: 0.8475
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3118 - accuracy: 0.8549 -
val_loss: 0.3302 - val_accuracy: 0.8502
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3020 - accuracy: 0.8617 -
val_loss: 0.3392 - val_accuracy: 0.8497
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3027 - accuracy: 0.8600 -
val_loss: 0.3567 - val_accuracy: 0.8363
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3008 - accuracy: 0.8585 -
val_loss: 0.3379 - val_accuracy: 0.8499
150/150 [=====] - 0s 989us/step - loss: 0.3350 - accuracy: 0.8540
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4155 - accuracy: 0.8007 -
val_loss: 0.3603 - val_accuracy: 0.8267
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3547 - accuracy: 0.8296 -
val_loss: 0.3356 - val_accuracy: 0.8500
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3397 - accuracy: 0.8394 -
val_loss: 0.3348 - val_accuracy: 0.8451
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3291 - accuracy: 0.8463 -
val_loss: 0.3265 - val_accuracy: 0.8527
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3232 - accuracy: 0.8520 -
val_loss: 0.3265 - val_accuracy: 0.8456
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3129 - accuracy: 0.8531 -
val_loss: 0.3285 - val_accuracy: 0.8505
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3214 - accuracy: 0.8491 -
val_loss: 0.3311 - val_accuracy: 0.8479
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3116 - accuracy: 0.8559 -
val_loss: 0.3308 - val_accuracy: 0.8490
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3058 - accuracy: 0.8576 -
val_loss: 0.3291 - val_accuracy: 0.8539
150/150 [=====] - 0s 933us/step - loss: 0.3288 - accuracy: 0.8507
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4122 - accuracy: 0.7973 -
val_loss: 0.3551 - val_accuracy: 0.8429
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3514 - accuracy: 0.8381 -
val_loss: 0.3308 - val_accuracy: 0.8485
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3338 - accuracy: 0.8416 -
val_loss: 0.3333 - val_accuracy: 0.8458
Epoch 4/100
1350/1350 [=====] - 2s 2ms/step - loss: 0.3267 - accuracy: 0.8477 -
val_loss: 0.3278 - val_accuracy: 0.8522
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3154 - accuracy: 0.8500 -
val_loss: 0.3328 - val_accuracy: 0.8486
Epoch 6/100
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1350/1350 [=====] - 2s 2ms/step - loss: 0.3156 - accuracy: 0.8483 -  
  val_loss: 0.3371 - val_accuracy: 0.8434  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3135 - accuracy: 0.8528 -  
  val_loss: 0.3328 - val_accuracy: 0.8505  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3076 - accuracy: 0.8567 -  
  val_loss: 0.3372 - val_accuracy: 0.8510  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8523 -  
  val_loss: 0.3682 - val_accuracy: 0.8489  
150/150 [=====] - 0s 957us/step - loss: 0.3929 - accuracy: 0.8307  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4050 - accuracy: 0.7997 -  
  val_loss: 0.3402 - val_accuracy: 0.8464  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3475 - accuracy: 0.8372 -  
  val_loss: 0.3272 - val_accuracy: 0.8504  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3262 - accuracy: 0.8450 -  
  val_loss: 0.3353 - val_accuracy: 0.8422  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3163 - accuracy: 0.8477 -  
  val_loss: 0.3368 - val_accuracy: 0.8464  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3212 - accuracy: 0.8466 -  
  val_loss: 0.3291 - val_accuracy: 0.8465  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3053 - accuracy: 0.8535 -  
  val_loss: 0.3300 - val_accuracy: 0.8511  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3177 - accuracy: 0.8488 -  
  val_loss: 0.3307 - val_accuracy: 0.8505  
150/150 [=====] - 0s 968us/step - loss: 0.3190 - accuracy: 0.8480  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4036 - accuracy: 0.8042 -  
  val_loss: 0.3626 - val_accuracy: 0.8251  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3380 - accuracy: 0.8436 -  
  val_loss: 0.3239 - val_accuracy: 0.8540  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3297 - accuracy: 0.8457 -  
  val_loss: 0.3408 - val_accuracy: 0.8538  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3322 - accuracy: 0.8432 -  
  val_loss: 0.3323 - val_accuracy: 0.8511  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3218 - accuracy: 0.8449 -  
  val_loss: 0.3335 - val_accuracy: 0.8487  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3153 - accuracy: 0.8551 -  
  val_loss: 0.3384 - val_accuracy: 0.8343  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3024 - accuracy: 0.8563 -  
  val_loss: 0.3437 - val_accuracy: 0.8403  
150/150 [=====] - 0s 975us/step - loss: 0.3385 - accuracy: 0.8387  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3991 - accuracy: 0.8091 -  
  val_loss: 0.3394 - val_accuracy: 0.8444  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3426 - accuracy: 0.8340 -  
  val_loss: 0.3328 - val_accuracy: 0.8498  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3292 - accuracy: 0.8412 -  
  val_loss: 0.3373 - val_accuracy: 0.8418  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3296 - accuracy: 0.8413 -  
  val_loss: 0.3368 - val_accuracy: 0.8341  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3218 - accuracy: 0.8489 -  
  val_loss: 0.3253 - val_accuracy: 0.8537  
Epoch 6/100
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1350/1350 [=====] - 3s 2ms/step - loss: 0.3123 - accuracy: 0.8519 -  
  val_loss: 0.3367 - val_accuracy: 0.8503  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3147 - accuracy: 0.8468 -  
  val_loss: 0.3406 - val_accuracy: 0.8496  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3106 - accuracy: 0.8538 -  
  val_loss: 0.3403 - val_accuracy: 0.8485  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3030 - accuracy: 0.8587 -  
  val_loss: 0.3540 - val_accuracy: 0.8403  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3028 - accuracy: 0.8569 -  
  val_loss: 0.3406 - val_accuracy: 0.8509  
150/150 [=====] - 0s 949us/step - loss: 0.3405 - accuracy: 0.8527  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4147 - accuracy: 0.7911 -  
  val_loss: 0.3479 - val_accuracy: 0.8409  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3447 - accuracy: 0.8395 -  
  val_loss: 0.3538 - val_accuracy: 0.8332  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3372 - accuracy: 0.8391 -  
  val_loss: 0.3323 - val_accuracy: 0.8481  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3279 - accuracy: 0.8439 -  
  val_loss: 0.3295 - val_accuracy: 0.8492  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3155 - accuracy: 0.8517 -  
  val_loss: 0.3327 - val_accuracy: 0.8524  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3001 - accuracy: 0.8565 -  
  val_loss: 0.3339 - val_accuracy: 0.8464  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3038 - accuracy: 0.8576 -  
  val_loss: 0.3384 - val_accuracy: 0.8442  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3100 - accuracy: 0.8532 -  
  val_loss: 0.3370 - val_accuracy: 0.8465  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3050 - accuracy: 0.8552 -  
  val_loss: 0.3384 - val_accuracy: 0.8526  
150/150 [=====] - 0s 857us/step - loss: 0.3315 - accuracy: 0.8500  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4164 - accuracy: 0.7839 -  
  val_loss: 0.3603 - val_accuracy: 0.8408  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3520 - accuracy: 0.8374 -  
  val_loss: 0.3582 - val_accuracy: 0.8247  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3365 - accuracy: 0.8445 -  
  val_loss: 0.3387 - val_accuracy: 0.8442  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3292 - accuracy: 0.8518 -  
  val_loss: 0.3291 - val_accuracy: 0.8513  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3201 - accuracy: 0.8524 -  
  val_loss: 0.3491 - val_accuracy: 0.8277  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3184 - accuracy: 0.8508 -  
  val_loss: 0.3366 - val_accuracy: 0.8416  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3126 - accuracy: 0.8514 -  
  val_loss: 0.3286 - val_accuracy: 0.8512  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3129 - accuracy: 0.8548 -  
  val_loss: 0.3361 - val_accuracy: 0.8518  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3019 - accuracy: 0.8590 -  
  val_loss: 0.3314 - val_accuracy: 0.8490  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3114 - accuracy: 0.8551 -
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val_loss: 0.3329 - val_accuracy: 0.8520
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3081 - accuracy: 0.8546 -
val_loss: 0.3370 - val_accuracy: 0.8423
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2949 - accuracy: 0.8639 -
val_loss: 0.3363 - val_accuracy: 0.8447
150/150 [=====] - 0s 952us/step - loss: 0.3342 - accuracy: 0.8340
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3950 - accuracy: 0.8070 -
val_loss: 0.3348 - val_accuracy: 0.8454
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3474 - accuracy: 0.8357 -
val_loss: 0.3375 - val_accuracy: 0.8510
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3275 - accuracy: 0.8433 -
val_loss: 0.3306 - val_accuracy: 0.8483
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3224 - accuracy: 0.8468 -
val_loss: 0.3366 - val_accuracy: 0.8504
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3179 - accuracy: 0.8497 -
val_loss: 0.3411 - val_accuracy: 0.8399
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3158 - accuracy: 0.8523 -
val_loss: 0.3374 - val_accuracy: 0.8494
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3060 - accuracy: 0.8571 -
val_loss: 0.3345 - val_accuracy: 0.8480
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3040 - accuracy: 0.8575 -
val_loss: 0.3323 - val_accuracy: 0.8515
150/150 [=====] - 0s 941us/step - loss: 0.3442 - accuracy: 0.8493
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4098 - accuracy: 0.8023 -
val_loss: 0.3459 - val_accuracy: 0.8444
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3494 - accuracy: 0.8389 -
val_loss: 0.3816 - val_accuracy: 0.7993
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3373 - accuracy: 0.8395 -
val_loss: 0.3449 - val_accuracy: 0.8396
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3275 - accuracy: 0.8490 -
val_loss: 0.3409 - val_accuracy: 0.8521
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3251 - accuracy: 0.8481 -
val_loss: 0.3312 - val_accuracy: 0.8527
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3117 - accuracy: 0.8538 -
val_loss: 0.3346 - val_accuracy: 0.8440
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3170 - accuracy: 0.8494 -
val_loss: 0.3640 - val_accuracy: 0.8140
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3149 - accuracy: 0.8535 -
val_loss: 0.3373 - val_accuracy: 0.8517
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3055 - accuracy: 0.8593 -
val_loss: 0.3369 - val_accuracy: 0.8517
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2990 - accuracy: 0.8601 -
val_loss: 0.3432 - val_accuracy: 0.8399
150/150 [=====] - 0s 901us/step - loss: 0.3600 - accuracy: 0.8247
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4069 - accuracy: 0.8007 -
val_loss: 0.3755 - val_accuracy: 0.8078
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3359 - accuracy: 0.8435 -
val_loss: 0.3367 - val_accuracy: 0.8443
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3285 - accuracy: 0.8469 -
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val_loss: 0.3272 - val_accuracy: 0.8513
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3259 - accuracy: 0.8485 -
val_loss: 0.3344 - val_accuracy: 0.8418
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3150 - accuracy: 0.8525 -
val_loss: 0.3364 - val_accuracy: 0.8505
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3084 - accuracy: 0.8577 -
val_loss: 0.3365 - val_accuracy: 0.8397
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3090 - accuracy: 0.8560 -
val_loss: 0.3319 - val_accuracy: 0.8512
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3108 - accuracy: 0.8563 -
val_loss: 0.3453 - val_accuracy: 0.8380
150/150 [=====] - 0s 908us/step - loss: 0.3403 - accuracy: 0.8400
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4203 - accuracy: 0.7894 -
val_loss: 0.3658 - val_accuracy: 0.8285
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3530 - accuracy: 0.8349 -
val_loss: 0.3359 - val_accuracy: 0.8502
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3379 - accuracy: 0.8446 -
val_loss: 0.3672 - val_accuracy: 0.8383
Epoch 4/100
1350/1350 [=====] - 3s 3ms/step - loss: 0.3238 - accuracy: 0.8497 -
val_loss: 0.3403 - val_accuracy: 0.8470
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3133 - accuracy: 0.8553 -
val_loss: 0.3348 - val_accuracy: 0.8502
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3235 - accuracy: 0.8482 -
val_loss: 0.3350 - val_accuracy: 0.8444
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3035 - accuracy: 0.8604 -
val_loss: 0.3593 - val_accuracy: 0.8437
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3037 - accuracy: 0.8563 -
val_loss: 0.3359 - val_accuracy: 0.8411
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3071 - accuracy: 0.8567 -
val_loss: 0.3357 - val_accuracy: 0.8445
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2946 - accuracy: 0.8582 -
val_loss: 0.3690 - val_accuracy: 0.8482
150/150 [=====] - 0s 862us/step - loss: 0.3793 - accuracy: 0.8520
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4126 - accuracy: 0.7998 -
val_loss: 0.3432 - val_accuracy: 0.8394
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3429 - accuracy: 0.8412 -
val_loss: 0.3379 - val_accuracy: 0.8393
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3326 - accuracy: 0.8475 -
val_loss: 0.3347 - val_accuracy: 0.8426
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3269 - accuracy: 0.8425 -
val_loss: 0.3268 - val_accuracy: 0.8505
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3219 - accuracy: 0.8504 -
val_loss: 0.3389 - val_accuracy: 0.8378
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3129 - accuracy: 0.8550 -
val_loss: 0.3279 - val_accuracy: 0.8481
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3111 - accuracy: 0.8539 -
val_loss: 0.3303 - val_accuracy: 0.8473
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8525 -
val_loss: 0.3341 - val_accuracy: 0.8479
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Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3099 - accuracy: 0.8582 -
val_loss: 0.3454 - val_accuracy: 0.8489
150/150 [=====] - 0s 920us/step - loss: 0.3423 - accuracy: 0.8360
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4081 - accuracy: 0.8041 -
val_loss: 0.3493 - val_accuracy: 0.8359
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3557 - accuracy: 0.8305 -
val_loss: 0.3500 - val_accuracy: 0.8318
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3381 - accuracy: 0.8405 -
val_loss: 0.3366 - val_accuracy: 0.8501
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3238 - accuracy: 0.8469 -
val_loss: 0.3641 - val_accuracy: 0.8145
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3297 - accuracy: 0.8417 -
val_loss: 0.3325 - val_accuracy: 0.8501
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3127 - accuracy: 0.8567 -
val_loss: 0.3383 - val_accuracy: 0.8459
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3111 - accuracy: 0.8536 -
val_loss: 0.3421 - val_accuracy: 0.8509
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3057 - accuracy: 0.8589 -
val_loss: 0.3325 - val_accuracy: 0.8518
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3056 - accuracy: 0.8562 -
val_loss: 0.3378 - val_accuracy: 0.8489
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3041 - accuracy: 0.8530 -
val_loss: 0.3486 - val_accuracy: 0.8476
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3059 - accuracy: 0.8591 -
val_loss: 0.3406 - val_accuracy: 0.8499
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2937 - accuracy: 0.8587 -
val_loss: 0.3614 - val_accuracy: 0.8422
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2925 - accuracy: 0.8624 -
val_loss: 0.3653 - val_accuracy: 0.8501
150/150 [=====] - 0s 911us/step - loss: 0.3353 - accuracy: 0.8520
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4068 - accuracy: 0.8100 -
val_loss: 0.3414 - val_accuracy: 0.8407
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3549 - accuracy: 0.8306 -
val_loss: 0.3413 - val_accuracy: 0.8506
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3324 - accuracy: 0.8430 -
val_loss: 0.3344 - val_accuracy: 0.8449
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3248 - accuracy: 0.8489 -
val_loss: 0.3325 - val_accuracy: 0.8502
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3064 - accuracy: 0.8582 -
val_loss: 0.3369 - val_accuracy: 0.8444
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3060 - accuracy: 0.8573 -
val_loss: 0.3403 - val_accuracy: 0.8485
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3129 - accuracy: 0.8506 -
val_loss: 0.3396 - val_accuracy: 0.8424
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3062 - accuracy: 0.8520 -
val_loss: 0.3509 - val_accuracy: 0.8415
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3060 - accuracy: 0.8516 -
val_loss: 0.3446 - val_accuracy: 0.8397
150/150 [=====] - 0s 896us/step - loss: 0.3385 - accuracy: 0.8333

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Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4076 - accuracy: 0.7994 -
val_loss: 0.3458 - val_accuracy: 0.8410
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3534 - accuracy: 0.8345 -
val_loss: 0.3736 - val_accuracy: 0.8230
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3491 - accuracy: 0.8377 -
val_loss: 0.3497 - val_accuracy: 0.8308
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3246 - accuracy: 0.8502 -
val_loss: 0.3415 - val_accuracy: 0.8445
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3278 - accuracy: 0.8437 -
val_loss: 0.3297 - val_accuracy: 0.8507
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3190 - accuracy: 0.8502 -
val_loss: 0.3505 - val_accuracy: 0.8314
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3222 - accuracy: 0.8466 -
val_loss: 0.3658 - val_accuracy: 0.8451
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2966 - accuracy: 0.8603 -
val_loss: 0.3445 - val_accuracy: 0.8390
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2980 - accuracy: 0.8596 -
val_loss: 0.3521 - val_accuracy: 0.8473
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2958 - accuracy: 0.8576 -
val_loss: 0.3520 - val_accuracy: 0.8464
150/150 [=====] - 0s 947us/step - loss: 0.3472 - accuracy: 0.8513
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4060 - accuracy: 0.8079 -
val_loss: 0.3735 - val_accuracy: 0.8237
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3405 - accuracy: 0.8396 -
val_loss: 0.3475 - val_accuracy: 0.8369
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3327 - accuracy: 0.8399 -
val_loss: 0.3516 - val_accuracy: 0.8390
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3255 - accuracy: 0.8465 -
val_loss: 0.3682 - val_accuracy: 0.8420
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3214 - accuracy: 0.8467 -
val_loss: 0.3308 - val_accuracy: 0.8463
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3214 - accuracy: 0.8497 -
val_loss: 0.3268 - val_accuracy: 0.8523
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3145 - accuracy: 0.8502 -
val_loss: 0.3382 - val_accuracy: 0.8408
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3109 - accuracy: 0.8534 -
val_loss: 0.3353 - val_accuracy: 0.8492
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3096 - accuracy: 0.8490 -
val_loss: 0.3322 - val_accuracy: 0.8442
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3016 - accuracy: 0.8564 -
val_loss: 0.3436 - val_accuracy: 0.8406
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2941 - accuracy: 0.8626 -
val_loss: 0.3376 - val_accuracy: 0.8440
150/150 [=====] - 0s 989us/step - loss: 0.3217 - accuracy: 0.8520
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4051 - accuracy: 0.8031 -
val_loss: 0.3523 - val_accuracy: 0.8392
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3529 - accuracy: 0.8376 -
val_loss: 0.3397 - val_accuracy: 0.8392
Epoch 3/100
```



```
1350/1350 [=====] - 3s 2ms/step - loss: 0.3358 - accuracy: 0.8464 -  
  val_loss: 0.3251 - val_accuracy: 0.8536  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3239 - accuracy: 0.8451 -  
  val_loss: 0.3268 - val_accuracy: 0.8487  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3316 - accuracy: 0.8404 -  
  val_loss: 0.3328 - val_accuracy: 0.8504  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3137 - accuracy: 0.8502 -  
  val_loss: 0.3290 - val_accuracy: 0.8475  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3077 - accuracy: 0.8595 -  
  val_loss: 0.3407 - val_accuracy: 0.8378  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.2961 - accuracy: 0.8626 -  
  val_loss: 0.3282 - val_accuracy: 0.8511  
150/150 [=====] - 0s 913us/step - loss: 0.3283 - accuracy: 0.8420  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4215 - accuracy: 0.7780 -  
  val_loss: 0.3525 - val_accuracy: 0.8395  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3625 - accuracy: 0.8263 -  
  val_loss: 0.3570 - val_accuracy: 0.8296  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3378 - accuracy: 0.8408 -  
  val_loss: 0.3446 - val_accuracy: 0.8328  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3233 - accuracy: 0.8436 -  
  val_loss: 0.3321 - val_accuracy: 0.8481  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3226 - accuracy: 0.8456 -  
  val_loss: 0.3251 - val_accuracy: 0.8534  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3105 - accuracy: 0.8518 -  
  val_loss: 0.3312 - val_accuracy: 0.8470  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3076 - accuracy: 0.8522 -  
  val_loss: 0.3372 - val_accuracy: 0.8456  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3072 - accuracy: 0.8525 -  
  val_loss: 0.3365 - val_accuracy: 0.8451  
Epoch 9/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3023 - accuracy: 0.8583 -  
  val_loss: 0.3465 - val_accuracy: 0.8404  
Epoch 10/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3040 - accuracy: 0.8595 -  
  val_loss: 0.3359 - val_accuracy: 0.8493  
150/150 [=====] - 0s 960us/step - loss: 0.3417 - accuracy: 0.8573  
Epoch 1/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.4047 - accuracy: 0.8067 -  
  val_loss: 0.3475 - val_accuracy: 0.8402  
Epoch 2/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3355 - accuracy: 0.8407 -  
  val_loss: 0.3432 - val_accuracy: 0.8379  
Epoch 3/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3244 - accuracy: 0.8458 -  
  val_loss: 0.3551 - val_accuracy: 0.8368  
Epoch 4/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3239 - accuracy: 0.8446 -  
  val_loss: 0.3327 - val_accuracy: 0.8461  
Epoch 5/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3214 - accuracy: 0.8490 -  
  val_loss: 0.3295 - val_accuracy: 0.8509  
Epoch 6/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8540 -  
  val_loss: 0.3334 - val_accuracy: 0.8486  
Epoch 7/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3155 - accuracy: 0.8544 -  
  val_loss: 0.3432 - val_accuracy: 0.8492  
Epoch 8/100  
1350/1350 [=====] - 3s 2ms/step - loss: 0.3001 - accuracy: 0.8586 -
```

```
val_loss: 0.3473 - val_accuracy: 0.8390
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3037 - accuracy: 0.8535 -
val_loss: 0.3401 - val_accuracy: 0.8442
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3012 - accuracy: 0.8591 -
val_loss: 0.3376 - val_accuracy: 0.8464
150/150 [=====] - 0s 1ms/step - loss: 0.3533 - accuracy: 0.8413
Epoch 1/100
1350/1350 [=====] - 4s 2ms/step - loss: 0.4174 - accuracy: 0.7925 -
val_loss: 0.3828 - val_accuracy: 0.8067
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3541 - accuracy: 0.8307 -
val_loss: 0.3386 - val_accuracy: 0.8476
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3316 - accuracy: 0.8442 -
val_loss: 0.3276 - val_accuracy: 0.8519
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3267 - accuracy: 0.8495 -
val_loss: 0.3361 - val_accuracy: 0.8490
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3200 - accuracy: 0.8497 -
val_loss: 0.3346 - val_accuracy: 0.8506
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3211 - accuracy: 0.8498 -
val_loss: 0.3421 - val_accuracy: 0.8387
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3170 - accuracy: 0.8510 -
val_loss: 0.3348 - val_accuracy: 0.8496
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3131 - accuracy: 0.8515 -
val_loss: 0.3336 - val_accuracy: 0.8514
150/150 [=====] - 0s 883us/step - loss: 0.3278 - accuracy: 0.8440
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4112 - accuracy: 0.7949 -
val_loss: 0.3639 - val_accuracy: 0.8224
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3482 - accuracy: 0.8357 -
val_loss: 0.3616 - val_accuracy: 0.8357
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3266 - accuracy: 0.8399 -
val_loss: 0.3299 - val_accuracy: 0.8493
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3254 - accuracy: 0.8474 -
val_loss: 0.3452 - val_accuracy: 0.8493
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3211 - accuracy: 0.8494 -
val_loss: 0.3307 - val_accuracy: 0.8487
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3171 - accuracy: 0.8505 -
val_loss: 0.3297 - val_accuracy: 0.8493
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3036 - accuracy: 0.8543 -
val_loss: 0.3382 - val_accuracy: 0.8466
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3032 - accuracy: 0.8561 -
val_loss: 0.3307 - val_accuracy: 0.8507
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3066 - accuracy: 0.8530 -
val_loss: 0.3570 - val_accuracy: 0.8431
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2923 - accuracy: 0.8662 -
val_loss: 0.3450 - val_accuracy: 0.8491
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2883 - accuracy: 0.8625 -
val_loss: 0.3416 - val_accuracy: 0.8495
150/150 [=====] - 0s 978us/step - loss: 0.3342 - accuracy: 0.8440
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4094 - accuracy: 0.7998 -
val_loss: 0.3733 - val_accuracy: 0.8346
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3584 - accuracy: 0.8332 -
```

```
val_loss: 0.3380 - val_accuracy: 0.8464
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3325 - accuracy: 0.8444 -
val_loss: 0.3315 - val_accuracy: 0.8501
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3274 - accuracy: 0.8476 -
val_loss: 0.3282 - val_accuracy: 0.8505
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3247 - accuracy: 0.8468 -
val_loss: 0.3360 - val_accuracy: 0.8405
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3165 - accuracy: 0.8505 -
val_loss: 0.3346 - val_accuracy: 0.8484
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3110 - accuracy: 0.8513 -
val_loss: 0.3306 - val_accuracy: 0.8505
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3085 - accuracy: 0.8537 -
val_loss: 0.3353 - val_accuracy: 0.8470
Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3012 - accuracy: 0.8533 -
val_loss: 0.3469 - val_accuracy: 0.8413
150/150 [=====] - 0s 912us/step - loss: 0.3470 - accuracy: 0.8340
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4023 - accuracy: 0.8097 -
val_loss: 0.3386 - val_accuracy: 0.8427
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3432 - accuracy: 0.8376 -
val_loss: 0.3393 - val_accuracy: 0.8464
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3334 - accuracy: 0.8422 -
val_loss: 0.3259 - val_accuracy: 0.8540
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3200 - accuracy: 0.8516 -
val_loss: 0.3354 - val_accuracy: 0.8440
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3204 - accuracy: 0.8468 -
val_loss: 0.3259 - val_accuracy: 0.8510
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3259 - accuracy: 0.8474 -
val_loss: 0.3293 - val_accuracy: 0.8476
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3115 - accuracy: 0.8530 -
val_loss: 0.3289 - val_accuracy: 0.8525
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3068 - accuracy: 0.8527 -
val_loss: 0.3337 - val_accuracy: 0.8505
150/150 [=====] - 0s 951us/step - loss: 0.3147 - accuracy: 0.8553
Epoch 1/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.4152 - accuracy: 0.7972 -
val_loss: 0.3661 - val_accuracy: 0.8190
Epoch 2/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3524 - accuracy: 0.8370 -
val_loss: 0.3351 - val_accuracy: 0.8492
Epoch 3/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3358 - accuracy: 0.8453 -
val_loss: 0.3309 - val_accuracy: 0.8482
Epoch 4/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3318 - accuracy: 0.8434 -
val_loss: 0.3612 - val_accuracy: 0.8227
Epoch 5/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3159 - accuracy: 0.8528 -
val_loss: 0.3490 - val_accuracy: 0.8362
Epoch 6/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3208 - accuracy: 0.8491 -
val_loss: 0.3385 - val_accuracy: 0.8531
Epoch 7/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3138 - accuracy: 0.8523 -
val_loss: 0.3433 - val_accuracy: 0.8314
Epoch 8/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3099 - accuracy: 0.8527 -
val_loss: 0.3299 - val_accuracy: 0.8455
```

```

Epoch 9/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3040 - accuracy: 0.8569 -
  val_loss: 0.3322 - val_accuracy: 0.8506
Epoch 10/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2964 - accuracy: 0.8631 -
  val_loss: 0.3367 - val_accuracy: 0.8433
Epoch 11/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.3021 - accuracy: 0.8618 -
  val_loss: 0.3427 - val_accuracy: 0.8511
Epoch 12/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2841 - accuracy: 0.8677 -
  val_loss: 0.3462 - val_accuracy: 0.8422
Epoch 13/100
1350/1350 [=====] - 3s 2ms/step - loss: 0.2862 - accuracy: 0.8667 -
  val_loss: 0.3486 - val_accuracy: 0.8428
150/150 [=====] - 0s 945us/step - loss: 0.3392 - accuracy: 0.8440
Epoch 1/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.4210 - accuracy: 0.8021 -
  val_loss: 0.3582 - val_accuracy: 0.8291
Epoch 2/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3296 - accuracy: 0.8462 -
  val_loss: 0.3262 - val_accuracy: 0.8479
Epoch 3/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3226 - accuracy: 0.8493 -
  val_loss: 0.3265 - val_accuracy: 0.8524
Epoch 4/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3192 - accuracy: 0.8469 -
  val_loss: 0.3243 - val_accuracy: 0.8498
Epoch 5/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3204 - accuracy: 0.8506 -
  val_loss: 0.3325 - val_accuracy: 0.8512
Epoch 6/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3118 - accuracy: 0.8534 -
  val_loss: 0.3403 - val_accuracy: 0.8523
Epoch 7/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3078 - accuracy: 0.8559 -
  val_loss: 0.3262 - val_accuracy: 0.8527
Epoch 8/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3057 - accuracy: 0.8607 -
  val_loss: 0.3302 - val_accuracy: 0.8487
Epoch 9/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3003 - accuracy: 0.8564 -
  val_loss: 0.3267 - val_accuracy: 0.8513

```

```

In [ ]: # summarize results
print('Best: %f using %s' % (grid_result.best_score_, grid_result.best_params_))

Best: 0.851133 using {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.001, 'neurons': 100}

```

```
In [ ]: means = grid_result.cv_results_['mean_test_score']
stds = grid_result.cv_results_['std_test_score']
params = grid_result.cv_results_['params']

for mean, stdev, param in zip(means, stds, params):
    print('%f (%s) with %r' % (mean, stdev, param))

0.849667 (0.006430828017965922) with {'batch_size': 5, 'epochs': 50, 'learning_rate': 0.001,
'neurons': 60}
0.850400 (0.0053516303683139995) with {'batch_size': 5, 'epochs': 50, 'learning_rate': 0.001,
'neurons': 80}
0.848267 (0.006162246006617268) with {'batch_size': 5, 'epochs': 50, 'learning_rate': 0.001,
'neurons': 100}
0.844600 (0.013928227166909366) with {'batch_size': 5, 'epochs': 50, 'learning_rate': 0.01,
'neurons': 60}
0.846533 (0.004008887621045862) with {'batch_size': 5, 'epochs': 50, 'learning_rate': 0.01,
'neurons': 80}
0.839600 (0.010621568575204979) with {'batch_size': 5, 'epochs': 50, 'learning_rate': 0.01,
'neurons': 100}
0.849933 (0.004939186220762856) with {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.001,
'neurons': 60}
0.846600 (0.008466664731056492) with {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.001,
'neurons': 80}
0.851133 (0.00684461830132255) with {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.001,
'neurons': 100}
0.846333 (0.0076434419840506794) with {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.01,
'neurons': 60}
0.845667 (0.006974551366404084) with {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.01,
'neurons': 80}
0.843600 (0.007752850196720381) with {'batch_size': 5, 'epochs': 100, 'learning_rate': 0.01,
'neurons': 100}
0.847467 (0.006550986353414152) with {'batch_size': 10, 'epochs': 50, 'learning_rate': 0.001,
'neurons': 60}
0.845200 (0.005946433268267152) with {'batch_size': 10, 'epochs': 50, 'learning_rate': 0.001,
'neurons': 80}
0.848267 (0.007298100701991682) with {'batch_size': 10, 'epochs': 50, 'learning_rate': 0.001,
'neurons': 100}
0.847800 (0.007453863544689222) with {'batch_size': 10, 'epochs': 50, 'learning_rate': 0.01,
'neurons': 60}
0.848000 (0.004402016623614556) with {'batch_size': 10, 'epochs': 50, 'learning_rate': 0.01,
'neurons': 80}
0.848133 (0.006965316393086776) with {'batch_size': 10, 'epochs': 50, 'learning_rate': 0.01,
'neurons': 100}
0.849333 (0.0064152622634789) with {'batch_size': 10, 'epochs': 100, 'learning_rate': 0.001,
'neurons': 60}
0.850000 (0.005481271845602674) with {'batch_size': 10, 'epochs': 100, 'learning_rate': 0.00
1, 'neurons': 80}
0.850000 (0.00762451853250853) with {'batch_size': 10, 'epochs': 100, 'learning_rate': 0.001,
'neurons': 100}
0.847000 (0.007231100839820487) with {'batch_size': 10, 'epochs': 100, 'learning_rate': 0.01,
'neurons': 60}
0.842400 (0.009536831967409752) with {'batch_size': 10, 'epochs': 100, 'learning_rate': 0.01,
'neurons': 80}
0.846533 (0.006862464405345037) with {'batch_size': 10, 'epochs': 100, 'learning_rate': 0.01,
'neurons': 100}
```

```
In [ ]: # best full model
best_model = grid_result.best_estimator_
```

```
In [ ]: best_model = load_model('best_model.h5')

# evaluate the model
_, train_acc = best_model.evaluate(X_train, y_train)
_, test_acc = best_model.evaluate(X_test, y_test)
print('Train: %.3f, Test: %.3f' % (train_acc, test_acc))
```

```
469/469 [=====] - 0s 833us/step - loss: 0.3135 - accuracy: 0.8524
313/313 [=====] - 0s 849us/step - loss: 0.3245 - accuracy: 0.8513
Train: 0.852, Test: 0.851
```

As GridSearchCV took too long to compute, we decided to create a model with the optimized parameters for future use.

```
In [ ]: # create model
def create_model():
    model = Sequential()

    # hidden layers
    model.add(Dense(100, input_dim=91, kernel_initializer='uniform', activation='relu'))
    model.add(Dense(20, kernel_initializer='uniform', activation='relu'))

    # output layer
    model.add(Dense(1, kernel_initializer='uniform', activation='sigmoid'))

    adam = keras.optimizers.Adam(lr = 0.001)
    model.compile(loss='binary_crossentropy', optimizer=adam, metrics=['accuracy'])

    return model

model=KerasClassifier(build_fn=create_model, epochs=100, batch_size=5, verbose=1, callbacks=[es,mc])
```

```
In [ ]: model.fit(X_train, y_train, validation_data=(X_test, y_test), callbacks=[es, mc], verbose=1)
```

```
Epoch 1/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.4163 - accuracy: 0.8100 -
val_loss: 0.3417 - val_accuracy: 0.8415
Epoch 2/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3408 - accuracy: 0.8396 -
val_loss: 0.3250 - val_accuracy: 0.8499
Epoch 3/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3309 - accuracy: 0.8439 -
val_loss: 0.3244 - val_accuracy: 0.8518
Epoch 4/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3131 - accuracy: 0.8499 -
val_loss: 0.3244 - val_accuracy: 0.8516
Epoch 5/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3117 - accuracy: 0.8529 -
val_loss: 0.3226 - val_accuracy: 0.8534
Epoch 6/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3149 - accuracy: 0.8506 -
val_loss: 0.3240 - val_accuracy: 0.8513
Epoch 7/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3135 - accuracy: 0.8514 -
val_loss: 0.3259 - val_accuracy: 0.8473
Epoch 8/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3067 - accuracy: 0.8567 -
val_loss: 0.3215 - val_accuracy: 0.8516
Epoch 9/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3071 - accuracy: 0.8565 -
val_loss: 0.3244 - val_accuracy: 0.8519
Epoch 10/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2981 - accuracy: 0.8611 -
val_loss: 0.3250 - val_accuracy: 0.8476
Epoch 11/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2992 - accuracy: 0.8626 -
val_loss: 0.3307 - val_accuracy: 0.8507
Epoch 12/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2918 - accuracy: 0.8650 -
val_loss: 0.3345 - val_accuracy: 0.8459
Epoch 13/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2931 - accuracy: 0.8631 -
val_loss: 0.3315 - val_accuracy: 0.8489
```

```
Out[ ]: <tensorflow.python.keras.callbacks.History at 0x7ffaa623cac8>
```

Feature Selection

```
In [ ]: # sensitivity analysis
X_mean = pd.DataFrame(X.mean().to_dict(), index=range(91))
X_min = X_mean.copy()
X_max = X_mean.copy()

for i in range(91):
    X_min.iloc[i,i] = 0
    X_max.iloc[i,i] = 1

df_y_min = pd.DataFrame(model.predict(X_min))
df_y_min.columns=['income_min']
df_y_max = pd.DataFrame(model.predict(X_max))
df_y_max.columns=['income_max']
df_y = pd.DataFrame(model.predict(X_mean), index=range(91))
df_y.columns=['income_mean']
names = pd.DataFrame(X.columns.tolist())
y_output = names.join(df_y.join(df_y_min.join(df_y_max)))
```

```
In [ ]: # y variation
pd.set_option('display.max_rows', 100)
y_output['Variation']=0
for i in range(91):
    if y_output['income_mean'][i] != y_output['income_min'][i] and y_output['income_mean'][i] !=
y_output['income_max'][i]:
        y_output['Variation'][i] = 2
    elif y_output['income_mean'][i] != y_output['income_min'][i]:
        y_output['Variation'][i] = 1
    elif y_output['income_mean'][i] != y_output['income_max'][i]:
        y_output['Variation'][i] = 1
    else:
        y_output['Variation'][i] = 0
y_output.sort_values(['Variation'], ascending=False)
```



```
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:12: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame
```

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
if sys.path[0] == '':  
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:10: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame
```

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

```
# Remove the CWD from sys.path while we load stuff.  
/usr/local/lib/python3.6/dist-packages/ipykernel_launcher.py:8: SettingWithCopyWarning:  
A value is trying to be set on a copy of a slice from a DataFrame
```

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy

Out[]:

		0	income_mean	income_min	income_max	Variation
46	race_Black		0	1	0	1
48	race_White		0	1	0	1
33	m_Married-civ-spouse		0	0	1	1
38	r_Husband		0	1	0	1
31	m_Divorced		0	1	0	1
39	r_Not-in-family		0	1	0	1
41	r_Own-child		0	1	0	1
42	r_Unmarried		0	1	0	1
26	o_Prof-specialty		0	1	0	1
24	o_Other-service		0	1	0	1
22	o_Handlers-cleaners		0	1	0	1
21	o_Farming-fishing		0	1	0	1
1	demogweight		0	0	1	1
19	o_Craft-repair		0	1	0	1
17	o_Adm-clerical		0	1	0	1
35	m_Never-married		0	1	0	1
88	c_United-States		0	1	0	1
2	education-num		0	0	1	1
3	sex		0	0	1	1
11	w_Private		0	1	0	1
4	capital-gain		0	0	1	1
5	capital-loss		0	0	1	1
60	c_Germany		0	0	1	1
6	hours-per-week		0	0	1	1
59	c_France		0	0	0	0
69	c_Iran		0	0	0	0
68	c_India		0	0	0	0
65	c_Honduras		0	0	0	0
64	c_Holand-Netherlands		0	0	0	0
67	c_Hungary		0	0	0	0
66	c_Hong		0	0	0	0
61	c_Greece		0	0	0	0
62	c_Guatemala		0	0	0	0
63	c_Haiti		0	0	0	0
70	c_Ireland		0	0	0	0
0	age		0	0	0	0
75	c_Mexico		0	0	0	0
71	c_Italy		0	0	0	0
81	c_Portugal		0	0	0	0
89	c_Vietnam		0	0	0	0
87	c_Trinidad&Tobago		0	0	0	0
86	c_Thailand		0	0	0	0
85	c_Taiwan		0	0	0	0

	0	income_mean	income_min	income_max	Variation
84	c_South	0	0	0	0
83	c_Scotland	0	0	0	0
82	c_Puerto-Rico	0	0	0	0
80	c_Poland	0	0	0	0
72	c_Jamaica	0	0	0	0
79	c_Philippines	0	0	0	0
78	c_Peru	0	0	0	0
77	c_Outlying-US(Guam-USVI-etc)	0	0	0	0
76	c_Nicaragua	0	0	0	0
57	c_El-Salvador	0	0	0	0
74	c_Laos	0	0	0	0
73	c_Japan	0	0	0	0
58	c_England	0	0	0	0
45	race_Asian-Pac-Islander	0	0	0	0
56	c_Ecuador	0	0	0	0
15	w_Without-pay	0	0	0	0
27	o_Protective-serv	0	0	0	0
25	o_Priv-house-serv	0	0	0	0
23	o_Machine-op-inspct	0	0	0	0
20	o_Exec-managerial	0	0	0	0
18	o_Armed-Forces	0	0	0	0
16	o_?	0	0	0	0
14	w_State-gov	0	0	0	0
55	c_Dominican-Republic	0	0	0	0
13	w_Self-emp-not-inc	0	0	0	0
12	w_Self-emp-inc	0	0	0	0
10	w_Never-worked	0	0	0	0
9	w_Local-gov	0	0	0	0
8	w_Federal-gov	0	0	0	0
7	w_?	0	0	0	0
28	o_Sales	0	0	0	0
29	o_Tech-support	0	0	0	0
30	o_Transport-moving	0	0	0	0
32	m_Married-AF-spouse	0	0	0	0
34	m_Married-spouse-absent	0	0	0	0
36	m_Separated	0	0	0	0
37	m_Widowed	0	0	0	0
40	r_Other-relative	0	0	0	0
43	r_Wife	0	0	0	0
44	race_Amer-Indian-Eskimo	0	0	0	0
47	race_Other	0	0	0	0
49	c_?	0	0	0	0
50	c_Cambodia	0	0	0	0
51	c_Canada	0	0	0	0

	0	income_mean	income_min	income_max	Variation
52	c_China	0	0	0	0
53	c_Columbia	0	0	0	0
54	c_Cuba	0	0	0	0
90	c_Yugoslavia	0	0	0	0

```
In [ ]: # get importance
perm = PermutationImportance(model).fit(X_train, y_train, callback=[es,mc])
eli5.show_weights(perm, feature_names = X_train.columns.tolist(), top=100)
```

```
3000/3000 [=====] - 3s 884us/step - loss: 0.2843 - accuracy: 0.8661
3000/3000 [=====] - 3s 873us/step - loss: 0.3171 - accuracy: 0.8488
3000/3000 [=====] - 3s 879us/step - loss: 0.2851 - accuracy: 0.8653
3000/3000 [=====] - 3s 894us/step - loss: 0.3301 - accuracy: 0.8355
3000/3000 [=====] - 3s 883us/step - loss: 0.2938 - accuracy: 0.8625
3000/3000 [=====] - 3s 871us/step - loss: 0.4145 - accuracy: 0.8361
3000/3000 [=====] - 3s 887us/step - loss: 0.2953 - accuracy: 0.8602
3000/3000 [=====] - 3s 876us/step - loss: 0.3010 - accuracy: 0.8584
3000/3000 [=====] - 3s 875us/step - loss: 0.2898 - accuracy: 0.8645
3000/3000 [=====] - 3s 873us/step - loss: 0.2854 - accuracy: 0.8653
3000/3000 [=====] - 3s 883us/step - loss: 0.2909 - accuracy: 0.8622
3000/3000 [=====] - 3s 898us/step - loss: 0.2842 - accuracy: 0.8661
3000/3000 [=====] - 3s 943us/step - loss: 0.2978 - accuracy: 0.8541
3000/3000 [=====] - 3s 883us/step - loss: 0.2864 - accuracy: 0.8649
3000/3000 [=====] - 3s 890us/step - loss: 0.2924 - accuracy: 0.8587
3000/3000 [=====] - 3s 884us/step - loss: 0.2887 - accuracy: 0.8632
3000/3000 [=====] - 3s 895us/step - loss: 0.2847 - accuracy: 0.8659
3000/3000 [=====] - 3s 896us/step - loss: 0.2898 - accuracy: 0.8635
3000/3000 [=====] - 3s 891us/step - loss: 0.2986 - accuracy: 0.8609
3000/3000 [=====] - 3s 894us/step - loss: 0.2845 - accuracy: 0.8659
3000/3000 [=====] - 3s 863us/step - loss: 0.3001 - accuracy: 0.8553
3000/3000 [=====] - 3s 860us/step - loss: 0.2882 - accuracy: 0.8651
3000/3000 [=====] - 3s 854us/step - loss: 0.2986 - accuracy: 0.8609
3000/3000 [=====] - 3s 869us/step - loss: 0.3030 - accuracy: 0.8609
3000/3000 [=====] - 3s 885us/step - loss: 0.2958 - accuracy: 0.8594
3000/3000 [=====] - 3s 898us/step - loss: 0.3057 - accuracy: 0.8571
3000/3000 [=====] - 3s 1ms/step - loss: 0.2986 - accuracy: 0.8648
3000/3000 [=====] - 4s 1ms/step - loss: 0.2889 - accuracy: 0.8639
3000/3000 [=====] - 4s 1ms/step - loss: 0.2867 - accuracy: 0.8642
3000/3000 [=====] - 3s 1ms/step - loss: 0.2922 - accuracy: 0.8617
3000/3000 [=====] - 3s 873us/step - loss: 0.2862 - accuracy: 0.8655
3000/3000 [=====] - 3s 885us/step - loss: 0.2904 - accuracy: 0.8616
3000/3000 [=====] - 3s 892us/step - loss: 0.3133 - accuracy: 0.8511
3000/3000 [=====] - 3s 895us/step - loss: 0.2847 - accuracy: 0.8659
3000/3000 [=====] - 3s 882us/step - loss: 0.2936 - accuracy: 0.8652
3000/3000 [=====] - 3s 883us/step - loss: 0.2866 - accuracy: 0.8659
3000/3000 [=====] - 3s 896us/step - loss: 0.3567 - accuracy: 0.8310
3000/3000 [=====] - 3s 888us/step - loss: 0.2964 - accuracy: 0.8634
3000/3000 [=====] - 3s 900us/step - loss: 0.2908 - accuracy: 0.8634
3000/3000 [=====] - 3s 895us/step - loss: 0.3089 - accuracy: 0.8489
3000/3000 [=====] - 3s 915us/step - loss: 0.2958 - accuracy: 0.8608
3000/3000 [=====] - 3s 903us/step - loss: 0.2917 - accuracy: 0.8643
3000/3000 [=====] - 3s 888us/step - loss: 0.2990 - accuracy: 0.8618
3000/3000 [=====] - 3s 905us/step - loss: 0.2935 - accuracy: 0.8625
3000/3000 [=====] - 3s 894us/step - loss: 0.2873 - accuracy: 0.8650
3000/3000 [=====] - 3s 896us/step - loss: 0.2872 - accuracy: 0.8645
3000/3000 [=====] - 3s 888us/step - loss: 0.2868 - accuracy: 0.8641
3000/3000 [=====] - 3s 880us/step - loss: 0.2911 - accuracy: 0.8632
3000/3000 [=====] - 3s 886us/step - loss: 0.2877 - accuracy: 0.8653
3000/3000 [=====] - 3s 967us/step - loss: 0.2913 - accuracy: 0.8599
3000/3000 [=====] - 3s 1ms/step - loss: 0.2896 - accuracy: 0.8627
3000/3000 [=====] - 3s 929us/step - loss: 0.2844 - accuracy: 0.8659
3000/3000 [=====] - 3s 887us/step - loss: 0.2854 - accuracy: 0.8659
3000/3000 [=====] - 3s 898us/step - loss: 0.2853 - accuracy: 0.8658
3000/3000 [=====] - 3s 910us/step - loss: 0.2857 - accuracy: 0.8657
3000/3000 [=====] - 3s 887us/step - loss: 0.2849 - accuracy: 0.8657
3000/3000 [=====] - 3s 898us/step - loss: 0.2883 - accuracy: 0.8654
3000/3000 [=====] - 3s 894us/step - loss: 0.2850 - accuracy: 0.8658
3000/3000 [=====] - 3s 902us/step - loss: 0.2875 - accuracy: 0.8657
3000/3000 [=====] - 3s 899us/step - loss: 0.2855 - accuracy: 0.8658
3000/3000 [=====] - 3s 911us/step - loss: 0.2843 - accuracy: 0.8661
3000/3000 [=====] - 3s 914us/step - loss: 0.2853 - accuracy: 0.8658
3000/3000 [=====] - 3s 887us/step - loss: 0.2853 - accuracy: 0.8659
3000/3000 [=====] - 3s 904us/step - loss: 0.2878 - accuracy: 0.8659
3000/3000 [=====] - 3s 911us/step - loss: 0.2844 - accuracy: 0.8659
3000/3000 [=====] - 3s 906us/step - loss: 0.2843 - accuracy: 0.8661
3000/3000 [=====] - 3s 898us/step - loss: 0.2846 - accuracy: 0.8661
3000/3000 [=====] - 3s 891us/step - loss: 0.2843 - accuracy: 0.8661
3000/3000 [=====] - 3s 899us/step - loss: 0.2844 - accuracy: 0.8660
3000/3000 [=====] - 3s 904us/step - loss: 0.2850 - accuracy: 0.8657
3000/3000 [=====] - 3s 906us/step - loss: 0.2850 - accuracy: 0.8659
```

```
3000/3000 [=====] - 3s 906us/step - loss: 0.2845 - accuracy: 0.8661
3000/3000 [=====] - 3s 904us/step - loss: 0.2853 - accuracy: 0.8656
3000/3000 [=====] - 3s 892us/step - loss: 0.2851 - accuracy: 0.8661
3000/3000 [=====] - 3s 897us/step - loss: 0.2845 - accuracy: 0.8658
3000/3000 [=====] - 3s 905us/step - loss: 0.2846 - accuracy: 0.8659
3000/3000 [=====] - 3s 888us/step - loss: 0.2897 - accuracy: 0.8641
3000/3000 [=====] - 3s 892us/step - loss: 0.2845 - accuracy: 0.8660
3000/3000 [=====] - 3s 903us/step - loss: 0.2847 - accuracy: 0.8661
3000/3000 [=====] - 3s 938us/step - loss: 0.2863 - accuracy: 0.8658
3000/3000 [=====] - 3s 961us/step - loss: 0.2850 - accuracy: 0.8657
3000/3000 [=====] - 3s 973us/step - loss: 0.2848 - accuracy: 0.8657
3000/3000 [=====] - 3s 974us/step - loss: 0.2869 - accuracy: 0.8658
3000/3000 [=====] - 3s 898us/step - loss: 0.2861 - accuracy: 0.8655
3000/3000 [=====] - 3s 904us/step - loss: 0.2847 - accuracy: 0.8660
3000/3000 [=====] - 3s 901us/step - loss: 0.2861 - accuracy: 0.8657
3000/3000 [=====] - 3s 902us/step - loss: 0.2848 - accuracy: 0.8657
3000/3000 [=====] - 3s 889us/step - loss: 0.2850 - accuracy: 0.8659
3000/3000 [=====] - 3s 905us/step - loss: 0.2845 - accuracy: 0.8660
3000/3000 [=====] - 3s 911us/step - loss: 0.2937 - accuracy: 0.8609
3000/3000 [=====] - 3s 891us/step - loss: 0.2868 - accuracy: 0.8656
3000/3000 [=====] - 3s 897us/step - loss: 0.2847 - accuracy: 0.8661
3000/3000 [=====] - 3s 898us/step - loss: 0.3176 - accuracy: 0.8481
3000/3000 [=====] - 3s 899us/step - loss: 0.2854 - accuracy: 0.8651
3000/3000 [=====] - 3s 898us/step - loss: 0.3310 - accuracy: 0.8333
3000/3000 [=====] - 3s 912us/step - loss: 0.2948 - accuracy: 0.8629
3000/3000 [=====] - 3s 912us/step - loss: 0.4244 - accuracy: 0.8353
3000/3000 [=====] - 3s 903us/step - loss: 0.2952 - accuracy: 0.8587
3000/3000 [=====] - 3s 903us/step - loss: 0.2994 - accuracy: 0.8597
3000/3000 [=====] - 3s 887us/step - loss: 0.2907 - accuracy: 0.8635
3000/3000 [=====] - 3s 912us/step - loss: 0.2861 - accuracy: 0.8651
3000/3000 [=====] - 3s 911us/step - loss: 0.2913 - accuracy: 0.8620
3000/3000 [=====] - 3s 907us/step - loss: 0.2845 - accuracy: 0.8659
3000/3000 [=====] - 3s 923us/step - loss: 0.2979 - accuracy: 0.8564
3000/3000 [=====] - 3s 908us/step - loss: 0.2869 - accuracy: 0.8644
3000/3000 [=====] - 3s 903us/step - loss: 0.2937 - accuracy: 0.8579
3000/3000 [=====] - 3s 912us/step - loss: 0.2888 - accuracy: 0.8628
3000/3000 [=====] - 3s 896us/step - loss: 0.2850 - accuracy: 0.8659
3000/3000 [=====] - 3s 907us/step - loss: 0.2903 - accuracy: 0.8627
3000/3000 [=====] - 3s 898us/step - loss: 0.2959 - accuracy: 0.8607
3000/3000 [=====] - 3s 922us/step - loss: 0.2855 - accuracy: 0.8661
3000/3000 [=====] - 3s 912us/step - loss: 0.2985 - accuracy: 0.8545
3000/3000 [=====] - 3s 904us/step - loss: 0.2880 - accuracy: 0.8655
3000/3000 [=====] - 3s 916us/step - loss: 0.3018 - accuracy: 0.8615
3000/3000 [=====] - 3s 911us/step - loss: 0.2978 - accuracy: 0.8624
3000/3000 [=====] - 3s 920us/step - loss: 0.2942 - accuracy: 0.8604
3000/3000 [=====] - 3s 878us/step - loss: 0.3052 - accuracy: 0.8574
3000/3000 [=====] - 3s 931us/step - loss: 0.2927 - accuracy: 0.8655
3000/3000 [=====] - 3s 888us/step - loss: 0.2893 - accuracy: 0.8636
3000/3000 [=====] - 3s 895us/step - loss: 0.2870 - accuracy: 0.8637
3000/3000 [=====] - 3s 905us/step - loss: 0.2915 - accuracy: 0.8608
3000/3000 [=====] - 3s 915us/step - loss: 0.2861 - accuracy: 0.8657
3000/3000 [=====] - 3s 921us/step - loss: 0.2894 - accuracy: 0.8629
3000/3000 [=====] - 3s 918us/step - loss: 0.3175 - accuracy: 0.8486
3000/3000 [=====] - 3s 930us/step - loss: 0.2848 - accuracy: 0.8659
3000/3000 [=====] - 3s 909us/step - loss: 0.2951 - accuracy: 0.8641
3000/3000 [=====] - 3s 934us/step - loss: 0.2873 - accuracy: 0.8656
3000/3000 [=====] - 3s 953us/step - loss: 0.3582 - accuracy: 0.8297
3000/3000 [=====] - 3s 935us/step - loss: 0.2968 - accuracy: 0.8622
3000/3000 [=====] - 3s 949us/step - loss: 0.2912 - accuracy: 0.8643
3000/3000 [=====] - 3s 935us/step - loss: 0.3093 - accuracy: 0.8473
3000/3000 [=====] - 3s 957us/step - loss: 0.2959 - accuracy: 0.8623
3000/3000 [=====] - 3s 919us/step - loss: 0.2898 - accuracy: 0.8643
3000/3000 [=====] - 3s 922us/step - loss: 0.2975 - accuracy: 0.8618
3000/3000 [=====] - 3s 918us/step - loss: 0.2934 - accuracy: 0.8629
3000/3000 [=====] - 3s 920us/step - loss: 0.2875 - accuracy: 0.8643
3000/3000 [=====] - 3s 909us/step - loss: 0.2868 - accuracy: 0.8644
3000/3000 [=====] - 3s 942us/step - loss: 0.2861 - accuracy: 0.8649
3000/3000 [=====] - 3s 934us/step - loss: 0.2902 - accuracy: 0.8625
3000/3000 [=====] - 3s 938us/step - loss: 0.2863 - accuracy: 0.8654
3000/3000 [=====] - 3s 915us/step - loss: 0.2899 - accuracy: 0.8627
3000/3000 [=====] - 3s 947us/step - loss: 0.2895 - accuracy: 0.8629
3000/3000 [=====] - 3s 935us/step - loss: 0.2846 - accuracy: 0.8659
```

```
3000/3000 [=====] - 3s 930us/step - loss: 0.2849 - accuracy: 0.8660
3000/3000 [=====] - 3s 925us/step - loss: 0.2851 - accuracy: 0.8655
3000/3000 [=====] - 3s 941us/step - loss: 0.2854 - accuracy: 0.8655
3000/3000 [=====] - 3s 930us/step - loss: 0.2847 - accuracy: 0.8659
3000/3000 [=====] - 3s 911us/step - loss: 0.2856 - accuracy: 0.8657
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3000/3000 [=====] - 3s 960us/step - loss: 0.2853 - accuracy: 0.8659
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3000/3000 [=====] - 3s 947us/step - loss: 0.2853 - accuracy: 0.8657
3000/3000 [=====] - 3s 946us/step - loss: 0.2872 - accuracy: 0.8653
3000/3000 [=====] - 3s 929us/step - loss: 0.2850 - accuracy: 0.8659
3000/3000 [=====] - 3s 949us/step - loss: 0.2896 - accuracy: 0.8654
3000/3000 [=====] - 3s 957us/step - loss: 0.2849 - accuracy: 0.8659
3000/3000 [=====] - 3s 963us/step - loss: 0.2859 - accuracy: 0.8655
3000/3000 [=====] - 3s 958us/step - loss: 0.2850 - accuracy: 0.8658
3000/3000 [=====] - 3s 938us/step - loss: 0.2844 - accuracy: 0.8660
3000/3000 [=====] - 3s 954us/step - loss: 0.2848 - accuracy: 0.8657
3000/3000 [=====] - 3s 952us/step - loss: 0.2849 - accuracy: 0.8657
3000/3000 [=====] - 3s 944us/step - loss: 0.2863 - accuracy: 0.8659
3000/3000 [=====] - 3s 1ms/step - loss: 0.2844 - accuracy: 0.8660
3000/3000 [=====] - 3s 970us/step - loss: 0.2843 - accuracy: 0.8661
3000/3000 [=====] - 3s 928us/step - loss: 0.2842 - accuracy: 0.8661
```

```
3000/3000 [=====] - 3s 989us/step - loss: 0.2844 - accuracy: 0.8660
3000/3000 [=====] - 3s 996us/step - loss: 0.2847 - accuracy: 0.8659
3000/3000 [=====] - 3s 987us/step - loss: 0.2847 - accuracy: 0.8658
3000/3000 [=====] - 3s 994us/step - loss: 0.2845 - accuracy: 0.8660
3000/3000 [=====] - 3s 1ms/step - loss: 0.2843 - accuracy: 0.8660
3000/3000 [=====] - 3s 988us/step - loss: 0.2850 - accuracy: 0.8657
3000/3000 [=====] - 3s 979us/step - loss: 0.2848 - accuracy: 0.8659
3000/3000 [=====] - 3s 1ms/step - loss: 0.2847 - accuracy: 0.8657
3000/3000 [=====] - 3s 999us/step - loss: 0.2850 - accuracy: 0.8660
3000/3000 [=====] - 3s 1000us/step - loss: 0.2895 - accuracy: 0.8644
3000/3000 [=====] - 3s 976us/step - loss: 0.2848 - accuracy: 0.8658
3000/3000 [=====] - 3s 1ms/step - loss: 0.2850 - accuracy: 0.8659
3000/3000 [=====] - 3s 1ms/step - loss: 0.2881 - accuracy: 0.8657
3000/3000 [=====] - 3s 997us/step - loss: 0.2851 - accuracy: 0.8658
3000/3000 [=====] - 3s 981us/step - loss: 0.2848 - accuracy: 0.8657
3000/3000 [=====] - 3s 965us/step - loss: 0.2855 - accuracy: 0.8660
3000/3000 [=====] - 3s 969us/step - loss: 0.2857 - accuracy: 0.8657
3000/3000 [=====] - 3s 1ms/step - loss: 0.2847 - accuracy: 0.8659
3000/3000 [=====] - 3s 991us/step - loss: 0.2851 - accuracy: 0.8656
3000/3000 [=====] - 3s 991us/step - loss: 0.2848 - accuracy: 0.8657
3000/3000 [=====] - 3s 963us/step - loss: 0.2843 - accuracy: 0.8659
3000/3000 [=====] - 3s 1ms/step - loss: 0.2845 - accuracy: 0.8659
3000/3000 [=====] - 3s 1ms/step - loss: 0.2957 - accuracy: 0.8598
3000/3000 [=====] - 3s 1ms/step - loss: 0.2846 - accuracy: 0.8659
3000/3000 [=====] - 3s 1ms/step - loss: 0.2846 - accuracy: 0.8659
```

Out[]:	Weight	Feature
	0.0341 ± 0.0039	m_Never-married
	0.0316 ± 0.0018	education-num
	0.0314 ± 0.0019	capital-gain
	0.0191 ± 0.0022	r_Husband
	0.0166 ± 0.0032	age
	0.0161 ± 0.0020	m_Divorced
	0.0112 ± 0.0012	o_Craft-repair
	0.0109 ± 0.0017	w_Private
	0.0099 ± 0.0018	o_Other-service
	0.0078 ± 0.0009	w_Self-emp-not-inc
	0.0076 ± 0.0018	hours-per-week
	0.0070 ± 0.0015	capital-loss
	0.0064 ± 0.0010	o_Machine-op-inspct
	0.0061 ± 0.0015	c_United-States
	0.0054 ± 0.0019	o_Handlers-cleaners
	0.0051 ± 0.0025	race_White
	0.0050 ± 0.0011	o_Adm-clerical
	0.0048 ± 0.0011	r_Not-in-family
	0.0047 ± 0.0006	o_Farming-fishing
	0.0045 ± 0.0011	o_Sales
	0.0043 ± 0.0005	r_Own-child
	0.0041 ± 0.0012	o_Transport-moving
	0.0037 ± 0.0007	w_Local-gov
	0.0034 ± 0.0010	m_Separated
	0.0033 ± 0.0004	r_Unmarried
	0.0031 ± 0.0005	race_Black
	0.0030 ± 0.0018	sex
	0.0030 ± 0.0006	w_State-gov
	0.0028 ± 0.0011	c_?
	0.0026 ± 0.0007	o_Prof-specialty
	0.0026 ± 0.0009	o_?
	0.0024 ± 0.0009	m_Widowed
	0.0023 ± 0.0011	w_?
	0.0023 ± 0.0008	o_Protective-serv
	0.0020 ± 0.0014	m_Married-civ-spouse
	0.0019 ± 0.0005	r_Other-relative
	0.0017 ± 0.0008	r_Wife
	0.0016 ± 0.0009	c_Mexico
	0.0015 ± 0.0002	race_Amer-Indian-Eskimo
	0.0015 ± 0.0006	w_Self-emp-inc
	0.0014 ± 0.0006	race_Asian-Pac-Islander
	0.0010 ± 0.0003	w_Federal-gov
	0.0009 ± 0.0001	demogweight
	0.0008 ± 0.0007	o_Priv-house-serv
	0.0008 ± 0.0003	o_Exec-managerial
	0.0007 ± 0.0004	race_Other
	0.0007 ± 0.0005	c_Columbia
	0.0005 ± 0.0003	c_Dominican-Republic
	0.0005 ± 0.0002	c_Italy
	0.0004 ± 0.0003	c_Vietnam
	0.0004 ± 0.0001	c_Puerto-Rico
	0.0004 ± 0.0003	m_Married-spouse-absent
	0.0004 ± 0.0002	c_China
	0.0004 ± 0.0003	c_Guatemala
	0.0003 ± 0.0002	c_India
	0.0003 ± 0.0003	c_South
	0.0003 ± 0.0002	c_Greece
	0.0003 ± 0.0002	c_Taiwan
	0.0003 ± 0.0003	o_Tech-support
	0.0003 ± 0.0004	c_El-Salvador
	0.0003 ± 0.0001	c_Philippines
	0.0003 ± 0.0002	c_England
	0.0003 ± 0.0001	c_Peru
	0.0003 ± 0.0002	c_Japan
	0.0003 ± 0.0002	c_Germany
	0.0003 ± 0.0003	c_Cuba
	0.0002 ± 0.0002	c_Portugal
	0.0002 ± 0.0001	c_Ecuador
	0.0002 ± 0.0003	c_Poland
	0.0002 ± 0.0001	c_Thailand
	0.0002 ± 0.0001	m_Married-AF-spouse
	0.0001 ± 0.0002	c_Nicaragua
	0.0001 ± 0.0001	c_Iran
	0.0001 ± 0.0002	c_Jamaica
	0.0001 ± 0.0001	c_Haiti
	0.0001 ± 0.0001	c_Cambodia
	0.0001 ± 0.0001	w_Without-pay
	0.0001 ± 0.0001	c_Canada
	0.0001 ± 0.0001	c_Scotland
	0.0001 ± 0.0002	c_Trinidad&Tobago
	0.0001 ± 0.0001	c_Hungary
	0.0001 ± 0.0001	c_Outlying-US(Guam-USVI-etc)
	0.0001 ± 0.0001	c_Laos
	0.0001 ± 0.0002	o_Armed-Forces
	0.0001 ± 0.0001	c_Yugoslavia
	0.0001 ± 0.0001	w_Never-worked

Weight	Feature
0.0000 ± 0.0001	c_Hong
0.0000 ± 0.0001	c_Ireland
0.0000 ± 0.0001	c_France
0 ± 0.0000	c_Holand-Netherlands
-0.0000 ± 0.0001	c_Honduras

```
In [90]: #Added all the variables from sensitivity table, and used 0.005 as a cutoff point for variables
in ELI5
features=["education-num", "capital-gain", 'capital-loss', 'hours-per-week', 'm_Never-married', "m_D
ivorced", 'w_Private', 'r_Not-in-family',
          'o_Other-service', 'r_Own-child', 'r_Husband', 'race_Black', 'race_White', 'c_Germany', 'r
_Own-child', 'm_Married-civ-spouse',
          'o_Prof-specialty', 'o_Other-service', 'o_Farming-fishing', 'demogweight', 'o_Craft-repai
r', 'o_Adm-clerical', 'c_United-States', 'sex', 'age', 'w_Self-emp-not-inc', 'o_Machine-op-inspct',
          'o_Handlers-cleaners'
]
```

```
In [91]: len(features)
```

```
Out[91]: 28
```

```
In [92]: # create model
def create_model():
    model = Sequential()

    # hidden layers
    model.add(Dense(100, input_dim=28, kernel_initializer='uniform', activation='relu'))
    model.add(Dense(20, kernel_initializer='uniform', activation='relu'))

    # output layer
    model.add(Dense(1, kernel_initializer='uniform', activation='sigmoid'))

    adam = keras.optimizers.Adam(lr = 0.001)
    model.compile(loss='binary_crossentropy', optimizer=adam, metrics=['accuracy'])

    return model

model_2 = KerasClassifier(build_fn=create_model, epochs=100, batch_size=5, verbose=1, callbacks
=[es,mc])
```

```
In [93]: # model with selected predictors
df_features = df[features]
X2 = df_features
y2 = df['income']

X2_train, X2_test, y2_train, y2_test = train_test_split(X2, y2, test_size=0.4, random_state=see
d)
```

```
In [94]: # fit model
model_2.fit(x=X2_train, y=y2_train, validation_data=(X2_test, y2_test), callbacks=[es, mc], verbose=1)
```

```
Epoch 1/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.4376 - accuracy: 0.7894 -
val_loss: 0.3673 - val_accuracy: 0.8264
Epoch 2/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3464 - accuracy: 0.8303 -
val_loss: 0.3451 - val_accuracy: 0.8353
Epoch 3/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3347 - accuracy: 0.8415 -
val_loss: 0.3301 - val_accuracy: 0.8482
Epoch 4/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3278 - accuracy: 0.8478 -
val_loss: 0.3386 - val_accuracy: 0.8313
Epoch 5/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3285 - accuracy: 0.8425 -
val_loss: 0.3304 - val_accuracy: 0.8458
Epoch 6/100
3000/3000 [=====] - 6s 2ms/step - loss: 0.3208 - accuracy: 0.8485 -
val_loss: 0.3311 - val_accuracy: 0.8446
Epoch 7/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3250 - accuracy: 0.8428 -
val_loss: 0.3336 - val_accuracy: 0.8501
Epoch 8/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3235 - accuracy: 0.8459 -
val_loss: 0.3284 - val_accuracy: 0.8508
Epoch 9/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3167 - accuracy: 0.8464 -
val_loss: 0.3231 - val_accuracy: 0.8513
Epoch 10/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3145 - accuracy: 0.8515 -
val_loss: 0.3337 - val_accuracy: 0.8434
Epoch 11/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3120 - accuracy: 0.8513 -
val_loss: 0.3251 - val_accuracy: 0.8510
Epoch 12/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3115 - accuracy: 0.8535 -
val_loss: 0.3264 - val_accuracy: 0.8481
Epoch 13/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3138 - accuracy: 0.8515 -
val_loss: 0.3222 - val_accuracy: 0.8511
Epoch 14/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3041 - accuracy: 0.8565 -
val_loss: 0.3213 - val_accuracy: 0.8502
Epoch 15/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3086 - accuracy: 0.8540 -
val_loss: 0.3239 - val_accuracy: 0.8495
Epoch 16/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2993 - accuracy: 0.8589 -
val_loss: 0.3225 - val_accuracy: 0.8503
Epoch 17/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3036 - accuracy: 0.8540 -
val_loss: 0.3208 - val_accuracy: 0.8513
Epoch 18/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3058 - accuracy: 0.8543 -
val_loss: 0.3210 - val_accuracy: 0.8505
Epoch 19/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2977 - accuracy: 0.8595 -
val_loss: 0.3287 - val_accuracy: 0.8485
Epoch 20/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3044 - accuracy: 0.8548 -
val_loss: 0.3226 - val_accuracy: 0.8504
Epoch 21/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3041 - accuracy: 0.8579 -
val_loss: 0.3227 - val_accuracy: 0.8500
Epoch 22/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2978 - accuracy: 0.8581 -
val_loss: 0.3177 - val_accuracy: 0.8531
Epoch 23/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3008 - accuracy: 0.8579 -
val_loss: 0.3227 - val_accuracy: 0.8504
Epoch 24/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2989 - accuracy: 0.8586 -
```



```

val_loss: 0.3209 - val_accuracy: 0.8518
Epoch 25/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3025 - accuracy: 0.8548 -
val_loss: 0.3200 - val_accuracy: 0.8528
Epoch 26/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.2985 - accuracy: 0.8529 -
val_loss: 0.3310 - val_accuracy: 0.8481
Epoch 27/100
3000/3000 [=====] - 5s 2ms/step - loss: 0.3028 - accuracy: 0.8555 -
val_loss: 0.3207 - val_accuracy: 0.8528

```

Out[94]: <tensorflow.python.keras.callbacks.History at 0x7ffa9e14d748>

```

In [95]: # predicted accuracy
# compare the predicted income with actual income
classificationSummary(y2_test, model_2.predict(X2_test))

70/2000 [>.....] - ETA: 1s

/usr/local/lib/python3.6/dist-packages/tensorflow/python/keras/engine/sequential.py:450: User
Warning: `model.predict_classes()` is deprecated and will be removed after 2021-01-01. Please
use instead: * `np.argmax(model.predict(x), axis=-1)`, if your model does multi-class classi
fication (e.g. if it uses a `softmax` last-layer activation). * `(model.predict(x) > 0.5).as
type("int32")`, if your model does binary classification (e.g. if it uses a `sigmoid` las
t-layer activation).
  warnings.warn("`model.predict_classes()` is deprecated and '

2000/2000 [=====] - 2s 795us/step
Confusion Matrix (Accuracy 0.8528)

      Prediction
Actual    0      1
0   6914   687
1   785   1614

```

```

In [96]: classificationSummary(y2_train, model_2.predict(X2_train))

127/3000 [>.....] - ETA: 2s

/usr/local/lib/python3.6/dist-packages/tensorflow/python/keras/engine/sequential.py:450: User
Warning: `model.predict_classes()` is deprecated and will be removed after 2021-01-01. Please
use instead: * `np.argmax(model.predict(x), axis=-1)`, if your model does multi-class classi
fication (e.g. if it uses a `softmax` last-layer activation). * `(model.predict(x) > 0.5).as
type("int32")`, if your model does binary classification (e.g. if it uses a `sigmoid` las
t-layer activation).
  warnings.warn("`model.predict_classes()` is deprecated and '

3000/3000 [=====] - 2s 805us/step
Confusion Matrix (Accuracy 0.8596)

      Prediction
Actual    0      1
0  10396  1019
1  1087   2498

```

EDA With Categorical Variables

```
In [101]: # df with predicted income
X_feat= df[features]
df_predict = pd.DataFrame(model_2.predict(X_feat))
df_predict.columns=['predicted_income']
df_full = df.join(df_predict)
```

```
145/5000 [.....] - ETA: 3s
```

```
/usr/local/lib/python3.6/dist-packages/tensorflow/python/keras/engine/sequential.py:450: User
Warning: `model.predict_classes()` is deprecated and will be removed after 2021-01-01. Please
use instead: * `np.argmax(model.predict(x), axis=-1)`, if your model does multi-class classi
fication (e.g. if it uses a `softmax` last-layer activation). * `(model.predict(x) > 0.5).as
type("int32")`, if your model does binary classification (e.g. if it uses a `sigmoid` las
t-layer activation).
```

```
warnings.warn("`model.predict_classes()` is deprecated and '
```

```
5000/5000 [=====] - 4s 724us/step
```

```
In [119]: #Top 3 categorical variables
plt.figure(figsize=(20, 8))
sns.countplot(x = "m_Never-married", data = df_full, hue = "predicted_income")

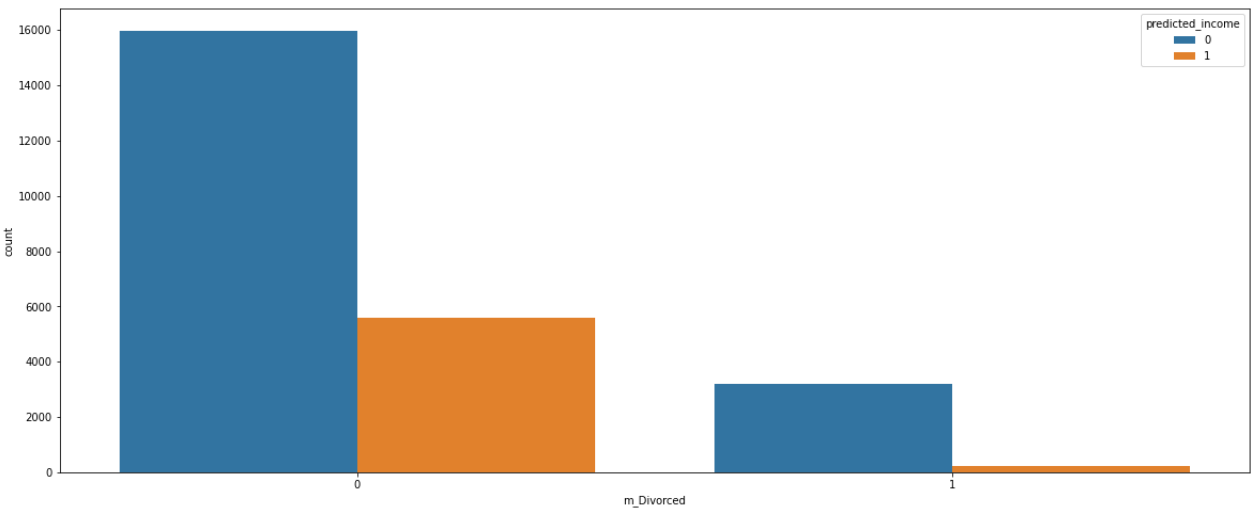
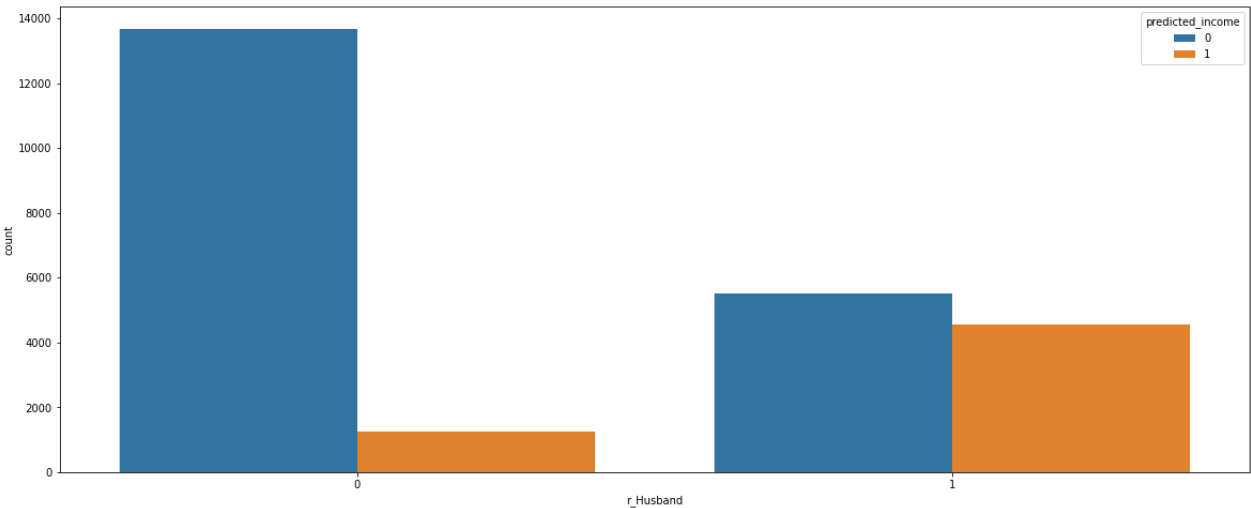
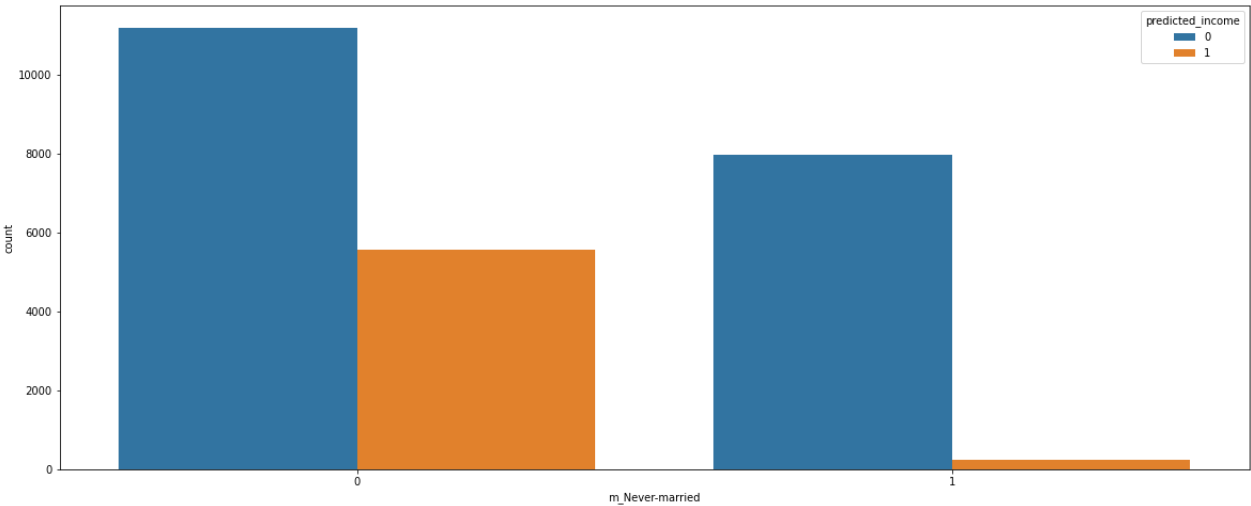
plt.figure(figsize=(20, 8))
sns.countplot(x = "r_Husband", data = df_full, hue = "predicted_income")

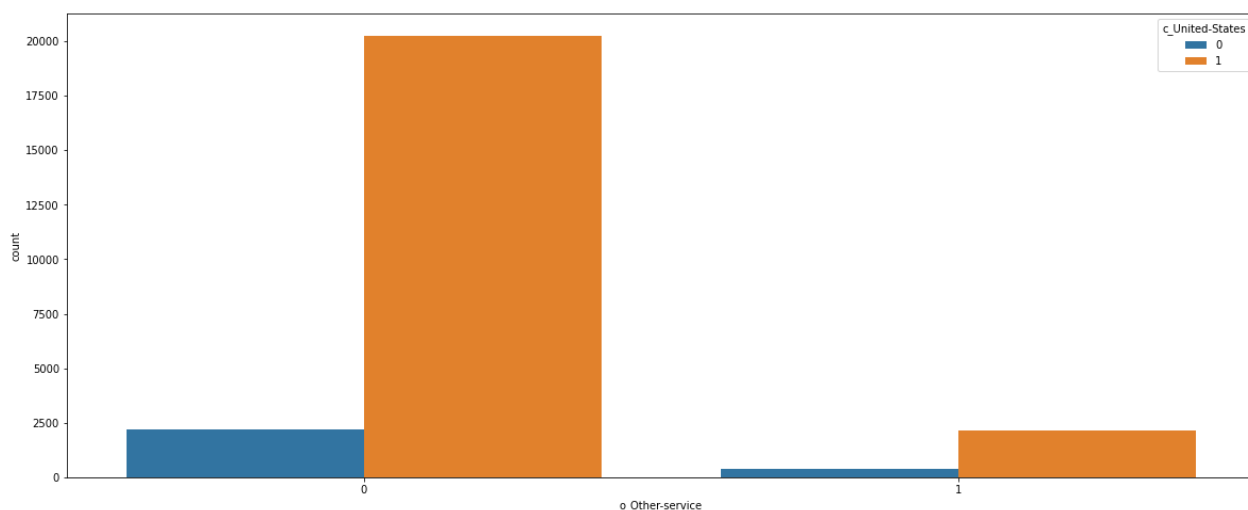
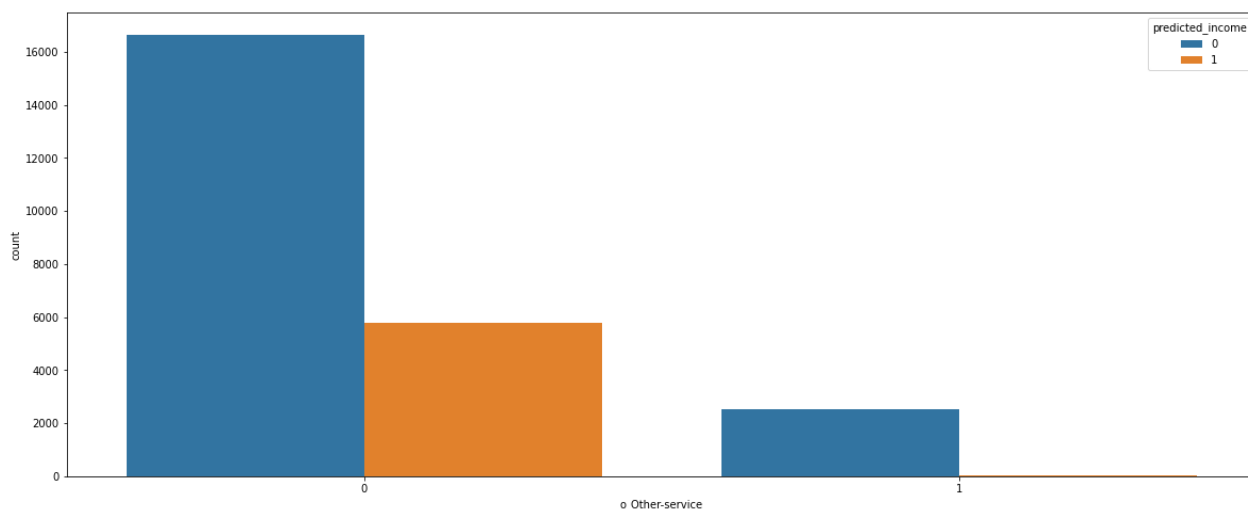
plt.figure(figsize=(20, 8))
sns.countplot(x = "m_Divorced", data = df_full, hue = "predicted_income")

plt.figure(figsize=(20, 8))
sns.countplot(x = "o_Other-service", data = df_full, hue = "predicted_income")

plt.figure(figsize=(20, 8))
sns.countplot(x = "o_Other-service", data = df_full, hue = "c_United-States")
```

Out[119]: <matplotlib.axes._subplots.AxesSubplot at 0x7ffa9865c2b0>





```
In [111]: pd.crosstab(df_full['predicted_income'], df_full["m_Never-married"])
```

Out[111]:

		m_Never-married	
		0	1
predicted_income			
	0	11202	7980
	1	5573	245

```
In [112]: pd.crosstab(df_full['predicted_income'], df_full["m_Divorced"])
```

Out[112]:

		m_Divorced	
		0	1
predicted_income			
	0	15977	3205
	1	5588	230

```
In [113]: pd.crosstab(df_full['predicted_income'], df_full["r_Husband"])
```

Out[113]:

		r_Husband	
		0	1
predicted_income			
	0	13683	5499
	1	1253	4565

```
In [115]: pd.crosstab(df_full['predicted_income'], df_full["o_Other-service"])
```

```
Out[115]:
```

		o_Other-service	
		0	1
predicted_income			
	0	16650	2532
	1	5795	23

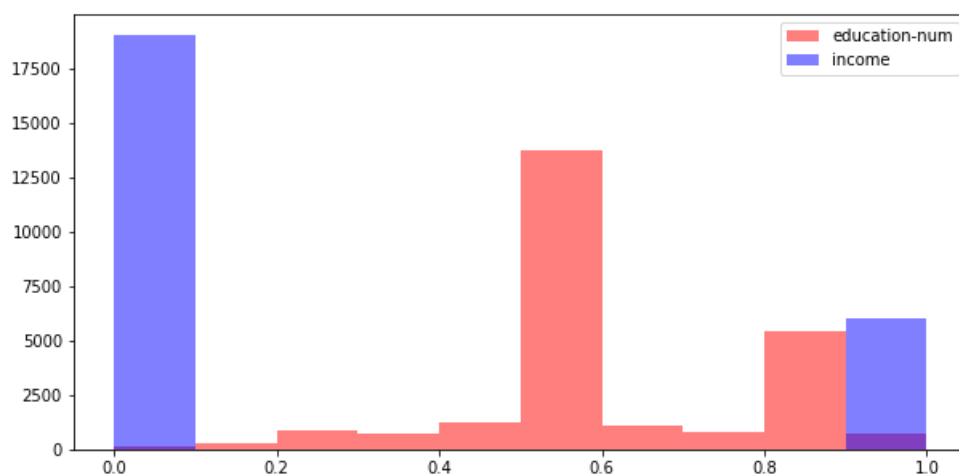
```
In [117]: pd.crosstab(df_full['predicted_income'], df_full["c_United-States"])
```

```
Out[117]:
```

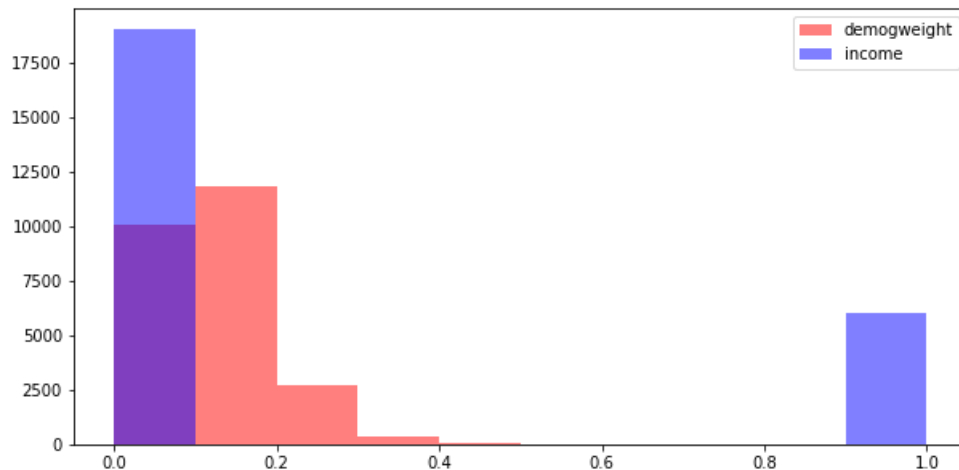
		c_United-States	
		0	1
predicted_income			
	0	2158	17024
	1	421	5397

EDA Numerical Variables

```
In [120]: # histogram for education-num overlay with income
plt.figure(figsize=(10, 5))
plt.hist(df["education-num"], 10, color='r', alpha=0.5, label='education-num')
plt.hist(df["income"], 10, color='b', alpha=0.5, label='income')
plt.legend(loc='upper right')
plt.show()
```



```
In [121]: # histogram for demogweight overlay with income
plt.figure(figsize=(10, 5))
plt.hist(df["demogweight"], 10, color='r', alpha=0.5, label='demogweight')
plt.hist(df["income"], 10, color='b', alpha=0.5, label='income')
plt.legend(loc='upper right')
plt.show()
```



Part Two

```
In [126]: df2 = pd.read_csv('USCensusTest.csv')
```

```
In [127]: # data preprocessing the test data

# education/education-num - drop education
df2 = df2.drop(columns=['education'])

# standadize inputs
# continuous variables - MinMax normalization
scaler = preprocessing.MinMaxScaler()
df2['age'] = scaler.fit_transform(df2[['age']])
df2['demogweight'] = scaler.fit_transform(df2[['demogweight']])
df2['education-num'] = scaler.fit_transform(df2[['education-num']])
df2['capital-gain'] = scaler.fit_transform(df2[['capital-gain']])
df2['capital-loss'] = scaler.fit_transform(df2[['capital-loss']])
df2['hours-per-week'] = scaler.fit_transform(df2[['hours-per-week']])

# categorical variables - Indicator
df2['sex'].replace({'Male': 1, 'Female': 0}, inplace=True)
df2 = pd.get_dummies(df2,
                    prefix=['w', 'o', 'm', 'r', 'race', 'c'],
                    columns=['workclass', 'occupation', 'marital-status', 'relationship', 'race', 'native-country'])
```

```
In [129]: # full model
test_pred=model2.predict(df2[features])
```

45/1513 [.....] - ETA: 1s

/usr/local/lib/python3.6/dist-packages/tensorflow/python/keras/engine/sequential.py:450: User Warning: `model.predict_classes()` is deprecated and will be removed after 2021-01-01. Please use instead: * `np.argmax(model.predict(x), axis=-1)`, if your model does multi-class classification (e.g. if it uses a `softmax` last-layer activation). * `(model.predict(x) > 0.5).astype("int32")`, if your model does binary classification (e.g. if it uses a `sigmoid` last-layer activation).

warnings.warn("`model.predict_classes()` is deprecated and "

1513/1513 [=====] - 2s 1ms/step

```
In [ ]:
```

Created Text File for the Numpy Array of Model Predictions

```
In [152]: with open('Team7Predictions.txt', 'wb') as f:  
          np.save(f, test_pred, allow_pickle=False)
```

```
In [153]: with open('Team7Predictions.txt', 'rb') as f:  
          test_set_predictions = np.load(f)
```

```
In [154]: test_set_predictions
```

```
Out[154]: array([[0],  
                [0],  
                [0],  
                ...,  
                [0],  
                [0],  
                [0]])
```