In [9]:
```
# SVM Classification

# Importing the libraries
import numpy as np
import matplotlib.pyplot as plt
import matplotlib.image as mpimg
import pandas as pd
```

In [2]:
```
# Importing the dataset
dataset = pd.read_csv('iris.csv')
```

In [3]:
```
#Looking at the first 5 values of the dataset
dataset.head()
```

Out[3]:

	sepal_length	sepal_width	petal_length	petal_width	species
0	5.1	3.5	1.4	0.2	setosa
1	4.9	3.0	1.4	0.2	setosa
2	4.7	3.2	1.3	0.2	setosa
3	4.6	3.1	1.5	0.2	setosa
4	5.0	3.6	1.4	0.2	setosa

In [4]:
```
%matplotlib inline
img=mpimg.imread('iris_types.jpg')
plt.figure(figsize=(20,40))
plt.axis('off')
plt.imshow(img)
```

Out[4]:
```
<matplotlib.image.AxesImage at 0x25883e298b0>
```

In [10]:
```
import numpy as np
import pandas as pd

import matplotlib.pyplot as plt
%matplotlib inline

from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.svm import SVC
from sklearn.metrics import accuracy_score
from sklearn.metrics import confusion_matrix

from matplotlib.colors import ListedColormap

import seaborn as sns
```

In [12]:
```
# Importing data and creating a dataframe.
df = pd.read_csv("user-data.csv")
display(df.head())
display(df.dtypes)
```

	user_id	gender	age	estimated_salary	purchased
0	15624510	Male	19	19000	0
1	15810944	Male	35	20000	0
2	15668575	Female	26	43000	0
3	15603246	Female	27	57000	0
4	15804002	Male	19	76000	0

```
user_id              int64
gender              object
age                  int64
estimated_salary     int64
purchased            int64
dtype: object
```

In [13]:
```
# Extracting independent and dependent variables.
x = df.iloc[:, [2, 3]].values
y = df.iloc[:, 4].values

# Output first five values in both the lists.
print(x[:5])
print(y[:5])

# Independent variables are age and estimated_salary.
# Dependent variable is purchased because it depends on a person's age as well as his/her estimated salary
```

```
[[   19 19000]
 [   35 20000]
 [   26 43000]
 [   27 57000]
 [   19 76000]]
[0 0 0 0 0]
```

In [14]:
```
# Splitting the data into training and testing data.
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.25, random_state=0)
```

In [15]:
```
std_x = StandardScaler()
x_train = std_x.fit_transform(x_train)
x_test = std_x.transform(x_test)

print("x_train:", x_train[:5], "...")
print("")
print("x_test:", x_test[:5], "...")
```

```
x_train: [[ 0.58164944 -0.88670699]
 [-0.60673761  1.46173768]
 [-0.01254409 -0.5677824 ]
 [-0.60673761  1.89663484]
 [ 1.37390747 -1.40858358]] ...

x_test: [[-0.80480212  0.50496393]
 [-0.01254409 -0.5677824 ]
 [-0.30964085  0.1570462 ]
 [-0.80480212  0.27301877]
 [-0.30964085 -0.5677824 ]] ...
```

In [16]:
```
model = SVC(kernel="linear", random_state=0)
model.fit(x_train, y_train)
```

Out[16]:
```
SVC(kernel='linear', random_state=0)
```

In [17]:
```
# Predicting the testing dataset results
y_pred = model.predict(x_test)
print(y_pred[:10], "...")
```

```
[0 0 0 0 0 0 0 1 0 0] ...
```

In [18]:
```
df = pd.DataFrame(y_test, y_pred)
df.head()
```

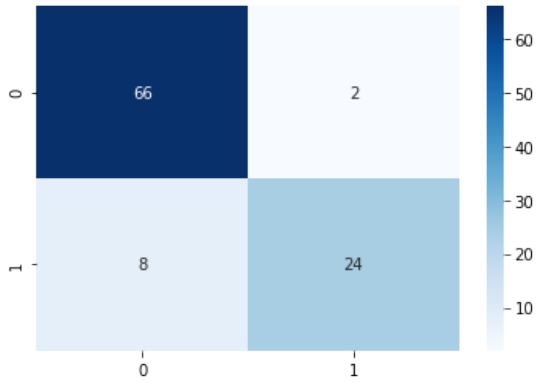
Out[18]:

	0
0	0
0	0
0	0
0	0
0	0

In [19]:
```
#Creating the Confusion matrix and heatmap
from sklearn.metrics import confusion_matrix
cm = confusion_matrix(y_test, y_pred)
print(cm)

sns.heatmap(cm, annot=True, cmap="Blues")
```

```
[[66  2]
 [ 8 24]]
```

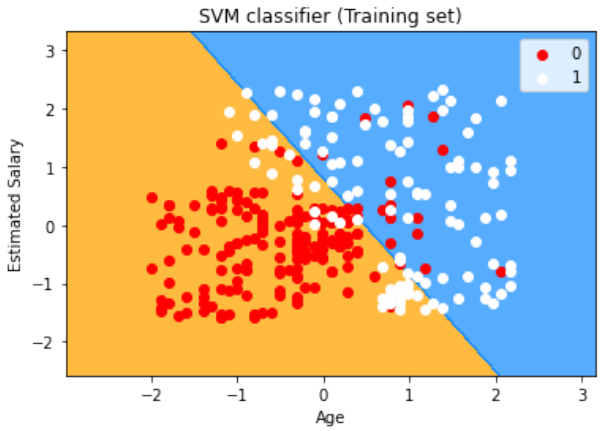
Out[19]: <AxesSubplot:>



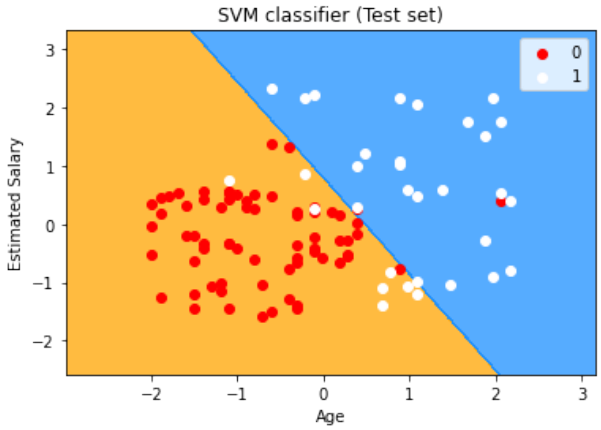
In [20]:
```
acc = accuracy_score(y_test, y_pred)
print("Accuracy:", acc)
```

```
Accuracy: 0.9
```

In [21]:
```
x_set, y_set = x_train, y_train

x1, x2 = np.meshgrid(np.arange(start=x_set[:, 0].min() - 1, stop=x_set[:, 0].max() + 1, step=0.01), np.ara

plt.contourf(x1, x2, model.predict(np.array([x1.ravel(), x2.ravel()]).T).reshape(x1.shape), alpha = 0.75,
plt.xlim(x1.min(), x1.max())
plt.ylim(x2.min(), x2.max())

for i, j in enumerate(np.unique(y_set)):
    plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1], c = [ListedColormap(('red', 'white'))(i)], lab

plt.title('SVM classifier (Training set)')

plt.xlabel('Age')
plt.ylabel('Estimated Salary')

plt.legend()

plt.show()
```



In [22]:
```
#Visulaizing the test set result
x_set, y_set = x_test, y_test
x1, x2 = np.meshgrid(np.arange(start = x_set[:, 0].min() - 1, stop = x_set[:, 0].max() + 1, step  =0.01),

plt.contourf(x1, x2, model.predict(np.array([x1.ravel(), x2.ravel()]).T).reshape(x1.shape), alpha = 0.75,
plt.xlim(x1.min(), x1.max())
plt.ylim(x2.min(), x2.max())

for i, j in enumerate(np.unique(y_set)):
    plt.scatter(x_set[y_set == j, 0], x_set[y_set == j, 1], c=[ListedColormap(('red', 'white'))(i)], label

plt.title('SVM classifier (Test set)')
plt.xlabel('Age')
plt.ylabel('Estimated Salary')
plt.legend()
plt.show()
```



In [ ]: