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**Algorithm 1** AutomatedGoogleSingleSignOn

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```
1: function AUTOSSO
2:   Get UINativeElements
3:   Click the field with the email name from UINativeElements
4:   Wait
5: end function
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**Algorithm 2** interactWithRunTimeConsentDialog

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```
1: function INTERACTWITHRUNTIME(queue, state, checkboxes=False)
2:   checkboxbuttons  $\leftarrow \emptyset$ 
3:   for each UIelement  $\in$  queue do
4:     if UIelement.text  $\in$  googleSSOKeys then AUTOSSO
5:     end if
6:   end for
7:   for each UIelement  $\in$  queue do
8:     if UIelement is clickable then
9:       if UIelement.text  $\in$  runtimeConsentKeys then
10:        runtimeconsent  $\leftarrow$  True
11:      end if
12:      if UIelement.text  $\in$  disagreeList then
13:        disagree  $\leftarrow$  True
14:        disagreeUI  $\leftarrow$  UIelement
15:      end if
16:      if UIelement.text  $\in$  agreeList then
17:        agree  $\leftarrow$  True
18:        agreeUI  $\leftarrow$  UIelement
19:      end if
20:      if UIelement.text  $\in$  agreeList and checkboxes then
21:        checkboxbuttons.append(UIelement)
22:      end if
23:    end if
24:  end for
25:  if runtimeconsent and agree and state==state.AGREE then
26:    if checkboxes==True then
27:      for each checkbox  $\in$  checkboxes do
28:        Click checkbox
29:      end for
30:    end if
31:    Click agreeUI
32:    state  $\leftarrow$  state.HAS_AGREE
33:  else if runtimeconsent and state==state.DISAGREE then
34:    if disagree then
35:      Click disagreeUI
36:      state  $\leftarrow$  state.HAS_DISAGREE
37:    else
38:      state  $\leftarrow$  state.NO_DISAGREE
39:    end if
40:  else
41:    state  $\leftarrow$  state.NO_RUNTIME
42:  end if
43:  return state
44: end function
```

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**Algorithm 3** CheckForRunTimeConsentDialog

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```
1: function CHECKFORRUNTIME(init_state)
2:   Get UINativeElements
3:   Get UIWebElements
4:   if UINativeElements and UIWebElements are empty then
5:     Begin BFS Traverse
6:     return state.NO_RUNTIME
7:   end if
8:   queue  $\leftarrow$  UINativeElements — UIWebElements
9:   state  $\leftarrow$  INTERACTWITHRUNTIME(queue, init_state, True)
10:  if state==state.NO_RUNTIME then
11:    Begin BFS Traverse
12:    return state.NO_RUNTIME
13:  end if
14:  if state==state.HAS_DISAGREE and
    init_state==state.DISAGREE and app exited then
15:    return state.DISAGREE_AND_EXIT
16:  else if state==state.NO_DISAGREE then
17:    return state.NO_DISAGREE
18:  end if
19:  Begin BFS Traverse
20:  return state.HAS_RUNTIME
21: end function ▷
22: checkstate  $\leftarrow$  CHECKFORRUNTIME(state.AGREE)
23: if checkstate==state.HAS_RUNTIME then
24:   CHECKFORRUNTIME(state.DISAGREE)
25: end if
```

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