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Respostas discursivas:

1. **Pesquisa com Dados de Satélite (Satellite)**
    a. **Resultados das Execuções:**

Random Forest:

```
                    Reference
Prediction          red soil cotton crop grey soil damp grey soil
   red soil             301           0         3              1
   cotton crop            0         138         1              0
   grey soil              3           0       261             27
   damp grey soil         0           0         4             79
   vegetation stubble     2           0         0              0
   very damp grey soil    0           2         2             18
                    Reference
Prediction          vegetation stubble very damp grey soil
   red soil                         5                     0
   cotton crop                      1                     0
   grey soil                        0                     3
   damp grey soil                   1                    14
   vegetation stubble             127                     3
   very damp grey soil              7                   281

Overall Statistics

             Accuracy : 0.9245
               95% CI : (0.9086, 0.9383)
   No Information Rate : 0.2383
   P-Value [Acc > NIR] : < 2.2e-16

                Kappa : 0.9064
```

SVM:

```
                  Reference
 Prediction          red soil cotton crop grey soil damp grey soil
   red soil             302          0        3               0
   cotton crop            0        136        2               2
   grey soil              2          0      260              27
   damp grey soil         0          1        6              72
   vegetation stubble     2          1        0               1
   very damp grey soil    0          2        0              23
                  Reference
 Prediction          vegetation stubble very damp grey soil
   red soil                      5                    0
   cotton crop                   2                    1
   grey soil                     0                    6
   damp grey soil                0                   24
   vegetation stubble          124                    2
   very damp grey soil          10                  268

Overall Statistics

               Accuracy : 0.905
                 95% CI : (0.8876, 0.9205)
    No Information Rate : 0.2383
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.8823
```

RNA:

```
                  Reference
 Prediction          red soil cotton crop grey soil damp grey soil
   red soil             290          0        0               3
   cotton crop            1        138        2               5
   grey soil             15          1      269             117
   damp grey soil         0          0        0               0
   vegetation stubble     0          1        0               0
   very damp grey soil    0          0        0               0
                  Reference
 Prediction          vegetation stubble very damp grey soil
   red soil                      9                    0
   cotton crop                  84                    2
   grey soil                    16                  293
   damp grey soil                0                    0
   vegetation stubble           32                    6
   very damp grey soil           0                    0

Overall Statistics

               Accuracy : 0.5678
                 95% CI : (0.5401, 0.5951)
    No Information Rate : 0.2383
    P-Value [Acc > NIR] : < 2.2e-16

                  Kappa : 0.4624
```

Tabela Comparativa

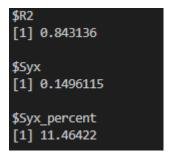|	**Random Forest**	**SVM**	**RNA**
Accuracy	0,9245	0,905	0,5678

b. Escolha do Modelo:

Com base na métrica de acurácia, o melhor modelo é o Random Forest, que obteve 0,9245 de Acurácia, contra 0,905 do SVM e 0,5678 do RNA.

2. Estimativa de volumes de árvores
a. Resultados das Execuções:

Random Forest

```
$R2
[1] 0.843136

$Syx
[1] 0.1496115

$Syx_percent
[1] 11.46422
```

SVM

```
$R2
[1] 0.8465577

$Syx
[1] 0.1479707

$Syx_percent
[1] 11.33849
```

Neural Network:

```
$R2
[1] -0.7244946

$Syx
[1] 0.49606

$Syx_percent
[1] 38.01139
```
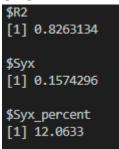
SPURR:

```
$R2
[1] 0.8263134

$Syx
[1] 0.1574296

$Syx_percent
[1] 12.0633
```

Tabela Comparativa

	Random Forest	SVM	Neural Network	SPURR
R²	0,843136	0,8465677	-0,7244946	0,8263134
Syx	0,1496115	0,1479707	0,49606	0,1574296
Syx Percent	11,4622	11,33849	38,01139	12,0633

b. Escolha do Modelo:

O modelo escolhido é o SVM devido a possuírem as melhores métricas, apesar do Random Forest ter um desempenho muito próximo.