

Miniproject01 - IMDB web scraping

```
library(tidyverse)
library(rvest) #scrape data from internet
```

```
url <- "https://www.imdb.com/search/title/?groups=top_100&sort=user_rating%2Cdesc"
```

```
print(url)
```

```
[1] "https://www.imdb.com/search/title/?groups=top_100&sort=user_rating%2Cdesc"
```

```
# Read HTML
imdb <- read_html(url)
imdb
```

```
{html_document}
<html xmlns:og="http://ogp.me/ns#" xmlns:fb="http://www.facebook.com/2008/fbml"
[1] <head>\n<meta http-equiv="Content-Type" content="text/html; charset=UTF-8 .
[2] <body id="styleguide-v2" class="fixed">\n          <img height="1" width .
```

```
titles <- imdb %>%
  html_nodes("h3.lister-item-header") %>%
  html_text2()
```

```
titles
```

```
'1. The Shawshank Redemption (1994)' · '2. The Godfather (1972)' · '3. The Dark Knight (2008)' ·
'4. The Lord of the Rings: The Return of the King (2003)' · '5. Schindler's List (1993)' ·
'6. The Godfather Part II (1974)' · '7. 12 Angry Men (1957)' · '8. Pulp Fiction (1994)' · '9. Inception (2010)' ·
'10. The Lord of the Rings: The Two Towers (2002)' · '11. Fight Club (1999)' ·
'12. The Lord of the Rings: The Fellowship of the Ring (2001)' · '13. Forrest Gump (1994)' ·
'14. Il buono, il brutto, il cattivo (1966)' · '15. The Matrix (1999)' · '16. Goodfellas (1990)' ·
'17. The Empire Strikes Back (1980)' · '18. One Flew Over the Cuckoo's Nest (1975)' · '19. Interstellar (2014)' ·
'20. Cidade de Deus (2002)' · '21. Sen to Chihiro no Kamikakushi (2001)' · '22. Saving Private Ryan (1998)' ·
'23. The Green Mile (1999)' · '24. La vita è bella (1997)' · '25. Se7en (1995)' · '26. Terminator 2: Judgment Day (1991)' ·
'27. The Silence of the Lambs (1991)' · '28. Star Wars (1977)' · '29. Seppuku (1962)' ·
'30. Shichinin no samurai (1954)' · '31. It's a Wonderful Life (1946)' · '32. Gisaengchung (2019)' ·
'33. Whiplash (2014)' · '34. The Intouchables (2011)' · '35. The Prestige (2006)' · '36. The Departed (2006)' ·
'37. The Pianist (2002)' · '38. Gladiator (2000)' · '39. American History X (1998)' · '40. The Usual Suspects (1995)' ·
'41. Léon (1994)' · '42. The Lion King (1994)' · '43. Nuovo Cinema Paradiso (1988)' · '44. Hotaru no haka (1988)' ·
'45. Back to the Future (1985)' · '46. Apocalypse Now (1979)' · '47. Alien (1979)' ·
'48. Once Upon a Time in the West (1968)' · '49. Psycho (1960)' · '50. Rear Window (1954)'
```

```
titles[1:10]
```

```
'1. The Shawshank Redemption (1994)' · '2. The Godfather (1972)' · '3. The Dark Knight (2008)' ·
'4. The Lord of the Rings: The Return of the King (2003)' · '5. Schindler's List (1993)' ·
'6. The Godfather Part II (1974)' · '7. 12 Angry Men (1957)' · '8. Pulp Fiction (1994)' · '9. Inception (2010)' ·
'10. The Lord of the Rings: The Two Towers (2002)'
```

```
#rating
ratings <- imdb %>%
  html_nodes("div.ratings-imdb-rating") %>%
  html_text2() %>%
  as.numeric()
```

```
ratings[1:10]
```

```
9.3 · 9.2 · 9 · 9 · 9 · 9 · 9 · 8.9 · 8.8 · 8.8
```

```
#num_vote
num_votes <- imdb %>%
  html_nodes("p.sort-num_votes-visible") %>%
  html_text2()
```

```
num_votes[1:10]
```

```
'Votes: 2,660,750 | Gross: $28.34M | Top 250: #1' · 'Votes: 1,843,959 | Gross: $134.97M | Top 250: #2' ·
'Votes: 2,633,682 | Gross: $534.86M | Top 250: #3' · 'Votes: 1,834,679 | Gross: $377.85M | Top 250: #7' ·
'Votes: 1,347,611 | Gross: $96.90M | Top 250: #6' · 'Votes: 1,263,207 | Gross: $57.30M | Top 250: #4' ·
'Votes: 785,671 | Gross: $4.36M | Top 250: #5' · 'Votes: 2,036,610 | Gross: $107.93M | Top 250: #8' ·
'Votes: 2,333,777 | Gross: $292.58M | Top 250: #14' · 'Votes: 1,656,631 | Gross: $342.55M | Top 250: #13'
```

```
df <- data.frame(
  title = titles,
  rating = ratings,
  num_vote = num_votes
)
```

A data.frame: 50 × 3

title	rating	num_vote
<chr>	<dbl>	<chr>
1. The Shawshank Redemption (1994)	9.3	Votes: 2,660,750 Gross: \$28.34M Top 250: #1
2. The Godfather (1972)	9.2	Votes: 1,843,959 Gross: \$134.97M Top 250: #2
3. The Dark Knight (2008)	9.0	Votes: 2,633,682 Gross: \$534.86M Top 250: #3
4. The Lord of the Rings: The Return of the King (2003)	9.0	Votes: 1,834,679 Gross: \$377.85M Top 250: #7
5. Schindler's List (1993)	9.0	Votes: 1,347,611 Gross: \$96.90M Top 250: #6
6. The Godfather Part II (1974)	9.0	Votes: 1,263,207 Gross: \$57.30M Top 250: #4
7. 12 Angry Men (1957)	9.0	Votes: 785,671 Gross: \$4.36M Top 250: #5
8. Pulp Fiction (1994)	8.9	Votes: 2,036,610 Gross: \$107.93M Top 250: #8
9. Inception (2010)	8.8	Votes: 2,333,777 Gross: \$292.58M Top 250: #14
10. The Lord of the Rings: The Two Towers (2002)	8.8	Votes: 1,656,631 Gross: \$342.55M Top 250: #13
11. Fight Club (1999)	8.8	Votes: 2,106,018 Gross: \$37.03M Top 250: #12
12. The Lord of the Rings: The Fellowship of the Ring (2001)	8.8	Votes: 1,863,568 Gross: \$315.54M Top 250: #9
13. Forrest Gump (1994)	8.8	Votes: 2,061,865 Gross: \$330.25M Top 250: #11
14. Il buono, il brutto, il cattivo (1966)	8.8	Votes: 758,514 Gross: \$6.10M Top 250: #10
15. The Matrix (1999)	8.7	Votes: 1,901,419 Gross: \$171.48M Top 250: #16
16. Goodfellas (1990)	8.7	Votes: 1,152,991 Gross: \$46.84M Top 250: #17
17. The Empire Strikes Back (1980)	8.7	Votes: 1,285,148 Gross: \$290.48M Top 250: #15
18. One Flew Over the Cuckoo's Nest (1975)	8.7	Votes: 1,003,732 Gross: \$112.00M Top 250: #18
19. Interstellar (2014)	8.6	Votes: 1,806,584 Gross: \$188.02M Top 250: #26
20. Cidade de Deus (2002)	8.6	Votes: 754,333 Gross: \$7.56M Top 250: #23
21. Sen to Chihiro no Kamikakushi (2001)	8.6	Votes: 757,872 Gross: \$10.06M Top 250: #31
22. Saving Private Ryan (1998)	8.6	Votes: 1,382,912 Gross: \$216.54M Top 250: #24
23. The Green Mile (1999)	8.6	Votes: 1,292,925 Gross: \$136.80M Top 250: #27
24. La vita è bella (1997)	8.6	Votes: 691,890 Gross: \$57.60M Top 250: #25
25. Se7en (1995)	8.6	Votes: 1,639,707 Gross: \$100.13M Top 250: #19
26. Terminator 2: Judgment Day (1991)	8.6	Votes: 1,093,497 Gross: \$204.84M Top 250: #29
27. The Silence of the Lambs (1991)	8.6	Votes: 1,423,534 Gross: \$130.74M Top 250: #22
28. Star Wars (1977)	8.6	Votes: 1,357,740 Gross: \$322.74M Top 250: #28

29. Seppuku (1962)	8.6	Votes: 57,173 Top 250: #44
30. Shichinin no samurai (1954)	8.6	Votes: 345,424 Gross: \$0.27M Top 250: #20
31. It's a Wonderful Life (1946)	8.6	Votes: 453,967 Top 250: #21
32. Gisaengchung (2019)	8.5	Votes: 790,334 Gross: \$53.37M Top 250: #34
33. Whiplash (2014)	8.5	Votes: 850,660 Gross: \$13.09M Top 250: #42
34. The Intouchables (2011)	8.5	Votes: 853,273 Gross: \$13.18M Top 250: #45
35. The Prestige (2006)	8.5	Votes: 1,325,508 Gross: \$53.09M Top 250: #41
36. The Departed (2006)	8.5	Votes: 1,317,722 Gross: \$132.38M Top 250: #39
37. The Pianist (2002)	8.5	Votes: 827,269 Gross: \$32.57M Top 250: #33
38. Gladiator (2000)	8.5	Votes: 1,491,227 Gross: \$187.71M Top 250: #37
39. American History X (1998)	8.5	Votes: 1,118,023 Gross: \$6.72M Top 250: #38
40. The Usual Suspects (1995)	8.5	Votes: 1,080,960 Gross: \$23.34M Top 250: #40
41. Léon (1994)	8.5	Votes: 1,154,684 Gross: \$19.50M Top 250: #35
42. The Lion King (1994)	8.5	Votes: 1,052,138 Gross: \$422.78M Top 250: #36
43. Nuovo Cinema Paradiso (1988)	8.5	Votes: 260,787 Gross: \$11.99M Top 250: #52
44. Hotaru no haka (1988)	8.5	Votes: 276,369 Top 250: #46
45. Back to the Future (1985)	8.5	Votes: 1,196,542 Gross: \$210.61M Top 250: #30
46. Apocalypse Now (1979)	8.5	Votes: 665,285 Gross: \$83.47M Top 250: #53
47. Alien (1979)	8.5	Votes: 878,308 Gross: \$78.90M Top 250: #50
48. Once Upon a Time in the West (1968)	8.5	Votes: 328,977 Gross: \$5.32M Top 250: #48
49. Psycho (1960)	8.5	Votes: 669,702 Gross: \$32.00M Top 250: #32
50. Rear Window (1954)	8.5	Votes: 490,714 Gross: \$36.76M Top 250: #49

Mini Project 02 - Specphone Phone Database

```
library(rvest)
library(tidyverse)
```

```
url <- read_html("https://specphone.com/Samsung-Galaxy-A04.html")
```

```
att <- url %>%
  html_nodes("div.topic") %>%
  html_text2()

value <- url %>%
  html_nodes("div.detail") %>%
  html_text2()
```

```
df <- data.frame(
  attribute = att,
  value = value
)

df
```

A data.frame: 31 × 2

attribute	value
<chr>	<chr>
วันเปิดตัว	ตุลาคม 2565
วันวางจำหน่าย	ยังไม่วางจำหน่าย
ขนาด	164.40 x 76.30 x 9.10 มม.
น้ำหนัก	192 กรัม
วัสดุ	Glass front, plastic back, plastic frame
SIM	รองรับ 2 ซิมการ์ด (nano sim, nano sim)
Technology	HSPA 42.2/5.76 Mbps, LTE-A
2G	850/900/1800/1900
3G	850/900/1900/2100
4G	850/900/1900/2100/2600
5G	-
ความเร็ว	HSPA 42.2/5.76 Mbps, LTE-A
ประเภท	PLS LCD
ขนาดหน้าจอ	6.50 นิ้ว
ความละเอียด	720 x 1600 pixels
ระบบปฏิบัติการ	Android 12
ชิปประมวลผล	Spreadtrum Unisoc SC9863A 1.6 GHz
ชิปกราฟิก	PowerVR GE8322
หน่วยความจำ	3 GB
ความจุ	32 GB
Memory Card	microSD (1)
กล้องหลัก	ตัวที่ 1: 50 MP, f/1.8, (wide), AF ตัวที่ 2: 2 MP, f/2.4, (depth)
ความละเอียดวิดีโอ	1080p@30fps
กล้องหน้า	ตัวที่ 1: 5 MP, f/2.2
Bluetooth	5.0, A2DP, LE
Wi-Fi	802.11 a/b/g/n/ac, dual-b
USB	Type-C
GPS	GLONASS, GALILEO, BDS
NFC	ไม่รองรับ
ความจุ	5,000 mAh
ประเภท	Non-removable Li-Po Batt

```
# All Samsung Smartphones
samsung_url <- read_html("https://specphone.com/brand/Samsung")
```

```
links <- samsung_url %>%
  html_nodes("li.mobile-brand-item a") %>%
  html_attr("href")
```

links

```

'/Samsung-Galaxy-M13.html' · '/Samsung-Galaxy-A23.html' · '/Samsung-Galaxy-A13.html' ·
'/Samsung-Galaxy-M32-5G.html' · '/Samsung-Galaxy-A12-Nacho.html' · '/Samsung-Galaxy-Pocket-Neo.html' ·
'/Samsung-Galaxy-Young.html' · '/Samsung-Galaxy-J1-Mini.html' · '/Samsung-Galaxy-A01-Core-1-16GB.html' ·
'/Samsung-Galaxy-V-PLUS.html' · '/Samsung-Galaxy-Young-2.html' · '/Samsung-Galaxy-M02.html' ·
'/Samsung-Galaxy-A11.html' · '/Samsung-Galaxy-J2-Pro-2018.html' · '/Samsung-Galaxy-A12-2021.html' ·
'/Samsung-Galaxy-A21s-3-32GB.html' · '/Samsung-Galaxy-J5.html' · '/Samsung-Galaxy-J4.html' ·
'/Samsung-Galaxy-Core-2-Duos.html' · '/Samsung-Galaxy-Ace-Plus.html' · '/Samsung-Galaxy-A20.html' ·
'/Samsung-Galaxy-Chat.html' · '/Samsung-Galaxy-Gio.html' · '/Samsung-Galaxy-Tab-A7-Lite-LTE.html' ·
'/Samsung-Galaxy-Tab-A-10.5WIFI.html' · '/Samsung-Galaxy-Alpha.html' · '/Samsung-Galaxy-S3-Slim.html' ·
'/Samsung-Galaxy-S4-zoom.html' · '/Samsung-Galaxy-Xcover-2.html' · '/Samsung-Galaxy-Tab-8.9-3G-16GB.html' ·
'/Samsung-Galaxy-Tab-A8-LTE-2021.html' · '/Samsung-Galaxy-A8-2018.html' ·
'/Samsung-Galaxy-Tab4-8.0-wifi.html' · '/Samsung-Galaxy-M33-5G.html' · '/Samsung-Galaxy-A50.html' ·
'/Samsung-Galaxy-E7.html' · '/Samsung-Galaxy-S6.html' · '/Samsung-Galaxy-S20-FE.html' ·
'/Samsung-Galaxy-Tab-S4-WIFI.html' · '/Samsung-Galaxy-S7.html' · '/Samsung-Galaxy-Note-5-Exynos.html' ·
'/Samsung-Galaxy-TabPRO-12.2-LTE.html' · '/Samsung-Galaxy-S4-Active.html' ·
'/Samsung-Galaxy-Tab-Active-3.html' · '/Samsung-Galaxy-Tab-S3-9.7.html' · '/Samsung-Galaxy-S6-edge.html' ·
'/Samsung-Galaxy-Note-4-Exynos.html' · '/Samsung-Galaxy-Round.html' ·
'/Samsung-Galaxy-Note-20-Ultra-5G.html' · '/Samsung-ATIV-Q.html' · '/Samsung-ATIV-Smart-PC-PRO.html' ·
'/Samsung-Galaxy-S22-Ultra12-128GB.html' · '/Samsung-Galaxy-Z-Flip-5G.html' · '/Samsung-Galaxy-Z-Flip.html' ·
'/Samsung-Galaxy-Tab-S8-Ultra-5G.html' · '/Samsung-Galaxy-S21-Ultra-16-512GB.html' ·
'/Samsung-Galaxy-S10-Plus-Ram-12GB.html' · '/Samsung-Galaxy-Z-Fold-3.html' · '/Samsung-Galaxy-Z-Fold4.html' ·
'/Samsung-Galaxy-Z-Fold-2-5G.html'
```

```
full_links <- paste0("https://specphone.com", links)
```

full_links

'https://specphone.com/Samsung-Galaxy-M13.html' · 'https://specphone.com/Samsung-Galaxy-A23.html' ·
'https://specphone.com/Samsung-Galaxy-A13.html' · 'https://specphone.com/Samsung-Galaxy-M32-5G.html' ·
'https://specphone.com/Samsung-Galaxy-A12-Nacho.html' ·
'https://specphone.com/Samsung-Galaxy-Pocket-Neo.html' ·
'https://specphone.com/Samsung-Galaxy-Young.html' · 'https://specphone.com/Samsung-Galaxy-J1-Mini.html' ·
'https://specphone.com/Samsung-Galaxy-A01-Core-1-16GB.html' ·
'https://specphone.com/Samsung-Galaxy-V-PLUS.html' · 'https://specphone.com/Samsung-Galaxy-Young-2.html' ·
'https://specphone.com/Samsung-Galaxy-M02.html' · 'https://specphone.com/Samsung-Galaxy-A11.html' ·
'https://specphone.com/Samsung-Galaxy-J2-Pro-2018.html' ·
'https://specphone.com/Samsung-Galaxy-A12-2021.html' ·
'https://specphone.com/Samsung-Galaxy-A21s-3-32GB.html' · 'https://specphone.com/Samsung-Galaxy-J5.html' ·
'https://specphone.com/Samsung-Galaxy-J4.html' · 'https://specphone.com/Samsung-Galaxy-Core-2-Duos.html' ·
'https://specphone.com/Samsung-Galaxy-Ace-Plus.html' · 'https://specphone.com/Samsung-Galaxy-A20.html' ·
'https://specphone.com/Samsung-Galaxy-Chat.html' · 'https://specphone.com/Samsung-Galaxy-Gio.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-A7-Lite-LTE.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-A-10.5WIFI.html' ·
'https://specphone.com/Samsung-Galaxy-Alpha.html' · 'https://specphone.com/Samsung-Galaxy-S3-Slim.html' ·
'https://specphone.com/Samsung-Galaxy-S4-zoom.html' ·
'https://specphone.com/Samsung-Galaxy-Xcover-2.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-8.9-3G-16GB.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-A8-LTE-2021.html' ·
'https://specphone.com/Samsung-Galaxy-A8-2018.html' ·
'https://specphone.com/Samsung-Galaxy-Tab4-8.0-wifi.html' ·
'https://specphone.com/Samsung-Galaxy-M33-5G.html' · 'https://specphone.com/Samsung-Galaxy-A50.html' ·
'https://specphone.com/Samsung-Galaxy-E7.html' · 'https://specphone.com/Samsung-Galaxy-S6.html' ·
'https://specphone.com/Samsung-Galaxy-S20-FE.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-S4-WIFI.html' · 'https://specphone.com/Samsung-Galaxy-S7.html' ·
'https://specphone.com/Samsung-Galaxy-Note-5-Exynos.html' ·
'https://specphone.com/Samsung-Galaxy-TabPRO-12.2-LTE.html' ·
'https://specphone.com/Samsung-Galaxy-S4-Active.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-Active-3.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-S3-9.7.html' ·
'https://specphone.com/Samsung-Galaxy-S6-edge.html' ·
'https://specphone.com/Samsung-Galaxy-Note-4-Exynos.html' ·
'https://specphone.com/Samsung-Galaxy-Round.html' ·
'https://specphone.com/Samsung-Galaxy-Note-20-Ultra-5G.html' · 'https://specphone.com/Samsung-ATIV-Q.html' ·
'https://specphone.com/Samsung-ATIV-Smart-PC-PRO.html' ·
'https://specphone.com/Samsung-Galaxy-S22-Ultra12-128GB.html' ·
'https://specphone.com/Samsung-Galaxy-Z-Flip-5G.html' · 'https://specphone.com/Samsung-Galaxy-Z-Flip.html' ·
'https://specphone.com/Samsung-Galaxy-Tab-S8-Ultra-5G.html' ·
'https://specphone.com/Samsung-Galaxy-S21-Ultra-16-512GB.html' ·
'https://specphone.com/Samsung-Galaxy-S10-Plus-Ram-12GB.html' ·
'https://specphone.com/Samsung-Galaxy-Z-Fold-3.html' · 'https://specphone.com/Samsung-Galaxy-Z-Fold4.html' ·
'https://specphone.com/Samsung-Galaxy-Z-Fold-2-5G.html'

```
result <- data.frame()

for (link in full_links){
  ss_topic <- link %>%
    read_html() %>%
    html_nodes("div.topic") %>%
    html_text2()

  ss_detail <- link %>%
    read_html() %>%
    html_nodes("div.detail") %>%
    html_text2()

  tmp <- data.frame(attribute = ss_topic,
                    value = ss_detail)

  result <- bind_rows(result, tmp)
  print("Progress . . . ")
}
```

```
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
[1] "Progress . . . "
```

result

A data.frame: 1934 × 2

attribute	value
<chr>	<chr>
วันเปิดตัว	มิถุนายน 2565
วันวางจำหน่าย	ยังไม่วางจำหน่าย
ขนาด	165.40 x 76.90 x 8.40 มม.
น้ำหนัก	192 กรัม
วัสดุ	Glass front, plastic back, plastic frame
SIM	รองรับ 2 ซิมการ์ด (nano sim, nano sim)
Technology	HSPA 42.2/5.76 Mbps, LTE-A
2G	850/900/1800/1900
3G	850/900/1900/2100
4G	850/900/1900/2100
5G	-
ความเร็ว	HSPA 42.2/5.76 Mbps, LTE-A
ประเภท	PLS LCD
ขนาดหน้าจอ	6.60 นิ้ว
ความละเอียด	1080 x 2408 pixels
ระบบปฏิบัติการ	Android 12
ชิปประมวลผล	Samsung Exynos 850 S5E3830 2 GHz
ชิปกราฟิก	Mali-G52 MP1
หน่วยความจำ	4 GB
ความจุ	64 GB
Memory Card	microSD (1)
กล้องหลัก	ตัวที่ 1: 50 MP, f/1.8, (wide), PDAF ตัวที่ 2: 5 MP, f/2.2, 123° (ultrawide) ตัวที่ 3: 2 MP, f/2.4, (depth)
ความละเอียดวิดีโอ	1080p@30fps
กล้องหน้า	ตัวที่ 1: 8 MP, f/2.2, (wide)
Bluetooth	5.0, A2DP, LE
Wi-Fi	802.11 a/b/g/n/ac, dual-b
USB	Type-C
GPS	A-GPS, GLONASS, GALILEO,
NFC	รองรับ
ความจุ	5,000 mAh
:	:
วัสดุ	glass,plastic,aluminum
SIM	รองรับ 2 ซิมการ์ด (nano sim, esim)
Technology	5G,EDGE,HSPA+,LTE cat 20 Enhanced 4X4 MIMO
2G	850/900/1800/1900

3G	850/900/1900/2100
4G	850/900/1900/2100/2600
5G	2100/2600/3500/4700
ความเร็ว	5G,EDGE,HSPA+,LTE cat 20 Enhanced 4X4 MIMO
ประเภท	Foldable Dynamic AMOLED
ขนาดหน้าจอ	7.60 นิ้ว
ความละเอียด	1768 x 2208 pixels
ฟีเจอร์เพิ่มเติม	สามารถแชร์อินเทอร์เน็ตให้อุปกรณ์อื่นได้ ใช้เป็น Diskdrive ได้เพื่อโอนหรือย้ายข้อมูลบน PC ได้ มาพร้อมอินเตอร์เฟซ One ui 2.5 และ Android 10 รองรับ Reverse wireless charging 4.5W หน้าจอรองรับ HDR10+ , 120Hz refresh rate รองรับ ANT+ จอด้านหลังขนาด 6.23" Super AMOLED ความละเอียด 816 x 2260 รองรับ Samsung DeX
ระบบปฏิบัติการ	Android 10
ชิปประมวลผล	Qualcomm Snapdragon 865+ SM8250-AB 3.1 GHz
ชิปกราฟิก	Adreno 650
หน่วยความจำ	12 GB
ความจุ	256 GB
Memory Card	Not Suppor
กล้องหลัก	ตัวที่ 1: 12 MP, f/1.8, 26mm (wide), 1/1.76 ตัวที่ 2: 12 MP, f/2.4, 52mm (telephoto), 1/3.6 ตัวที่ 3: 12 MP, f/2.2, 123°, 12mm (ultrawide), 1.12µm
ความละเอียดวิดีโอ	4K@60fps, 1080p@60/240fps (gyro-EIS), 720p@960fps (gyro-EIS), HDR10+
กล้องหน้า	ตัวที่ 1: 10 MP, f/2.2, 26mm (wide), 1.22µm
Bluetooth	5.0, A2DP, LE, aptX HD
Wi-Fi	802.11 a/b/g/n/ac/6 HE80
USB	3.1, Type-C 1.0 reversible connector
GPS	GPS ,A-GPS, GLONASS, BDS,
NFC	รองรับ
ความจุ	4,500 mAh

```
write_csv(result, "result_ss_phone.csv")
```