Creating Survival Plots Informative and Elegant with `survminer`

### Survival Curves

The function `coxph()` from the `survival` package may be used to test the proportional hazards assumption for a Cox regression model fit. The graphical verification of this assumption may be performed with the function `ggcoxph()` from the `survminer` package. For each covariate it produces plots with scaled Schoenfeld residuals against the time.

```r
library("survival")
fit <- coxph(Surv(time, status) ~ sex + age, data = lung)
ggcoxph(fit)
```

The function `ggcoxdiagnostics()` plots different types of residuals as a function of time, linear predictor or observation id. The type of residual is selected with `type` argument. Possible values are "martingale", "deviance", "score", "schoenfeld", "dfbeta", "ciह joyita"; and "scaledsch".

```r
library("survival")
library("survminer")
fit <- coxph(Surv(time, status) ~ sex + ph.ecog + age, data = lung)
ggcoxdiagnostics(fit, type = "deviance")
ggcoxdiagnostics(fit, type = "schoenfeld")
ggcoxdiagnostics(fit, type = "scaledsch")
```

Use the `fun` argument to set the transformation of the survival curve. E.g. "event" for cumulative events, "cumhaz" for the cumulative hazard function or "pct" for survival probability in percentage.

```r
library("survival")
fit <- survfit(Surv(time, status) ~ sex, data = lung)
cex = 1.5

ggplot(fit, data = lung) + geom_step(aes(colour = sex), size = 1) + coord_cartesian(xlim = c(0, max(fit$time))) + theme_classic()
```

### Diagnostics of Cox Model

#### Global Schoenfeld Test

- **p-value:** 0.2656
- **Significance:** Not significant

#### Hazard Ratio

- **Hazard ratio:** 1.600
- **Confidence interval:** (1.6 - 2.5)

### Summary of Cox Model

The function `ggforest()` from the `survminer` package creates a forest plot for a Cox regression model fit. Hazard ratio estimates along with confidence intervals and p-values are plotted for each variable.

```r
library("survminer")
library("survival")
lungSage <- ifelse(lungSage > 70, ">70", "<70")
fit <- coxph(Surv(time, status) ~ sex + ph.ecog + age, data = lung)

## Call:
## coxph(formula = Surv(time, status) ~ sex + ph.ecog + age, data = lung)
##
## ## na = 227, number of events = 164

ggforest(fit)
```