Lung Cancer Death Risk Predictor

Description

In both the absence and presence of screening, the R package calculates individual risks of lung cancer and lung cancer death based on covariates: age, education, sex, race, smoking intensity/duration/quit-years, Body Mass Index, family history of lung-cancer, and self-reported emphysema. In the presence of CT screening akin to the NLST (3 yearly screens, 5 years of follow-up), it uses the covariates to estimate risk of false-positive CT screen as well as the reduction in risk of lung cancer death and increase in risk of lung cancer screening.

Usage

lcrisk(x, y)

Arguments

x   A numeric matrix containing individuals’ covariates for the model. Covariates should be in the following column and format:
   - column 1 - current age (numeric);
   - column 2 - gender (1=Female, 0=Male);
   - column 3 - years smoked (numeric);
   - column 4 - years quit (numeric or NA);
   - column 5 - cigarettes per day (numeric);
   - column 6 - race (0=Non-hispanic white, 1=Non-hispanic Black/African American, 2=Hispanic, 3=Other Ethnicity);
   - column 7 - lung disease (1=COPD or Emphysema, 0=No COPD or Emphysema);
   - column 8 - number of parents with lung cancer (0,1,2);
   - column 9 - bmi;
   - column 10 - highest education level (1=<12 grade, 2=HS graduate, 3=post hs, no college, 4=associate degree/some college, 5=bachelors degree, 6=graduate school);

y   Number of years to calculate risks for (numeric, max of 10).

Value

A numeric matrix containing individuals' predictions:

- column 1 - An indicator variable for whether the individual is eligible for CT lung screening
according to US Preventive Services Task Force (USPSTF) recommendations.

- column 2 - Number of years predictions are for.

- column 3 - Among 1000 people in the US with this risk-factor profile, this is the number who will die from lung cancer if they do not attend screening.

- column 4 - In the NLST, those who underwent 3 rounds of annual CT screening had their risk reduced by 20 percent. Therefore, among those who would have died from lung cancer, this is the number who will not die from lung cancer death.

- column 5 - Among 1000 people in the US with this risk-factor profile, this is the number who will be diagnosed with lung cancer if they do not attend screening (LCRAT).

- column 6 - In the NLST, those who underwent CT screening had 12.4 percent more lung cancer diagnosed, all of which require treatment. Therefore, among 1000 people with this risk-factor profile, this is the number of extra lung cancer that would be diagnosed, if they undergo 3 yearly CT lung screens as in the NLST.

- column 7 - Out of 1000 NLST participants with this risk profile, this is the number who had at least one false-positive CT screen out of 3 screens.

**Warning**

VGAM is a required dependency of this package. VGAM may automatically be installed the first time this package is used.

**Model Objects in Package**

- LCDRAT - model for lung cancer death in absence of screening;
- LCRAT - model for lung cancer incidence in absence of screening;
- cox.death - model for deaths from causes other than lung cancer;
- polytmod - polytomous model for false positive CT lung screens.

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**References**


**Examples**

```r
age <- c(66, 58, 75, 72, 56)
```
bmi <- c(23,28,26,27,24)
cpd <- c(36,36,40,24,40)
emp <- c(0,1,1,0,1)
fam.lung.trend <- c(0,2,0,2,0)
female <- c(0,1,0,1,0)
smkyears <- c(43,37,45,42,29)
qtyears <- c(NA,NA,9,6,6)
race <- c(0,1,2,2,3)
edu6 <- c(3,5,4,5,5)
years <- 5

persons <- cbind(age,
                female,
                smkyears,
                qtyears,
                cpd,
                race,
                emp,
                fam.lung.trend,
                bmi,
                edu6)

persons_predictions <- lcrisk(persons,years)

persons_predictions