Mixed stands in Spain

Model

Mixed stands in Spain.
Individual tree growth model independent from distance for mixed stands in Spain.

Model description

- Species (the order of main and secondary species does not matter):

  Pinus halepensis x *P. nigra / P. pinaster / P. pinea / Quercus faginea / Q. ilex*
  Pinus nigra x *P. halepensis / P. pinaster / P. sylvestris / Q. faginea / Q. ilex*
  Pinus pinaster x *P. halepensis / P. nigra / P. pinea / P. sylvestris / Q. ilex / Q. pyrenaica / Q. suber*
  Pinus pinea x *P. halepensis / P. pinaster / Q. ilex / Q. suber*
  Pinus sylvestris x *Fagus sylvatica / P. nigra / P. pinaster / P. uncinata / Q. faginea / Q. ilex / Q. petraea / Q. pyrenaica*
  Pinus uncinata x *P. sylvestris*
  Fagus sylvatica x *P. sylvestris / Q. petraea / Q. pyrenaica / Q. robur*
  Quercus faginea x *P. halepensis / P. nigra / P. sylvestris / Q. ilex*
  Quercus ilex x *P. halepensis / P. nigra / P. pinaster / P. pinea / P. sylvestris / Q. faginea / Q. pyrenaica / Q. suber*
  Quercus petraea x *F. sylvatica / P. sylvestris*
  Quercus pyrenaica x *F. sylvatica / P. pinaster / P. sylvestris / Q. ilex / Q. robur*
  Quercus robur x *F. sylvatica / Q. pyrenaica*
  Quercus suber x *P. pinaster / P. pinea / Q. ilex*

- Species SFNI (Spanish Forest National Inventory) code: see documentation
- Geographical area: Spain

Model requirements and recommended use

- Initial inventory requirements: ID (species 1 and 2) and Martonne Aridity Index of the plot; specie, expan, dbh and h of the trees
- Geographical area: Spain, closer places and another places with similar characteristics (assuming differences)
- Stand type: mixed stands
- Execution recommended time: 5 years executions (growth equations developed by using that criteria)
- The model allows the modification of Martonne Aridity Index across time when values are available on the initial inventory

Bibliography

Complete SIMANFOR model recommended citation):

SIMANFOR (year). Individual tree growth model independent from distance for mixed stands in Spain.

Model components:

- **Survival equation**:
  Mortality of 2% aplied when SDImax > SDI (calculation by species)

- **Basal area growth equation**:
  de Prado DR, Riofrío J, Aldea J, Bravo F, de Aza CH (2022). Competition and climate influence in the basal area increment models for Mediterranean mixed forests. Forest Ecology and Management, 506, 119955. https://doi.org/10.1016/j.foreco.2021.119955

- **General calculations: bal, g, slenderness, normal circumference**:
  Standard equations

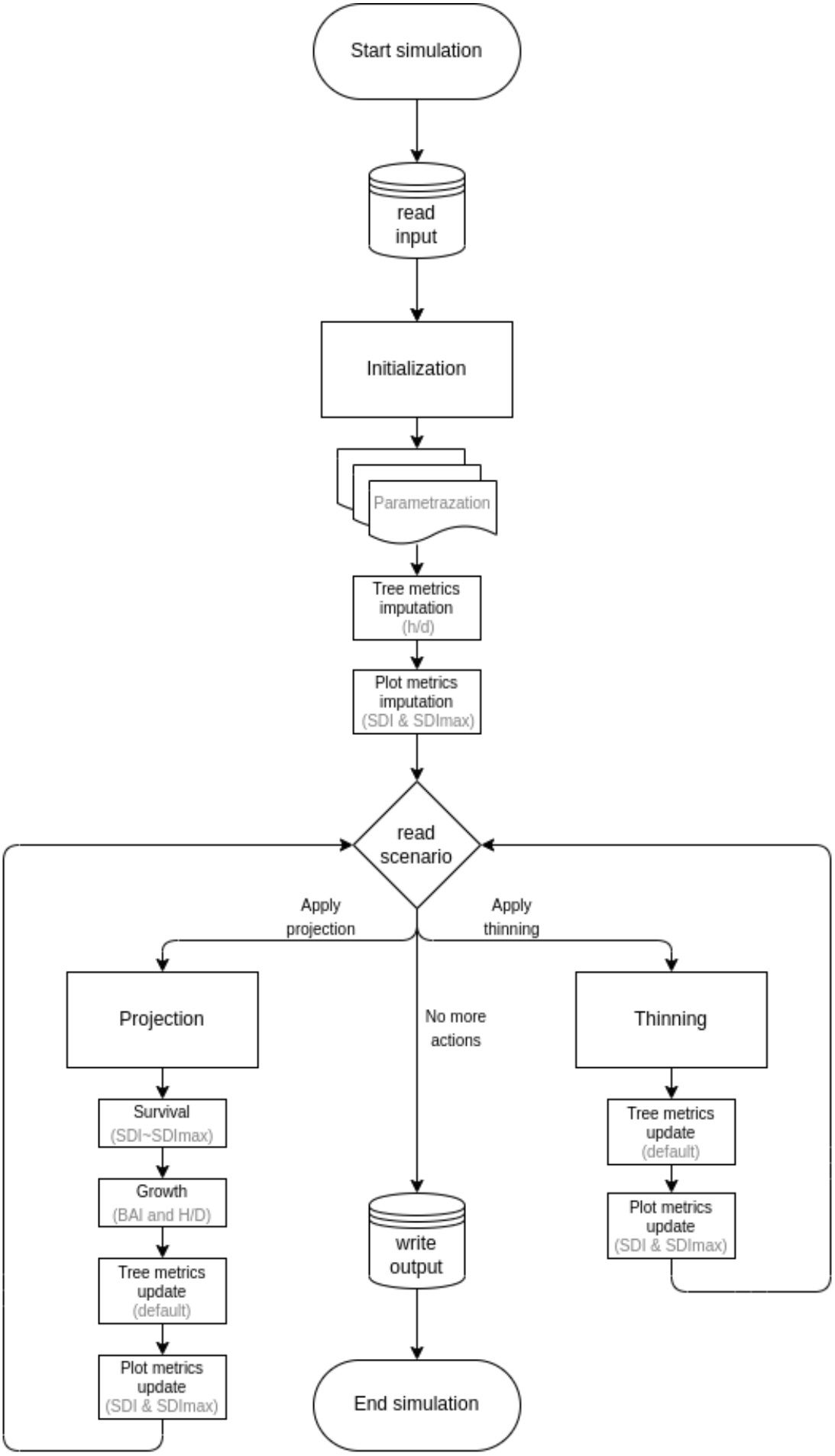
- **Generalized height-diameter equation**:
  de Prado RD, Riofrío J, Aldea J, McDermott J, Bravo F, de Aza CH (2022). Species Mixing Proportion and Aridity Influence in the Height–Diameter Relationship for Different Species Mixtures in Mediterranean Forests. Forests, 13(1), 119. https://doi.org/10.3390/f13010119

- **Taper equations over and under bark (volume)**:
  Badía M, Rodríguez F, Broto M (2001). Modelos del perfil del árbol. Aplicación al pino radiata (Pinus radiata D. Don). In Congresos Forestales
  Calama R, Montero G (2006). Stand and tree-level variability on stem form and tree volume in Pinus pinea L.: a multilevel random components approach. Forest Systems, 15(1), 24-41
  Lizarralde I (2008). Dinámica de rodales y competencia en las masas de pino silvestre (Pinus sylvestris L.) y pino negral (Pinus pinaster Ait.) de los Sistemas Central e Ibérico Meridional. Tesis Doctoral. 230 pp
  López-Sánchez C A (2009). Estado selvícola y modelos de crecimiento y gestión de plantaciones de Pseudotsuga menziesii (Mirb.) Franco en España (Doctoral dissertation, Doctoral thesis. Universidad de Santiago de Compostela, Lugo.
  Manrique-González, J., Bravo, F., del Peso, C., Herrero, C., Rodríguez, F., 2017. Ecuaciones de perfil para las especies de roble albar (Quercus petraea (Matt.) Liebl.) y rebollo (Quercus pyrenaica Willd) en la comarca de la "Castillería" en el Norte de la provincia de Palencia. 7º Congreso Forestal Español (póster). http://7cfe.congresoforestal.es/sites/default/files/comunicaciones/776.pdf

- **Biomass equations**:
  Castaño-Santamaría J, Bravo F (2012). Variation in carbon concentration and basic density along stems of sessile oak (Quercus petraea (Matt.) Liebl.) and Pyrenean oak (Quercus pyrenaica Willd.) in the Cantabrian Range (NW Spain). Annals of Forest Science 69, 663–672. https://doi.org/10.1007/s13595-012-0183-6
  Diéguez-Aranda U, Rojo A, Castedo-Dorado F, et al (2009). Herramientas selvícolas para la gestión forestal sostenible en Galicia. Forestry, 82, 1-16
  Herrero de Aza C, Turrión MB, Pando V, et al. (2011). Carbon in heartwood, sapwood and bark along the stem profile in three Mediterranean Pinus species. Annals of Forest Science 68, 1067. https://doi.org/10.1007/s13595-011-0122-y
  Ruiz-Peinado R, del Rio M, Montero G (2011). New models for estimating the carbon sink capacity of Spanish softwood species. Forest Systems, 20(1), 176-188. https://doi.org/10.1016/j.ecolmodel.2019.108870
  Ruiz-Peinado R, Montero G, del Río MD (2012). Biomass models to estimate carbon stocks for hardwood tree species. Forest Systems, 21, 42-52. https://doi.org/10.5424/fs/2112211-02193
  Telmo C, Lousada J, Moreira N (2010). Proximate analysis, backwards stepwise regression between gross calorific value, ultimate and chemical analysis of wood. Bioresource Technology, 101(11):3808-3815. https://doi.org/10.1016/j.biortech.2010.01.021

- **Technological wood uses information**:
  Rodríguez F (2009). Cuantificación de productos forestales en la planificación forestal: Análisis de casos con cubiFOR. In Congresos Forestales

- **Value for Reineke Index equation (plot)**:
  Standard
- **Reineke Index and Maximum Reineke Index by species (SDI and SDImax)**:
  de Prado, DR, San Martín R, Bravo F, de Aza CH (2020). Potential climatic influence on maximum stand carrying capacity for 15 Mediterranean coniferous and broadleaf species. Forest Ecology and Management, 460, 117824. https://doi.org/10.1016/j.foreco.2019.117824


Start simulation
read input
Initialization
Parametrazation
Tree metrics imputation (h/d)
Plot metrics imputation (SDI & SDImax)
read scenario
Apply projection
Apply thinning
No more actions
Projection
Survival (SDI~SDImax)
Growth (BAI and H/D)
Tree metrics update (default)
Plot metrics update (SDI & SDImax)
write output
Thinning
Tree metrics update (default)
Plot metrics update (SDI & SDImax)
End simulation

Contacts

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Related information

SIMANFOR - Support System for the Simulation of Sustainable Forest Management Alternatives. Website (`https://www.simanfor.es/`) **and GitHub repository** `https://github.com/simanfor`

iuFOR - University Institute for Sustainable Forest Management. Website: `http://sostenible.palencia.uva.es/` y `https://iufor.uva.es/`

ETSIIAA Palencia - Higher Technical School of Agricultural Engineering of Palencia. Website: `http://etsiiaa.uva.es/`

UVa - University of Valladolid. Website `https://www.uva.es`