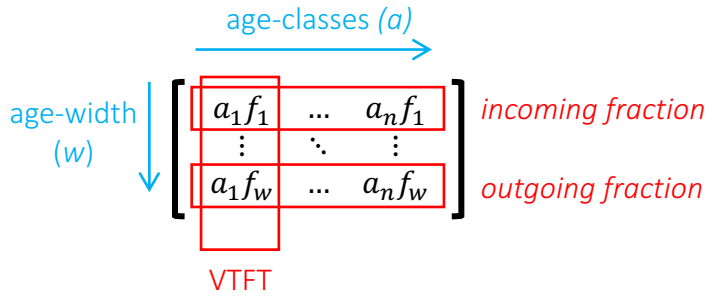
(a) Vector-Tracking of Fractional Transitions (VTFT)



$$f_{total} := \sum_{i=1}^{w} f_i$$

age-class state variables
on fractional area (m^{-2}) basis

$$a_x C_{soil}\, m^{-2} = a_x f_{total} * a_x C_{soil}$$

(b) VTFT Example #1 w/ 3 age-classes:
Single instance age-class creation

Time step 1

$$\begin{bmatrix} 0.25 & 0.00 & 0.75 \\ 0.00 & 0.00 & \\ 0.00 & 0.00 & \end{bmatrix}$$

oldest age-class 0.50 clear-cut
$a_3\ f_w$ *outgoing fraction* = 0.50
is the incoming fraction $a_1\ f_1$

Time step 2

$$\begin{bmatrix} 0.50 & 0.00 & 0.25 \\ 0.25 & 0.00 & \\ 0.00 & 0.00 & \end{bmatrix}$$

area-weighted average in a_1
of existing and incoming fractions

$$a_1 C_{soil} = (a_1 C_{soil} * a_1 f_{total}) + (a_3 C_{soil} * a_3 f_w)$$

, where $a_1 f_{total}$ *is the total fraction in* a_1 *at Time step 1*

(c) VTFT Example #2 w/ 3 age-classes:
Fractional age-class transition

Time step 1

$$\begin{bmatrix} 0.20 & 0.50 & 0.00 \\ 0.00 & 0.00 & \\ 0.30 & 0.00 & \end{bmatrix}$$

$a_1\ f_w$ *outgoing fraction* = 0.30
is the incoming fraction $a_2\ f_1$

Time step 2

$$\begin{bmatrix} 0.00 & 0.30 & 0.00 \\ 0.20 & 0.50 & \\ 0.00 & 0.00 & \end{bmatrix}$$

area-weighted average in a_2
of existing and incoming fractions

$$a_2 C_{soil} = (a_2 C_{soil} * a_2 f_{total}) + (a_1 C_{soil} * a_1 f_w)$$

, where $a_2 f_{total}$ *is the total fraction in* a_2 *at Time step 1*