Künstliche Intelligenz

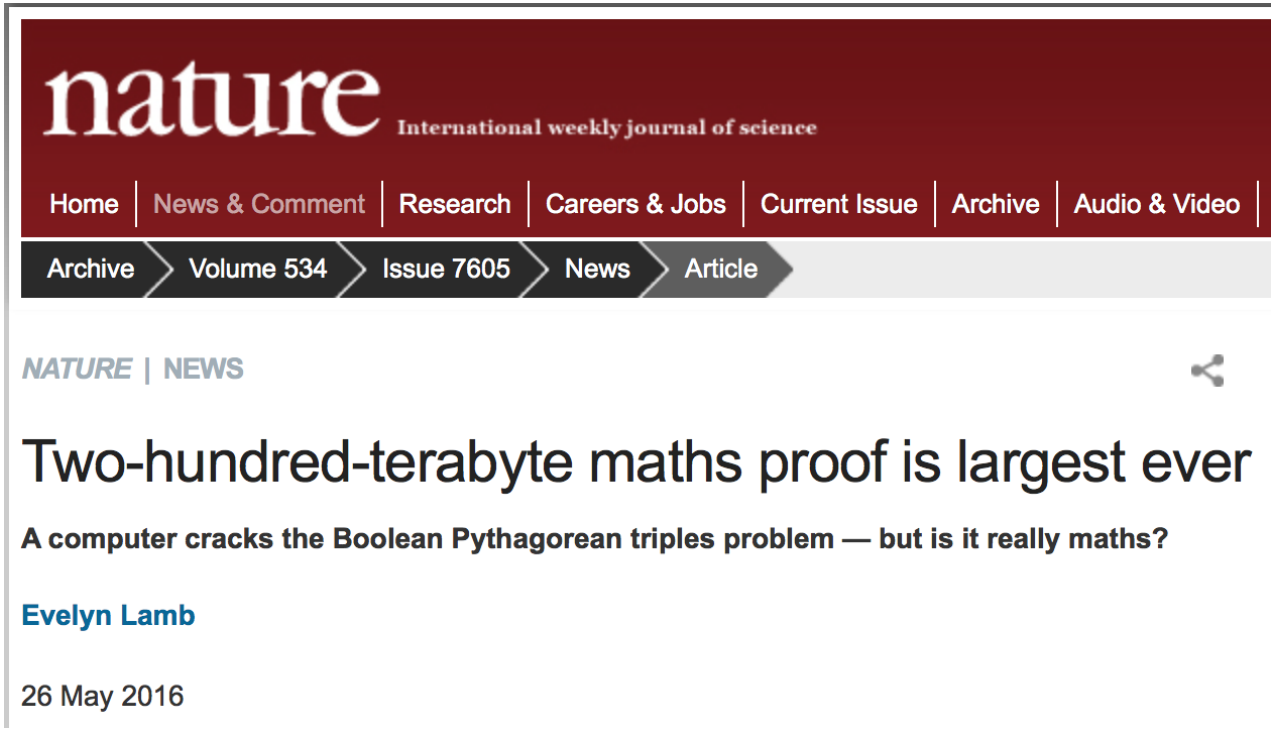
Prof. Dr. Christoph Benzmüller (& Prof. Dr. Christoph Schommer)
FU Berlin & U Luxembourg

Summer 2019

Topics addressed here:

- Knowledge Representation and Reasoning
- Propositional Logic and SAT Solving
- Davis-Putnam-Logemann-Loveland (DPLL) Algorithmus

Beispiel einer Erfolgsgeschichte



nature International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 10$

$$3^2 + 4^2 = 5^2$$

(wähle die Farbe der anderen Zahlen beliebig)

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 10$

$$3^2 + 4^2 = 5^2$$

(wähle die Farbe der anderen Zahlen beliebig)

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 10$

$$3^2 + 4^2 = 5^2$$

(wähle die Farbe der anderen Zahlen beliebig)

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 10$

$$3^2 + 4^2 = 5^2$$

Verboten: nur eine Farbe!

Beispiel einer Erfolgsgeschichte

nature International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 20$

$$3^2 + 4^2 = 5^2$$
$$5^2 + 12^2 = 13^2$$
$$8^2 + 15^2 = 17^2$$

(wähle die Farbe der anderen Zahlen beliebig)

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 30$

$$3^2 + 4^2 = 5^2$$
$$5^2 + 12^2 = 13^2$$
$$8^2 + 15^2 = 17^2$$
$$7^2 + 24^2 = 25^2$$

(choose color of the other numbers arbitrarily)

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 40$

$$3^2 + 4^2 = 5^2$$

$$5^2 + \boxed{12}^2 = 13^2$$

$$8^2 + 15^2 = 17^2$$

$$7^2 + 24^2 = 25^2$$

$$20^2 + 21^2 = 29^2$$

$$\boxed{12}^2 + 35^2 = 37^2$$

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 40$

$$3^2 + 4^2 = 5^2$$
$$5^2 + 12^2 = 13^2$$
$$8^2 + 15^2 = 17^2$$
$$7^2 + 24^2 = 25^2$$
$$20^2 + 21^2 = 29^2$$
$$12^2 + 35^2 = 37^2$$

(wähle die Farbe der anderen Zahlen beliebig)

Beispiel einer Erfolgsgeschichte

nature
International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

Kann die Menge $N = \{1, 2, \ldots, n\}$ in zwei Untermengen zerlegt werden, so dass keine Untermenge ein pythagoräisches Triple $(\mathbf{a}, \mathbf{b}, \mathbf{c})$ enthält mit $\mathbf{a}^2 + \mathbf{b}^2 = \mathbf{c}^2$?

$n = 40$

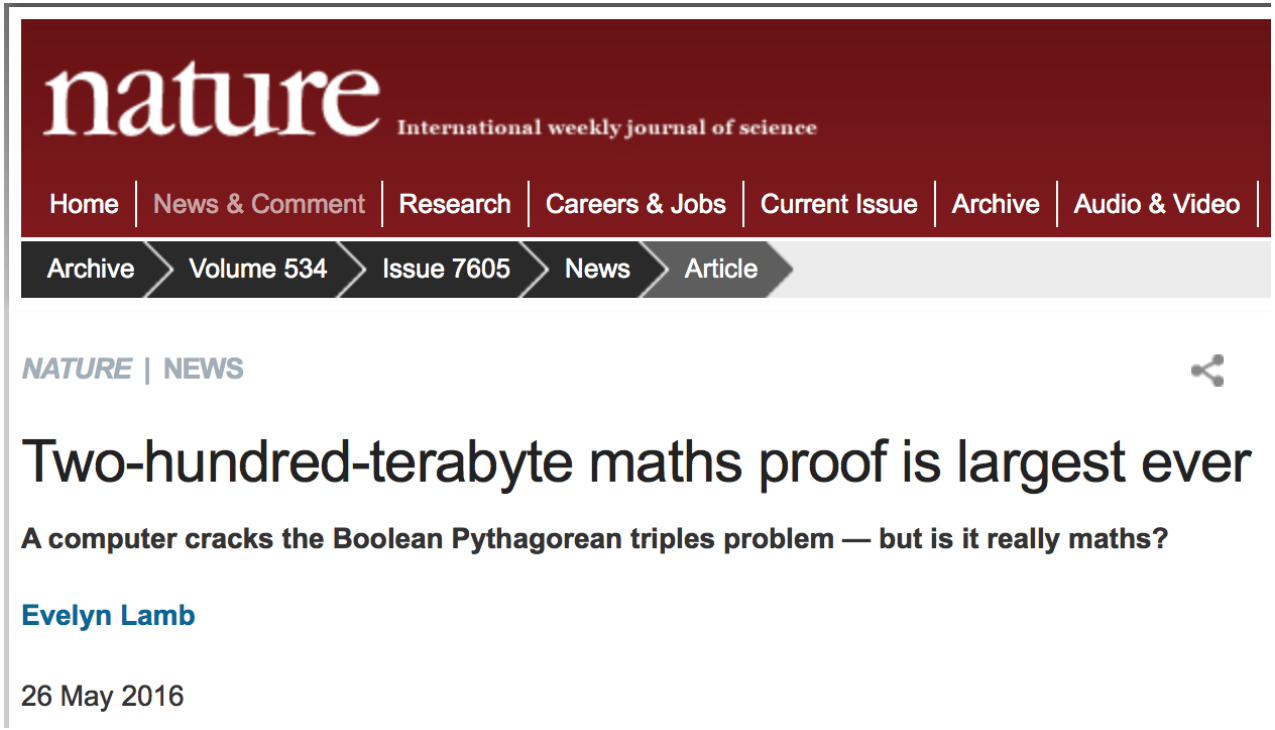
$$3^2 + 4^2 = 5^2$$
$$5^2 + 12^2 = 13^2$$
$$8^2 + 15^2 = 17^2$$
$$7^2 + 24^2 = 25^2$$
$$20^2 + 21^2 = 29^2$$
$$12^2 + 35^2 = 37^2$$

(wähle die Farbe der anderen Zahlen beliebig)

Shown by SAT-Solver:

For $n \geq 7825$ consistent bi-coloring becomes impossible.

Beispiel einer Erfolgsgeschichte



nature International weekly journal of science

Home | News & Comment | Research | Careers & Jobs | Current Issue | Archive | Audio & Video

Archive > Volume 534 > Issue 7605 > News > Article

NATURE | NEWS

Two-hundred-terabyte maths proof is largest ever

A computer cracks the Boolean Pythagorean triples problem — but is it really maths?

Evelyn Lamb

26 May 2016

Beitrag von

M. Heule
O. Kullmann
V. Marek

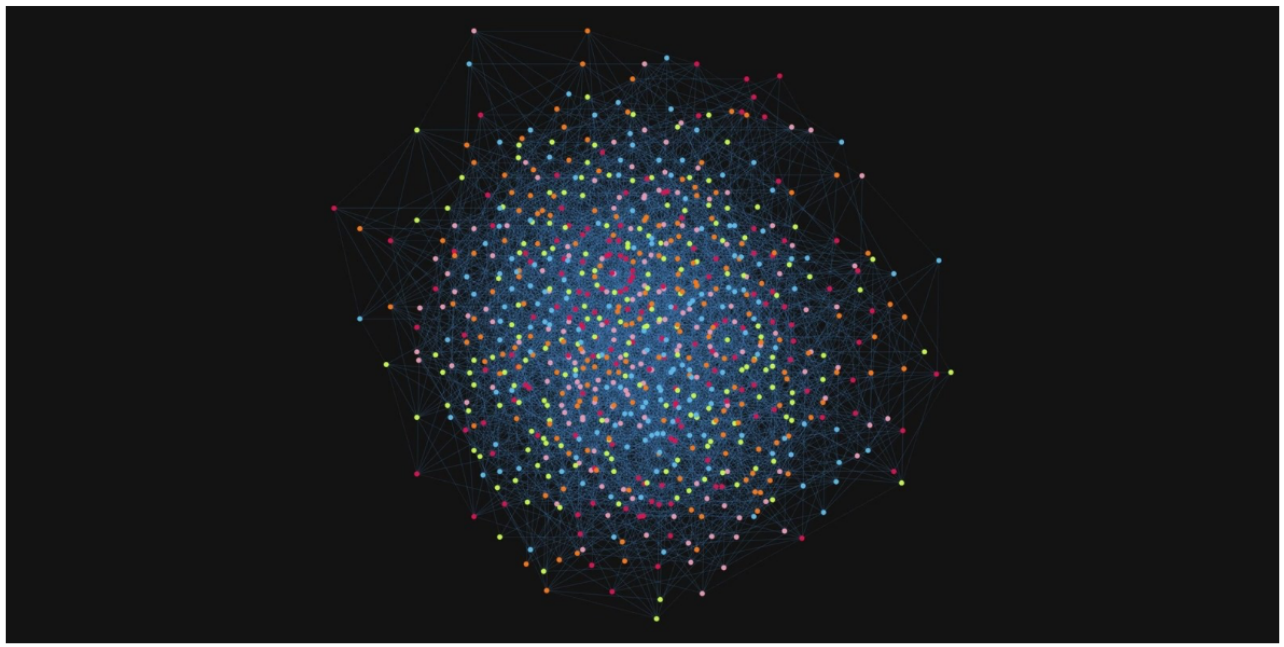
The Science of Brute Force, M.J.H. Heule, O. Kullmann, Communications of the ACM, Vol. 60 No. 8, Pages 70-79, 2017, DOI:10.1145/3107239

https://cacm.acm.org/magazines/2017/8/219606-the-science-of-brute-force/fulltext

Latest Results from just a Week Ago

EVELYN LAMB SCIENCE 04.30.18 09:00 AM

AN ANTI-AGING PUNDIT SOLVES A DECADES-OLD MATH PROBLEM



This 826-vertex graph requires at least five colors to ensure that no two connected vertices are the same shade. (Click here for a high-resolution version.)

OLENA SHMAHALO/QUANTA MAGAZINE; SOURCE: MARIJN HEULE

DPLL — Motivation, Grundlage, Notation

Übergeordnetes Thema: Erfüllbarkeitsproblem (SAT) der Aussagenlogik

- **P vs. NP** (1 Million Dollar Frage, Clay Mathematics Institute)
- **SAT** ist **NP-vollständig**
- **SAT-Solver** trotzdem sehr erfolgreich in der Praxis

Fokus der Vorlesung: DPLL-Algorithmus

- Intelligente Tiefensuche (Backtracking)
- Literatur
  - Martin Davis, Hilary Putnam. **A Computing Procedure for Quantification Theory.** J.ACM 7(3): 201-215 (1960)
  - Martin Davis, George Logemann, Donald W. Loveland. **A Machine Program for Theorem Proving.** Commun. ACM 5(7):394-397 (1962)
  - ...
  - Robert Nieuwenhuis, Albert Oliveras, Cesare Tinelli. **Solving SAT and SAT Modulo Theories: From an abstract Davis-Putnam-Logemann-Loveland procedure to DPLL(T).** J. ACM 53(6): 937-977 (2006)
  - ...

DPLL — Motivation, Grundlage, Notation

Übergeordnetes Thema: Erfüllbarkeitsproblem (SAT) der Aussagenlogik

- **P vs. NP** (1 Million Dollar Frage, Clay Mathematics Institute)
- **SAT** ist **NP-vollständig**
- **SAT-Solver** trotzdem sehr erfolgreich in der Praxis

Fokus der Vorlesung: DPLL-Algorithmus

- Intelligente Tiefensuche (Backtracking)
- Literatur
  - Martin Davis, Hilary Putnam. **A Computing Procedure for Quantification Theory.** J.ACM 7(3): 201-215 (1960)
  - Martin Davis, George Logemann, Donald W. Loveland. **A Machine Program for Theorem Proving.** Commun. ACM 5(7):394-397 (1962)
  - ...
  - Robert Nieuwenhuis, Albert Oliveras, Cesare Tinelli. **Solving SAT and SAT Modulo Theories: From an abstract Davis-Putnam-Logemann-Loveland procedure to DPLL(T).** J. ACM 53(6): 937-977 (2006)
  - ...

DPLL — Motivation, Grundlage, Notation

. . . zuvor in Vorlesung eingeführt . . .

Syntax Aussagenlogik

$$s, t ::= \top \mid \bot \mid A \mid \neg s \mid s \vee t \mid s \wedge t \mid s \rightarrow t \mid s \leftrightarrow t$$

Semantik Aussagenlogik: Abbildung nach T(rue) oder F(alse)

s	t	$\top$	$\bot$	$\neg s$	$s \vee t$	$s \wedge t$	$s \rightarrow t$	$s \leftrightarrow t$
T	T	T	F	F	T	T	T	T
T	F	T	F	F	T	F	F	F
F	T	T	F	T	T	F	T	F
F	F	T	F	T	F	F	T	T

Klauselnormalform bzw. Konjunktive Normalform (CNF)

Beispielformel: $(A \wedge \neg B) \leftrightarrow (A \vee B)$

Beispielformel in CNF: $(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$

Syntax Aussagenlogik

$$s, t ::= \top \mid \bot \mid A \mid \neg s \mid s \vee t \mid s \wedge t \mid s \rightarrow t \mid s \leftrightarrow t$$

Semantik Aussagenlogik: Abbildung nach T(rue) oder F(alse)

s	t	$\top$	$\bot$	$\neg s$	$s \vee t$	$s \wedge t$	$s \rightarrow t$	$s \leftrightarrow t$
T	T	T	F	F	T	T	T	T
T	F	T	F	F	T	F	F	F
F	T	T	F	T	T	F	T	F
F	F	T	F	T	F	F	T	T

Klauselnormalform bzw. Konjunktive Normalform (CNF)

Beispielformel: $(A \wedge \neg B) \leftrightarrow (A \vee B)$

Beispielformel in CNF: $(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$

Syntax Aussagenlogik

$$s, t ::= \top \mid \bot \mid A \mid \neg s \mid s \vee t \mid s \wedge t \mid s \rightarrow t \mid s \leftrightarrow t$$

Semantik Aussagenlogik: Abbildung nach T(rue) oder F(alse)

s	t	$\top$	$\bot$	$\neg s$	$s \vee t$	$s \wedge t$	$s \rightarrow t$	$s \leftrightarrow t$
T	T	T	F	F	T	T	T	T
T	F	T	F	F	T	F	F	F
F	T	T	F	T	T	F	T	F
F	F	T	F	T	F	F	T	T

Klauselnormalform bzw. Konjunktive Normalform (CNF)

Beispielformel: $(A \wedge \neg B) \leftrightarrow (A \vee B)$

Beispielformel in CNF: $(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$

Syntax Aussagenlogik

$$s, t ::= \top \mid \bot \mid A \mid \neg s \mid s \vee t \mid s \wedge t \mid s \rightarrow t \mid s \leftrightarrow t$$

Semantik Aussagenlogik: Abbildung nach T(rue) oder F(alse)

s	t	$\top$	$\bot$	$\neg s$	$s \vee t$	$s \wedge t$	$s \rightarrow t$	$s \leftrightarrow t$
T	T	T	F	F	T	T	T	T
T	F	T	F	F	T	F	F	F
F	T	T	F	T	T	F	T	F
F	F	T	F	T	F	F	T	T

Klauselnormalform bzw. Konjunktive Normalform (CNF)

Beispielformel: $(A \wedge \neg B) \leftrightarrow (A \vee B)$

Beispielformel in CNF: $(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$

DPLL — Motivation, Grundlage, Notation

. . . zuvor in Vorlesung eingeführt . . .

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF	$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$
Notation für Klauseln	$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$
Notation für Klausel-Listen	$A\bar{B}, \bar{A}\bar{B}, \bar{B}$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

$[A\bar{B}]$ repräsentiert die **Belegung** $\{A \longrightarrow \mathsf{T}, B \longrightarrow \mathsf{F}\}$

$[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$

$[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s

$[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF	$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$
Notation für Klauseln	$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$
Notation für Klausel-Listen	$A\bar{B}, \bar{A}\bar{B}, \bar{B}$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

$[A\bar{B}]$ repräsentiert die **Belegung** $\{A \longrightarrow \mathsf{T}, B \longrightarrow \mathsf{F}\}$

$[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$

$[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s

$[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF	$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$
Notation für Klauseln	$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$
Notation für Klausel-Listen	$A\bar{B}, \bar{A}\bar{B}, \bar{B}$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

$[A\bar{B}]$ repräsentiert die **Belegung** $\{A \longrightarrow \mathsf{T}, B \longrightarrow \mathsf{F}\}$

$[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$

$[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s

$[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF	$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$
Notation für Klauseln	$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$
Notation für Klausel-Listen	$A\bar{B}, \bar{A}\bar{B}, \bar{B}$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

$[A\bar{B}]$ repräsentiert die **Belegung** $\{A \longrightarrow \mathsf{T}, B \longrightarrow \mathsf{F}\}$

$[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$

$[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s

$[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF	$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$
Notation für Klauseln	$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$
Notation für Klausel-Listen	$A\bar{B}, \bar{A}\bar{B}, \bar{B}$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

$[A\bar{B}]$ repräsentiert die **Belegung** $\{A \longrightarrow \mathsf{T}, B \longrightarrow \mathsf{F}\}$

$[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$

$[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s

$[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

Notation: Konjunktion von Klausel, Klauseln, Literale

CNF	$(A \vee \neg B) \wedge (\neg A \vee \neg B) \wedge \neg B$
Notation für Klauseln	$A\bar{B} \wedge \bar{A}\bar{B} \wedge \bar{B}$
Notation für Klausel-Listen	$A\bar{B}, \bar{A}\bar{B}, \bar{B}$

Annahme (für Rest der Vorlesung)

Darstellung von Klauseln und Klausel-Listen: **Kommutativ und Assoziativ**

Belegungen $[\psi]$ am Beispiel:

$[A\bar{B}]$ repräsentiert die **Belegung** $\{A \longrightarrow \mathsf{T}, B \longrightarrow \mathsf{F}\}$

$[\bar{B}]$ ist eine **partielle Belegung** für $A\bar{B}, \bar{A}\bar{B}, \bar{B}$

$[\psi] \models s$ ist **Notation** für: Belegung $[\psi]$ erfüllt Formel s

$[\psi]$ wird dann auch als **Modell für** s bezeichnet

Regelsysteme/Transitionssysteme

Grundkenntnisse werden vorausgesetzt

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabeformel	(CNF & Initialisierung)
[]	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Schritt 1)
	...	(Schritt 2)
	...	
	...	(Schritt n)
$[\bar{B}C]$	$A\bar{B}C, \bar{B}, C\bar{D}, BCD$	(Solved)

Kriterium für "Solved"?

$[\bar{B}C]$ $\underbrace{A\bar{B}C}_{\checkmark}, \underbrace{\bar{B}}_{\checkmark}, \underbrace{C\bar{D}}_{\checkmark}, \underbrace{BCD}_{\checkmark}$ —alle Klauseln sind erfüllt—

(es gilt dann: $[\bar{B}C] \models$ Eingabeformel)

Solved-Regel

$[\psi]$ ϕ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
[]	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \cancel{\bar{D}}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
[]	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
[]	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
[]	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Unit-Propagation-Regel:

$[\psi]$ $\quad \phi, \varphi L$ $\quad$ (Unit-Propagation)

Bedingung:

$\downarrow$ $\quad [\psi] \models \neg\varphi$

$L \notin [\psi]$

$[\psi L]$ $\quad \phi, \varphi L$ $\quad$ **Verarbeite neue Belegungsinformation**

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Pure-Literal-Regel

$[\psi]$ $\quad \phi, \varphi L$ $\quad$ (Pure-Literal)

Bedingung:

$\downarrow$

L nur mit einheitlicher Polarität in $\phi, \varphi L$

L undefiniert in $[\psi]$

$[\psi L]$ $\quad \phi, \varphi L$ $\quad$ **Verarbeite neue Belegungsinformation**

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Split-Regel:

$[\psi]$ $\quad \phi$ $\quad$ (Split)

Bedingung:

$\downarrow$ $\quad$ L und $\bar{L}$ kommen in ϕ vor

L undefiniert in $[\psi]$

$[\psi L_b]$ $\quad \phi$ $\quad$ **Verarbeite neue Belegungsinformation**

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
~~$[\bar{B}\bar{D}C_bF_b]$~~	~~$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$~~	~~(Unit-Propagation)~~
~~$[\bar{B}\bar{D}C_bF_bG]$~~	~~$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F\bar{G}}$~~	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Backtrack Rule:

$[\psi L_b \psi']$ ϕ, φ (Backtrack)

Bedingung:

$\downarrow$

$[\psi L_b \psi'] \models \neg\varphi$

ψ' enhält keine mit “b” markierten Literale

$[\psi \bar{L}]$ ϕ, φ **Verarbeite neue Belegungsinformation**

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Solved-Regel

$[\psi] \quad \phi \qquad$ (Solved)

Bedingung: $[\psi] \models \phi$

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}}\cancel{F}G, \bar{D}E, \cancel{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{F}\cancel{G}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}\cancel{F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Fail-Regel:

$[\psi] \quad \phi, \varphi$ (Split)

Bedingung:

$\downarrow$

$[\psi] \models \neg\varphi$

ψ enhält keine Backtrack-Literale

$[]$ **Fail**

DPLL-Algorithmus — Entwicklung am Beispiel

	Eingabe-Formel	(CNF & Initialisierung)
$[]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Pure-Literal)
$[\bar{B}\bar{D}]$	$A\bar{B}, \bar{B}, \cancel{B}CF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}}FG, \cancel{\bar{C}}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Split)
$[\bar{B}\bar{D}C_bF_b]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \cancel{\bar{C}\bar{F}}G, \bar{D}E, \cancel{\bar{F}}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_bF_bG]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \cancel{\bar{F}\bar{G}}$	(Backtrack)
$[\bar{B}\bar{D}C_b\bar{F}]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \cancel{\bar{C}F}G, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Unit-Propagation)
$[\bar{B}\bar{D}C_b\bar{F}G]$	$A\bar{B}, \bar{B}, BCF, C\bar{G}F, \bar{C}FG, \bar{C}\bar{F}G, \bar{D}E, \bar{F}\bar{G}$	(Solved)

Abstrakter DPLL Algorithmus (Regelbasierte Darstellung)

Wende die Regeln erschöpfend an mit folgender Priorität:

1. Solved
2. Fail
3. Backtrack
4. Unit-Propagation
5. Pure-Literal
6. Split

DPLL Algorithmus am Beispiel — Kurzes Beispiel, alle Regeln

[]	an , ãn , ãñ , bn	(Pure Literal)
[b]	an , ãn , ãñ , bn	(Split)
~~[b**a**]~~	~~an , ãn , ãñ , bn~~	~~(Unit Propagation)~~
~~[b**a**n]~~	~~an , ãn , ãñ , bn~~	~~(Widerspruch: n&ñ, Backtracking)~~
[b**ã**]	an , ãn , ãñ , bn	(Unit Propagation)
[b**ã**n]	an , ãn , ãñ , bn	(Solved)

Möglichkeiten zur weiteren Verbesserung bzw. Optimierung

- Heuristiken für Split: z.B. wähle das am häufigsten vorkommende Literal
  (Vorheriges Beispiel: wähle F zuerst – diese Wahl verhindert Backtracking und generiert eine alternative Belegung (Übungsaufgabe))
- Nicht-chronologisches Backtracking
- Klausel-Lernen beim Backtracking
- Effiziente Datenstrukturen
- Indexing-Techniken, Watchlist
- . . .

Korrektheit und Vollständigkeit: für abstraktes System in Vorlesung

Systeme (z.B. zChaff, MiniSat, PicoSat, Limmat, Lingeling)

Anwendungsbeispiele

Satisfiability modulo Theories